Title:

Development Strategies For Small Island States: The Role Of Tourism

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By

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To my parents
Fikret and Adalet
and to my wife
Saskia
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Abstract


We modified Witt and Martin’s (1987) econometric model and applied on tourism demand analysis for six destination countries (Malta, the Isle of Man, North Cyprus, Turkey, Austria and the UK). The number of tourist arrivals in per capita form are estimated in this thesis. The explanatory variables such as, income, cost of living, exchange rates, air fares and surface travel costs are included in a model for estimation. We also included dummies, trend and habit persistence variables in our estimation analysis.

We used cointegration analysis to see the long-run economic relationship on the number of tourist arrivals.

Forecasting tourism demand has also been studied in this thesis and we used RMSE to decide the best forecasting method for 5, 2 and 1 year ahead forecast horizon. HW was found the best forecast method and Econometric forecast did not perform well due to several reasons.

Finally, the aims and hypothesis are explained and related policy implications are developed.
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Preface

Development Strategies for small island states and the role of tourism are areas of enhancing academic interest and curiosity. There has been quite sufficient research conducted in the area of tourism demand especially during the last decade. Since most of the empirical research is based on annual estimation, we aimed at using quarterly data to estimate tourism demand. We included Malta, the Isle of Man, North Cyprus, Austria, Turkey and the UK in our estimation model and tried to select randomly different origin countries visiting the above named destination countries. When we selected them randomly, we were careful about the countries' geographical importance, economic importance, the distance and the total number of visits undertaken during the period 1976-1995. In this thesis, we used the number of visits data on quarterly basis and consequently made a contribution to this neglected area.

One of the main difficulties encountered was the lack of quarterly income per capita data. Some countries do not publish quarterly GDP/GNP. Therefore, interpolation methods were implemented on the annual GNP/GDP data. Most of the tourist data covering the period 1976-1995 were obtained from the National Tourist Board of the related countries. The other data series i.e. consumer price index and exchange rates were collected from International Financial Statistics published by the International Monetary Fund. Quarterly population statistics were obtained from the UN Vital Population Statistics. The airfares were obtained from ABC World Airways Guide and diesel petrol prices were collected from OPEC Quarterly Energy Price Statistics. We also obtained the distances from origin country capital to a destination country capital (or important city which has tourist airports) were obtained from Europe and World Atlas. We processed most of the data in micro TSP-7 and EVIEWS-2 software packages. All test results and data series are stored in the Annex which is included in this thesis as a separate volume.
INTRODUCTION

This thesis consists of nine chapters. We decided to keep the introduction separate from the theoretical chapters. We can divide those chapters into three parts. The first four chapters are related to literature review and give a broad picture of different paradigms on the structural development of geography and trade, and the importance of tourism. They are mainly descriptive chapters. The three following chapters on the other hand, are prescriptive. They try to give a theoretical background on regression analysis, cointegration and forecasting. The theory of demand will be explained and an empirical model is going to be identified. Cointegration and forecasting results in chapter 7 will be based on the same model and we will try to find out consistency among them. We will conclude this thesis with chapter 8. We will also have brief conclusions at the end of each chapter.

In chapter 1 we are aiming to describe the meaning of smallness. Since we are interested in small island economies, we will look at the economic importance and the development strategies of the small island states. The new paradigm by Porter (1990) which has been in use for more than a decade seems very appropriate for the descriptive part of this thesis. Porter’s (1990) National Diamond, and Four Stages of National Competitive Development in his theory are based on the new management philosophy that many small countries may achieve competitiveness in trade through technology and know how. Therefore, this is a very good key for us to identify the national diamond for North Cyprus and to see whether tourism is really the pioneer of the economy. We will have a very brief conclusion at the end of chapter 1 which will express the summary of discussions.

Chapter 2 will give us a brief understanding of Location and Trade theory. Krugman’s (1991) Geography and Trade theory is going to be explained in this chapter within the Localisation and Labour Pooling framework. Krugman analysed the international trade specialisation from the economic geography perspectives which we are going to put forward localisation theory by identifying the advantages
of being a region or a nation. Core and periphery in the geographical location are so important that we targeted them to describe the importance of the concepts and we discuss them in more detail from different dimensions within this chapter. During our literature review, we came across many comments on this issue and therefore we decided to emphasise them in this chapter.

Chapter 3 largely deals with a critique on Porter’s (1990) and Krugman’s (1991) new paradigms. The main criticism will be based on classical economists and the alternative approach to economic geography. The importance of multinationals in a newly developing tourist resort will be explained in this chapter. The ownership advantages are explained and this chapter will also be focused on the internalisation advantage. The mergers in airlines and hotel chains associated with airlines are the other important topics which will be followed towards the conclusion. In the brief conclusion of chapter 3, we aim to point out Porter’s (1995) new paradigm on the competitive advantage of the inner cities in which he stresses the green environment and the importance of location and business development.

Chapter 4, “The Tourism Phenomena”, provides a survey of the literature on tourism concepts. Whereas the introductory part categorises the definition of tourism and tourists, greater emphasis will be placed on Butler’s (1980) Tourist Area Life Cycle. We are aiming to implement Butler’s (1980) Life Cycle model on the Isle of Man which is currently facing the stagnation stage of the cycle and try to develop some rejuvenation strategies. We will also apply the same model to North Cyprus and we will analyse how North Cyprus can move from the development to the consolidation stage. Tourism Master Plan will be developed in the context of the development of North Cyprus’ tourism and the necessary steps for policy and standards of development are going to follow the short conclusion.

Chapter 5 provides a survey of the literature on the tourism demand functions which aims to give the detail explanations of the theory of demand in tourism. We will also explain the methodology used and the model implemented. We will modify Witt and Martin’s (1987) International Tourism Demand Model and identify the
specifications of the model within the same chapter. The number of tourist arrivals per capita from the origin country to the destination country is the dependent variable of the model. The explanatory variables will include income per capita, cost of living, exchange rates, air fares and surface travel costs. However, we will specify population, price, substitution prices and promotional expenditures in this chapter, but they will not be included in the estimation of the model during the empirical study. Instead, their proxies will be replaced and additional dummies, trend and lagged dependent variables will be included in the estimation model. The sources of data and the simple description of estimating the demand function will conclude the chapter.

Cointegration analysis is the main topic for chapter 6. Since cointegration (Engle-Granger method and Johansen method) became very popular during the last decade, we decided to use Johansen’s (1991) cointegration analysis in our thesis. From our survey we will include the theoretical background of the cointegration analysis in the beginning of this chapter. The methodology will follow the theoretical background and stationarity (Augmented Dickey Fuller (ADF) test) in the time series are going to be discussed afterwards. The theory of integration is necessary before we make cointegration, therefore, a brief theoretical explanations are going to be forwarded. Error correction mechanism and testing for cointegration will follow the methods about modelling cointegrated series. There are three methods (Engle-Granger two-step, Engle-Yoo three-step, and Johansen Maximum Likelihood Estimation Method (Vector Autoregressive Method (VAR)) in the literature that are widely in use, therefore, we decided to explain them briefly in chapter six. However, we will only use the Johansen Maximum Likelihood Estimation Method (Vector Autoregressive Model) in our empirical study. Chapter 6 will also follow, the brief explanation of several forecasting accuracy techniques. A brief conclusion will complete chapter six.

Forecasting tourism demand gained popularity by many researchers and practitioners during the last two decades. We decided to use the forecast demand model in chapter 7. Archer (1987) emphasised that forecasts are needed for
marketing, production, and financial planning. He added that in the tourism industry, in common with most other sectors, the need to forecast accurately is acute because of the perishable nature of the product. Archer (1976) has gained a lot of support for many researchers and practitioners for his argument that "unfilled airline seats and unused hotel rooms cannot be stockpiled and demand must be anticipated and even manipulated". This is the leading theorist's argument, which influenced us to use forecasting in chapter 7. We will use econometric (actual static), double exponential smoothing, holt-winters and box-jenkins univariate (autoregressive) methods in the empirical part of this thesis. We aim to use accuracy techniques RMSE as a judgement criterion to select the best forecasting method and it is briefly identified in chapter 6.

Chapter 7 is the empirical chapter. It will consist of three different sections. Our objective is to tabulate all findings and interpret the results within the same section. We will plan to organise section one as regression results and their interpretation, section two as cointegration results and their interpretation, and section three forecasting results and its interpretation. Finally chapter 8 is the overall conclusion which explains the contribution of the thesis briefly. We will try to identify our aim and hypothesis in this chapter and try to discover consistencies between theory and findings. The thesis will conclude with a summary of the main issues put forward and investigated, the findings and conclusions obtained and suggestions for future research in tourism demand.
Ch 1: Size and Economic Development of Small Island States: The case of North Cyprus.

1.1 Introduction

We shall use different terminology in this study: small countries, small economies and small states. Although they all have a slightly different meaning, here we will use these words to express the same idea, since we want to put the stress on smallness more than anything else.

Smallness can be defined in terms of the physical size (land area), population and gross national product (GNP) i.e. gross domestic product (GDP), or a combination of these variables as attempted by Taylor (1971). Economically, demographically and geographically speaking, countries are classified as small if they meet any of the criteria outlined by the Commonwealth Secretariat of the UN (1978). More specifically, those criteria are:

- having a surface of less than 10,000 km$^2$ of land
  and/or
- having a population of less than 1,000,000
  and/or
- having less than USD 5,000 GDP per capita

North Cyprus, for example, has a population of 177,120 (1993 figures), 3298 kilometre square land (387 km picturesque coastline) and USD 624.9 million GNP (1993 figures). The income per capita was calculated as USD 3528.4 in 1993. We see that even though it only takes one of the criteria to be considered "small", North Cyprus meets all three of them.

Having explained the size of small islands, we will now analyse economic development, with North Cyprus as the example case. In order to understand the economic problems of North Cyprus, we will analyse the trade and tourism sector.

North Cyprus has a comparative advantage in the tourism sector, since it provides a good sand-sea-sun combination. Kaminarides and Briguglio (1993) explained in one of their articles that tourism is a growing source of foreign exchange inflow in
many small island economies. Demetriades, Al-Jebory and Kamperis (1993) stated that the main reason behind the success of the small island economies, which seems to have been overlooked by the early literature, was their comparative advantage in the provision of services of which tourism seems to be the most important one.

It is the trade sector that problems arise. North Cyprus does not have many rich natural resources, except clean air and an unpolluted sea. The mines that used to be very active before the 1970's do not provide coal any more. The country has had to import all kinds of manufacturing products from abroad. The only exportable products nowadays are citrus fruits and textiles (denim jeans and garments), since North Cyprus produces more of these products than can be consumed within the country. The country therefore exports its excess production exclusively to the European Union countries (mainly the UK) and Turkey. Nevertheless, export earnings are not enough to cover import expenditure, so that the North Cyprus economy has a growing trade deficit every year. Since it is a small country, it is a price-taker and, as such, it cannot influence its own economy. Further explanation of the deterioration in the terms of trade will be explained more clearly later. Another important factor we have to take into consideration is that the North Cyprus economy is a small open economy and at the same time inward-oriented.

Generally speaking, small islands depend upon a few primary products for their export earnings while importing a wide range of consumer as well as capital goods.

Another important issue is the geographical location of the island. Singapore, for example, has enjoyed the greatest geographical advantage in the service sector of all the South Asian countries. It is located at the crossroads of the world's busiest marine transportation route which connects the Asia-Pacific region to as far as Europe. The sea lane which passes by Singapore has been a lifeline for Japan. It is this geographical advantage that has made Singapore one of the world's busiest air and cargo ports. Many multinational corporations (MNCs) have established their operational headquarters (OHQ) there being lured, not only by Singapore's locational advantages, but also by its political stability, well established infrastructural facilities, and financial and information networks. Krugman's (1991) Geography and Trade theory (chapter 2) will support the argument explained below.

Furthermore, the North Cyprus economy suffers from diseconomies of scale in production, investment, consumption, transportation, education and administrative
services. Some small island countries are dependent on the monetary authorities of industrial countries in the sense that "they do not have an independent currency and/or do not follow autonomous monetary policies. North Cyprus uses the Turkish lira (TL) as a legal tender, so inflation in Turkey directly affects the North Cyprus economy. Another way in which small islands are dependent on other countries is foreign aid. North Cyprus, for example, is largely financed from Turkey to cover the chronic deficit in their trade imbalance.

1.2 The Role of Trade in the North Cyprus Economy

The trade and tourism sector will now be analysed in a more theoretical way. Classical economists, in particular Adam Smith (1925) and John Stuart Mill (1909), hinted that foreign trade would be more beneficial to a small and poor nation than to a large and rich one, simply because the latter's reciprocal demand for trading goods is much stronger than the former's. This classical proposition is further expanded and elaborated by Graham (1948), whose trade model is particularly important because it is the only multi-country, multi-good model of comparative advantage in which the (pre-trade) size of countries has been introduced as a variable, and because it yields significant results.

Graham's model shows that small countries tend to gain more from trade than large countries because they can specialise exclusively in a few goods whose international terms of trade, under which all other goods can be obtained, differ greatly from their domestic terms of trade, under which they can produce all goods themselves.

Todaro (1989) emphasized that development economics, to a greater extent than traditional neo-classical economics or even political economy, must be concerned with the economic, cultural and political requirements for affecting rapid structural and institutional transformations of entire societies in a manner that will most efficiently bring the fruits of economic progress to the broadest segments of their populations.

When we consider North Cyprus trade development, we will take the following points into consideration in which we can find Todaro's economic, cultural and political requirements as:

- The size of the country (geographic, demographic and economic)
- Historical and colonial background  
- Physical and human resource endowments  
- Relative importance of its public and private sectors  
- Industrial structure  
- Degree of dependence on external economic and political forces  
- Power and institutional & political structure

North Cyprus is an independent state, but economically dependent on Turkey. Since most of the technology is transferred from Turkey, there is no reason for North Cyprus to produce it themselves. In order to overcome this problem and to raise the productivity, domestic savings and foreign finance must be mobilised to generate new investment in physical capital goods, and a stock of human capital (e.g. managerial skills) must be built up. The year 1994 was designated by the United Nations Assembly to be the *Year of Small Island States*, in the United Nations conference on sustainable development in small island states that was held in Barbados in April/May 1994. The conference adopted plans and proposals geared to addressing the environment and development needs of small island developing states. I will explain these in further chapters in more detail.

Milner and Westaway (1993) pointed out that one way of reaching higher growth rate for the small island economy is to transfer labour from one sector to another in which productivity changes accordingly. This might need some structural changes in the economy, but it is clear that in small size economies there is less regional specialisation and smaller distances (physical and cultural) between the locations and different types of sectoral activity. This is going to be explained in a more comprehensible way in chapter 2.

We believe this approach to be very relevant for the North Cyprus economy, in which 16,365 employees are working for the government in the service sector and only 5,182 in the trade sector according to the 1993 figures. A great proportion of the government budget is allocated to salaries every year. Therefore it is a perennial problem to the island's economy.

It is clear that there is another argument made by Olgun (1993) about the low productivity in the public sector. Low productivity in the public sector is mainly attributable to the government's desire to monopolise power in North Cyprus and the tendency to use secure and *comparatively advantageous* public employment as political bribery during election years. These factors have resulted in over-
employment in the public sector and the mis-allocation of expensive professional and technical human resources. Over-employment is a menace and under-utilised staff set a bad example to others, resulting in endemic laziness, lack of motivation, excessive bureaucratic formalities and pressure to reduce working hours.

Table 1.1 North Cyprus Economy’s GDP Millions of US$ and TL

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<tbody>
<tr>
<td>Consumption</td>
<td>45,939.5</td>
<td>8,658.4</td>
<td>5,754,395.5</td>
<td>1,197,935.8</td>
</tr>
<tr>
<td>Investment (Export-Import)</td>
<td>-7,557.7</td>
<td>-11,107.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>11.2</td>
<td>47,0040.2</td>
<td>624.9</td>
<td>6,941,224.3</td>
</tr>
<tr>
<td>Population*</td>
<td>155.5</td>
<td>155.5</td>
<td>177.12</td>
<td>177.12</td>
</tr>
<tr>
<td>GDP/Head*</td>
<td>720.25</td>
<td>302.46</td>
<td>3,528.4</td>
<td>39,189.3</td>
</tr>
</tbody>
</table>

* Expressed in thousands

Source: State Planning Office (1994)

Table 1.2 Comparison of GDP North Cyprus and Singapore

<table>
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<tr>
<th></th>
<th>North Cyprus</th>
<th>Singapore</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (USD million)</td>
<td>541.4</td>
<td>42,963.5</td>
</tr>
<tr>
<td>Population</td>
<td>173,756</td>
<td>2,760,000</td>
</tr>
<tr>
<td>GDP/head (USD)</td>
<td>3,115.9</td>
<td>12,717</td>
</tr>
</tbody>
</table>

Source: State Planning Office (SPO) North Cyprus (1994)
Singapore Statistics Yearbook (1994)
The figures indicated in Table 1.1 simply compare GDP/head between 1983 and 1993 in North Cyprus. There was a 392.83% increase in GDP per capita in eleven years. This means an annual increase of 35.7%. Table 1.2, however, demonstrates the comparisons of GDP per head between two small island states, North Cyprus and Singapore.

It is necessary to point out that GNP and GDP do not have the same economic meaning. In economic literature, GDP is the total of all economic activity in one country, regardless of who owns the productive assets. For example, Britain's GDP includes the profits of a foreign firm located in Britain even if they are remitted to the firm's parent company in another country. On the other hand, GNP is the total of incomes earned by residents of a country, regardless of where the assets are located. For example, Britain's GNP includes profits from British-owned businesses located in other countries.

Net National Product is another term which has a different meaning. The Gross in GDP and GNP indicates that there is no allowance for depreciation (capital consumption). It stands for the amount of capital resources used up in the production process due to wear and tear, accidental damage, obsolescence or retirement of capital assets. Net National Product is GNP less depreciation.

The relationship between the three measures is straightforward:

\[
\text{GDP (gross domestic product)} = \text{net property income from abroad (rent, interest, profits and dividends)} + \text{GNP (gross national product)} - \text{capital consumption (depreciation)} = \text{NNP (net national product)}
\]

Net national product (NNP) is the most comprehensive measure of economic activity, but it is of little practical value due to the problems of accounting. Gross concepts are more useful.

Analysts tend to say that GDP is a better measure than GNP, although in practice the choice between the two depends largely on national conventions. Of the major industrial countries, only Germany and Japan focus on GNP. All the rest prefer
GDP. (USA used GNP until the end of 1991). The difference between GDP and GNP is usually relatively small, perhaps 1% of GDP, but there are a few exceptions; for example, in 1989 Kuwait's GNP was 35% bigger than its GDP, due to the country's vast income from foreign assets. In the short term, a large change in total net property income has only a minor effect on GDP. When reviewing longer-term trends, it is advisable to check net property income to see if it is making GNP grow faster than GDP (see Richards, 1993).

We will use GDP per capita as a proxy for personal disposable income in our empirical study. In chapter 8 we will estimate GDP per head as an income variable for short and long-term (cointegration) elasticities. GDP figures are obtained from 23 different countries. Chapter 6 will give more detailed information.

As mentioned above, North Cyprus is heavily dependent on trade and tourism. The island has an incremental amount of imports from abroad mainly from the UK & Turkey and export earnings will never cover import expenditures. Although it is small in terms of its production and consumption capacity, it has free market economy characteristics. Because of being small and having no power to change the world prices of exportable and importable commodities, it always ends with trade deficits in the trade balance and deterioration in terms of trade. All deficits caused by trade have been financed by Turkey since 1977.

Table 1.3 External Trade of North Cyprus

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<tbody>
<tr>
<td>Imports TL TL</td>
<td>50061.3</td>
<td>75536.2</td>
<td>104550.4</td>
<td>192745.0</td>
<td>310089.5</td>
<td>561525.8</td>
<td>999129.9</td>
</tr>
<tr>
<td></td>
<td>136.3</td>
<td>143.0</td>
<td>153.2</td>
<td>221.0</td>
<td>218.1</td>
<td>262.5</td>
<td>381.5</td>
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<tr>
<td>Exports TL TL</td>
<td>14163.6</td>
<td>24476.1</td>
<td>35499.5</td>
<td>46072.0</td>
<td>72849.5</td>
<td>114995.5</td>
<td>169354.1</td>
</tr>
<tr>
<td></td>
<td>38.6</td>
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<td>55.1</td>
<td>52.4</td>
<td>55.2</td>
<td>65.5</td>
</tr>
<tr>
<td>Trade Deficit TL</td>
<td>-35897.7</td>
<td>-51059.5</td>
<td>-65050.9</td>
<td>-46673.0</td>
<td>-37240.0</td>
<td>-466530</td>
<td>-829775</td>
</tr>
<tr>
<td></td>
<td>-97.7</td>
<td>-96.7</td>
<td>-101.2</td>
<td>-165.2</td>
<td>-165.7</td>
<td>-207.3</td>
<td>-316.0</td>
</tr>
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</table>

Source: State Planning Organization (1994), North Cyprus
Table 1.4 Foreign Trade for North Cyprus

<table>
<thead>
<tr>
<th>Year</th>
<th>IMPORTS</th>
<th>EXPORTS</th>
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<tr>
<td>1984</td>
<td>136,30</td>
<td>38,80</td>
</tr>
<tr>
<td>1985</td>
<td>143,00</td>
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<tr>
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<td>221,00</td>
<td>55,10</td>
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<td>218,10</td>
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<tr>
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<td>55,20</td>
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</tr>
<tr>
<td>1993</td>
<td>363,90</td>
<td>54,50</td>
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</tbody>
</table>

Source: SPO (1994), Nicosia

I would now like to make a comparison between North Cyprus and Singapore which are both small islands and geographically important: one in the Mediterranean and the other in the South China Sea (Pacific Ocean).

Singapore gained its independence in 1965, whereas North Cyprus in 1974. The economy in Singapore has been managed by a blend of socialist and capitalist principles, and the unique mixture of a parliamentary democracy and a paternalistic-oriented authoritarian government. Socialist aspects of the Singapore economy are particularly manifested in such areas as land use, housing development, finance, and various co-operative movements.

Singapore has high trade dependency, on imports in particular; a dependency that stems from openness. It has a trade balance deficit around 16% of its GNP. Yet the tourism earnings are high enough to finance the trade deficit. In 1989, 73% of its tourist earnings financed the trade deficit.

It is clear that the North Cyprus economy has serious problems which call for need restructuring of the economy. Our suggestion is first to control the excess spending. Secondly some of the sectors, like agriculture, should not be supported as a priority sector. Priority should be given to tourism and manufacturing; and factors of mobility should be adjusted. For example, the labour force working in agriculture should move to the tourism sector, but this does not mean that the agriculture sector should be excluded completely. There should be enough domestic production for the
domestic market of residents and tourists. Potatoes are an essential commodity for catering in tourism, especially during spring and summer. What source/strategic development can be suggested to overcome the economic shortages of North Cyprus? Porter's (1990) *Four Stages of National Competitive Development* model seems a valuable one for the North Cyprus economy.

The National Diamond concept suggest tourism as a sector (besides other sectors) can be used to improve the economic situation of North Cyprus with good geographical location and natural resources. Arguably, single sector will certainly not enough to achieve the economic prosperity for a whole nation. Shipping, insurance and tourism within service industry helped Singapore to achieve economic welfare by using national diamond. Printing industry in Germany, tiles production in Italy, engineering/architectural, construction in Korea, airlines, airport terminal, port services, ship repair in Singapore, hotels, engineering/architectural, trading, commercial banking, shipping in Japan, hotel management, accounting, advertising in America, and insurance, auctioneering, money management in Great Britain played an important role to achieve an economic prosperity by using national diamond. Besides tourism, higher education, and off shore banking can also be suggested for North Cyprus economic improvement within national diamond perspective.

This model is very popular and has been in use in many South Asian countries for more than a decade. Our aim is to implement this model in North Cyprus which is competitively advantageous with good sand-sea-sun package offer. Tourism is the only sector which will act as the pioneer to overcome the shortcomings of the economy and create a chance of having economic independency.

1.3 The Determinants of National Advantage

The determinants of national advantage are explained by Porter (1990) through a *diamond*. The most dynamic national environment will achieve competitive
advantage in an industry. According to Porter, technology and knowledge (know-how) are the two most important preconditions in achieving the national advantage.

![Diagram](Image)

**Figure 1: The Determinants of National Advantage**

**Source:** Porter (1990)

It simply explains the term factors of production such as labour, arable land, natural resources, capital and infrastructure.

### 1.3.1 Factor Conditions

The standard theory of trade rests on the factors of production. According to the theory, nations are endowed with differing stocks of factors. A nation will export those goods which make intensive use of factors with which it is relatively well endowed. North Cyprus, for example, has been a substantial exporter of agricultural goods (e.g. citrus and potatoes), textiles (e.g. garments which are relatively cheaper because of the low labour costs) and tourism (e.g. selling packages that include cheap air fares, hotels, etc.).
Factors in the competitive advantage of a nation are important and can be grouped into a number of broad categories such as: human resources, physical resources, knowledge resources, capital resources and infrastructure.

The mix of factors employed differs widely among industries. A nation's firms gain competitive advantage if they possess low-cost or uniquely high-quality factors of the particular types that are significant to competition in a particular industry. The technology and know-how (knowledge skills) are the major elements which play an important role in the success of the nation's economy. Choosing and applying the right technology will make the nation's firms achieve their objectives.

The hierarchy among factors, factor creation, selective factor disadvantages are important concepts which should be taken into consideration when the factor conditions of Porter's diamond model are explained.

1.3.2 The Demand Conditions

In Porter's diamond, the home demand conditions for the industry's product or service is another determinant of national competitive advantage.

While home demand, through its influence on economies of scale, can confer static efficiencies, its far more important influence is dynamic. It shapes the rate and character of improvement and innovation by nation's firms.

The composition of home demand, the size and pattern of the growth of home demand, and the mechanism by which a nation's domestic preferences are transmitted to foreign markets, are important concepts.

The composition of home demand shapes how a firm perceives, interprets and responds to buyer needs. Three characteristics of the composition of home demand are particularly significant in achieving national competitive advantage: segment structure of demand, sophisticated and demanding buyers and anticipatory buyer needs.
Apart from these characteristics, the Demand Size and Pattern of Growth is another important concept which should be explained. There are two schools of thought about the size of home demand. One argues that a large home market is a strength, because of the economies of scale. Other commentators see it as a weakness, reasoning that limited local demand forces firms to export, in order to gain a competitive advantage in global industries.

The size of home demand may be significant in some industries. Local firms often enjoy some natural advantages in serving their home market, compared with foreign firms: a result of proximity as well as language, regulation and cultural affinities.

Home demand is also transmitted via political alliances or historical ties. This embeds in foreign nations such things as the legal system, product or technical standards, and preferences in purchasing. Foreign aid and special political relationships among nations are having less dramatic but similar effects today. The North Cyprus - Turkey relationship is a typical example of the above explanation.

1.3.3 The Related and Supporting Industries

The presence of internationally competitive supplier industries in a nation creates advantages in downstream industries in several ways. The first is via efficient, early, rapid and sometimes preferential, access to the most cost-effective inputs.

Having a competitive domestic supplier industry is far preferable to relying on well-qualified foreign suppliers. The home market is highly visible to domestic suppliers and success there is a matter of pride. Proximity of managerial and technical personnel, along with cultural similarity, tend to facilitate a free and open information flow. Transaction costs are reduced.

1.3.4 The Firm Strategy, Structure and Rivalry

Porter specifies his theory of national competitive advantage with a diamond in which firms are created, organised and managed as well as the nature of domestic rivalry. The goals, strategies, and ways of organising in industries vary widely among nations. National advantage results from a good match between these choices and the sources of competitive advantage in a particular industry. The
pattern of rivalry at home also has a profound role to play in the process of innovation and the ultimate prospects for international success.

Porter emphasises that important national differences in management practices and approaches occur in such areas as the training, background, and orientation of leaders, the group versus hierarchical style, the strength of individual initiative, the tools for decision making, the nature of the relationships with customers, the ability to co-ordinate across functions, the attitude towards international activities, and the relationship between labour and management. These differences in managerial approaches and organisational skills create advantages in competing in different types of industries. Labour management relationships are particularly significant in many industries, because they are central to the ability of firms to improve and innovate.

Porter also stresses that sharp differences exist among nations in the *goals* that firms seek to achieve as well as the motivation of their employees and managers. Nations will succeed in industries where these goals and motivations are aligned with the sources of competitive advantage. In many industries, one component of achieving and sustaining advantage is sustained investment. More broadly, nations succeed in industries where there is unusual commitment and effort.

Domestic rivalry, like any rivalry, creates pressure on firms to improve and innovate. Local rivals push each other to lower cost, improve quality and service, and create new products and processes. Rivalry among domestic firms often goes beyond the purely economic and can become emotional and even personal.

**1.3.5 The Role of Chance**

Porter make a list of chance events which are important in influencing competitive advantage. These are:

1- Acts of pure invention;
2- Major technological discontinuities (e.g. biotechnology, microelectronics);
3- Discontinuities in input costs such as the oil crisis;
4- Significant shifts in world financial markets or exchange rates;
5- Surges of world or regional demand;
6- Political decision by foreign governments; and
7- Wars.

Chance events are important because they create discontinuities which allow shifts in competitive position. While chance events can allow shifts in competitive advantage in an industry, national attributes play an important role insofar as which nation exploits them. The nation with the most favourable *diamond* will be most likely to convert chance events into a competitive advantage. This will reflect an environment aligned to the new sources of advantage and firms pressured to move most aggressively to seize them.

1.3.6 The Role of Government

The government's real role, in creating national competitive advantage, is in influencing the factor determinants. Government can influence (and be influenced by) each of the four determinants either positively or negatively. Governmental bodies establish local product standards or regulations that mandate or influence buyer needs. Government is also often a major buyer of many products in a nation. Among them are defence goods, telecommunications equipment, aircraft for the national airline. The way this role as a buyer is played can either help or hurt the nation's industries.

The model we have been explaining, is the skeleton of Porter's *National Competitive Advantage Theory* which will be the guide to explain the North Cyprus economic development by using the *Four Stages of National Competitive Development* model.

1.4 Four Stages of National Competitive Development

Porter divided the national competitive development model into four distinct stages i.e. *factor driven*, *investment driven*, *innovation driven* and *wealth driven*.
Figure 1.2 Four Stages of National Competitive Development
Source: Porter (1990)

The first three stages involve successive upgrading of a nation's competitive advantages and will normally be associated with progressively rising economic prosperity. The fourth stage is one of drift and ultimately decline. These stages, though brought schematics, provide one way of understanding how economies develop, the characteristic problems faced by nation's firms at different points in time, and the forces which propel the economy forwards or cause it to falter. Within this framework, we will implement Butler's (1980) tourist life cycle theory in North Cyprus and the Isle of Man (chapter 4) to see how Porter's four stages are achieved over the periods.

1.4.1 Factor Driven

Porter advanced his national competitive development model from the economic perspective that each country is classified into different stages e.g. Singapore (factor driven), Italy (factor driven and Innovation driven), and Switzerland (innovation driven). In the factor driven stage he states that all internationally successful industries in the nation draw their advantage almost solely from basic factors of production, whether they are natural resources, favourable growing conditions for certain crops, or an abundant and inexpensive semi-skilled labour pool.

Technology is sourced largely from other nations and not created. This occurs in some industries through imitation or more often through the acquisition of foreign capital goods.
North Cyprus has 387 km length of unpolluted coastline which is competitively more advantageous than South Cyprus. The island is not heavily industrialised, so there is a chance for the country to preserve its scenery, whereas Greek Cypriots have destroyed the southern coast with heavy industrialisation and unplanned construction responding to mass tourism.

Technology has always been imported by Turkey and because of the dependency on the Turkish economy, obsolescent technology is adopted to the North Cyprus infrastructural investments.

In this stage, an economy is sensitive to world economic cycles and exchange rates, which drive demand and relative prices. It is also vulnerable to the loss of factor advantages to other nations and to rapidly shifting industry leadership. While the possession of abundant natural resources may support a high income per capita for a sustained period of time, a factor-driven economy is one with a poor foundation for sustained productivity growth.

The mix of domestically oriented industries in a factor-driven economy may widen over time through import substitution, which is often the result of protecting the home market from foreign competition. However, import-substituting domestic industries lack competitive advantage in international terms and, if protection is widespread, it may actually reduce national productivity due to their inefficiency.

1.4.2 Investment Driven

In the investment driven stage, national competitive advantage is based on the willingness and ability of a nation and its firms to invest intensively. Firms invest to construct modern, efficient, and often large-scale facilities equipped with the best technology available on global markets. They also invest to acquire more complex foreign products and process technology through licenses, joint ventures, and other means, which allows for competition in more sophisticated industries and industry segments.

Nations, their citizens, and firms all invest in an investment-driven economy to upgrade factors from basic to more advanced ones and create a modern infrastructure. North Cyprus is not investment driven. The hydroelectric termic
plant completed in June 1994 and exploded in the first testing stage, because the raw materials and technology used were inexpensive and of low quality.

The investment driven stage, as its name indicates, is one when the ability and willingness to invest is the principal advantage rather than the ability to offer unique products or produce with unique processes. At this stage, firms still compete in the relatively standardised, price-sensitive segments of the market, and product designs often reflect foreign market needs. Production is almost solely based on foreign technology, foreign equipment, and even foreign components. As a result, process technology is modern but less modern than that of global leaders, since dependency on foreign suppliers constraints the pace of innovation.

The investment driven stage is characterised by rapid gains in employment and the bidding up of wages and factor costs.

The investment-driven model requires a national consensus which favours investment and long-term economic growth over current consumption and income distribution.

1.4.3 Innovation Driven

Innovation driven is a stage where firms create and improve technology. Favourable demand conditions, a supplier base, specialised factors, and the presence of related industries in the nation allow firms to innovate and to sustain innovation.

Firms in an innovation-driven economy compete internationally in more differentiated industry segments. They continue to compete on costs; however, it does not depend on factor costs but on productivity due to high skill levels and advanced technology. Price-sensitive, less sophisticated segments are gradually ceded to firms from other nations.

A growing international position in sophisticated services is also a characteristic of an innovation-driven economy, a reflection of the upgrading competitive advantages in the industry. Factor-and investment-driven nations are rarely successful in international service industries, except those dependent on labour costs (for example, general cargo shipping and some segments of international construction).
All innovation-driven economies will have a higher domestic service component than nations at earlier stages, because of their sophistication and affluence.

The government’s appropriate role in this stage is markedly different from the previous one. Porter explained that the appropriate philosophy of intervention and types of intervention changes. Allocation of capital, protection, licensing controls, export subsidy, and other forms of direct intervention lose relevance or effectiveness in innovation-based competition.

1.4.4 Wealth Driven

It is the last and worst stage. When the wealth driven stage progresses, many companies become troubled, unemployment or underemployment pressure is persistent, and the average standard of living is declining. Social programs begin to outstrip the ability of the economy to pay for them. Taxation of wealth in addition to income tax may come to be seen as the only way to make ends meet, so diminishing incentives even further.

Porter pointed out that, in the wealth-driven stage, firms begin to lose competitive advantage in international industries for a variety of reasons. Ebbing rivalry, a result of more attention to preserving position than to enhancing it, declining corporate motivation to invest and the ability of powerful firms to insulate themselves by influencing government policy, is often at the root of the problem.

1.5 The Process of National Economic Development

According to Porter's theory, all nations are classified according to different stages and each nation goes through its own unique process of development. The "diamond", which we explained before represents and reflects each nation's unique circumstances. It is important to say at this stage that the nation's history plays an important role, by shaping such things as the basic skills which have been created, the prevailing values and norms of behaviour, the needs, tastes, and preferences which underpins demand patterns, and the challenges that have been set.
Improvements in factor quantity and quality are the principal concern, described by Porter in his theory. The nation which has advanced most rapidly in the post-war period, Japan, has passed through each of the first three stages. The investment driven stage, though fraught with challenges and difficulties, has accelerated the development process in some nations. However, national economies seem to be able to move directly from factor driven to innovation driven over a long time period, skipping any noticeable transition through the investment driven stage.

The economic prosperity of a nation moves through the first three stages, because upgrading leads to increasing national productivity. A nation with unusually abundant natural resources for its size, however, can enjoy high national income despite a position in the factor-driven stage, though it is not likely to be sustainable indefinitely.

Another important point which Porter emphasised, is the resource abundance. When it is great enough, a nation may move directly from the factor-driven stage to the wealth-driven stage. Diminishing competition, adversarial labour-management relations and protection may arise as attention in the economy shifts toward preservation of the status quo. Nations such as Canada and Norway face this risk.

As for the wealth driven stage, he stressed that, if it occurs, it will eventually lead to a slow decline in economic prosperity.

As a conclusion, Porter drew attention to the possibility that a nation mired in the wealth-driven stage will revert to the factor driven stage. As positions are lost in the higher productivity industries within the economy, wages and other factor costs may eventually fall so far in relative terms that a nation regresses to competing on factor costs.
Singapore remains a factor-driven economy which is largely a production base for foreign multinationals, attracted by Singapore's relatively low-cost, well-educated workforce and efficient infrastructure including roads, ports, airports and telecommunications. From this economic perspective we would cite Singapore as a good example. This country made a big achievement ever since its independence (1965).

Singapore's improvement in living standards has come from upgrading the quality of human resources and total quality management. Singapore's exceptional performance would be a good model for other small island states to educate and train its human resources.

1.6 Conclusion

In many small island states, trade and manufacturing are found to be insufficient to overcome the economic shortcomings. Tourism always takes place as an alternative sector, where foreign exchange earnings may be used to cover the financial deficits of the budget. Tourism is the pioneer sector of the economy, but it is not enough to develop the country as a whole.

Porter's competitive advantage theory has been developed in our study to make the above statement clear. The determinants of national advantage have been discussed and we have been trying to analyse the application of a national diamond. The factors which influence the diamond have also been explained here. The four different stages of national competitive development have been discussed in this chapter.

Although this chapter gives us a useful theoretical approach, we decided to enhance the understandings of the economic importance of trade between countries with Krugman's geography and trade theory in the next chapter.
Ch 2 : Location And Trade

2.1 Introduction

In the previous chapter we explained the North Cyprus economic development within the framework of Porter's (1990) "National Competitive Advantage Theory". We described the theory by adopting the "Four Stages of the National Competitive Development Model" and we mentioned the importance of tourism for the future of economic prosperity.

In order to explain this further we will use Krugman's (1991) "Location" theory in which he develops a new approach the international economics and trade concept. He explained the "location" theory within the economic geography framework. As long as North Cyprus has logistic and geographic importance in the Mediterranean Sea, the theories of economic geography and of location are important topics to be studied.

Our aim is to make an analysis of the geographical relations between North Cyprus and Turkey as well as between the Isle of Man\(^1\) and England. The relationship between North Cyprus and Turkey is very similar to the one between the IOM and England.

The IOM is a small island in the Irish Sea and it was separated, politically and economically, from England in 1860. It is 221 square miles (572 km\(^2\)) and is 32.5 miles (52km) long and 13.5 miles (22km) wide. Its perimeter is 100 miles (160km) and it is 30 miles (48km) away from England, 16 miles (26km) from Scotland, 27 miles (43km) from North Ireland and 48 miles (77km) from Wales.

It is not part of England but, like the Channel Islands it is a Crown dependency with a high degree of autonomy over domestic, political and legislative matters. The

\(^1\)The Isle of Man will be written as IOM hereafter.
Queen is head of state and the UK government looks after the island's foreign relations and defense, and maintains a seldom-used veto over legislation passed by Tynwald, the island's parliament. The UK and the IOM co-exist on a basis of perceived mutual benefits. The population is 71,267 according to the last 1991-April 14/15 census. Economically, one third of the GDP is earned by the offshore finance sector, and the rest from trade and tourism. Agriculture is small in terms of economic contribution. The IOM has its own bank notes and coinage. Its GDP per capita is only about 80 per cent of the UK and less than that of many European countries. The GDP per head was £6,901 in 1992, compared to £8,896 in the UK. Tourism makes a 6 per cent contribution to the GDP, whereas manufacturing makes 11 and finance 35 per cent. The rest is contributed from other sectors. The finance sector gives the greatest contribution to the IOM's economy because the island has a tax haven status.

We have already explained the demographic, geographic and economic situation of the IOM. These features put the IOM in the category of "small states" and classify it as a small island according to the classification of the United Nations (see chapter 1).

If we compare the IOM with North Cyprus, we see that North Cyprus is geographically bigger than the IOM with 3300km² and economically smaller with US$ 3000 GDP per capita. The population of North Cyprus is more than twice that of the IOM and it is therefore demographically bigger.

2.2 The Location Theory

We aim to analyze the location theory for the IOM & North Cyprus tourism industries within their economic geography framework. By economic geography, Krugman (1991) means "the location of production in space"; that branch of economics which considers where things happen in relation to one another. According to his argument, countries are normally modeled as dimensionless points, within which the factors of production can be instantly and cheaply moved from one activity to another, and trade among countries is usually given a sort of spaceless
representation in which transport costs are zero for all the goods which can be traded.

Krugman (1991) applied his arguments to some states in the USA and also to some EEC countries in Central Europe. We will make some modifications and implement Krugman's theory on North Cyprus. The cost of travel will be considered when using the term transportation. In tourism a product is a general terminology which refers to a tourist package, including accommodation, leisure, etc. So, you may assume that the service is a "product" hereafter for the rest of this explanation.

You may ask why we need to overlook the economic geography? There are three reasons explained by Krugman (1991). First, the location of economic activity within countries is an important subject in its own right. Second the lines between international economics are becoming blurred in some important cases. The last and the most important reason is the intellectual and empirical laboratory which it provides. The "new" trade, growth, and business cycle theories of the past decade have suggested to us a world view of economics that is very different from that of most pre-1980 theories.

Krugman (1991) also pointed out that increasing returns have a pervasive influence on the economy, and play a decisive role in history and in determining the geography of real economies. He also suggested that increasing returns affect economic geography on many scales. In his regional development argument, he preferred to explain the economic geography with a simple example: the US "manufacturing belt". The model developed sketchily and showed the interaction of demand, increasing returns, and transportation costs, all of which drives a cumulative process of regional divergence.

Geographers note that the major part of North Cyprus' tourism is concentrated in the Northern region of Cyprus, within the parallelogram of Kyrenia. Before 1974 it was Famagusta because Varosha (closed zone) was the bulk of the Cyprus tourism. After the 1974-war this area was closed for tourism as well as for
settlement and was left as a restricted zone. So Kyrenia is now the core and the tourism belt contains approximately 70 per cent of the tourist accommodation and 65 per cent of the bed capacity. About 60 percent of the tourism employment is in the same region. Because the tourism belt is in the Kyrenia region, other sectors of the economy located in that region are benefiting from this situation, e.g. the financial sector (foreign exchange bureau and insurance companies), transportation (both public and private), retailing (supermarkets, shops) and many other sectors. If the tourism belt had not existed, the Northern region would have had an even smaller share of employment.

Howells (1984) explained the importance of center and periphery in one of his articles. He described that according to the filter-down hypothesis, firms and plants located in peripheral or less-urbanized areas are less technologically sophisticated than establishments located within more urbanized and/or larger urban centers and/or central regions. Because of this, the peripheral and more rural areas are less able to take advantage of, and participate in, new growth sectors of the economy. As a consequence their industry lags behind in investing, developing and adopting new products and process technology.

Dommen (1982) pointed out that a peripheral location benefits more from the spread effects if its products are income-elastic (like tourism) or if it is near the center. Nearness is measured not so much in kilometers as in convenience and cost of transport. Better transport and easier access to the services of the center encourage a wider range of trade. We will discuss the income elasticities for short-run and long-run (cointegration) periods in chapter 8. We can drive a conclusion whether income elastic countries are benefitting from low transportation costs or not.

According to Keller (1987), the function of tourism as a means of economic development for disadvantaged or underdeveloped peripheral regions is generally accepted, and its merits and drawbacks are discussed at some length in the literature. Peripheral tourism and core-periphery concepts are also explained by Butler (1980),
Cohen (1972), and Plog (1977) within the theory. Besides that, Friedmann (1972) argued that core regions, being regions with a high interaction potential, the favorable locations for headquarters and decision making functions, while peripheral regions are penetrated by core-region-based enterprises and institutions and are in a dependent position. Friedmann's theoretical concept is therefore an interesting starting point for investigating the organizational status and external control of plants and regions. He defined "core areas" as districts with both a high degree of accessibility and high level of development. Peripheral less-developed areas, on the other hand, are defined as districts with a low degree of accessibility and a low level of development.

Another argument was made by Dawes & D'Elia (1995) about tourism and core-periphery patterns. They said that if we take the 19th and the first part of the 20th century into account, tourism does not seem to be a migration from core to periphery, but more from the core to the semiperiphery. Williams & Montanari (1995), Ioannides (1995) and Williams & Shaw (1995) are other important available references.

2.2.1 Localisation

Krugman commented on the literature about industry localisation being too extensive to cite. Notable examples over the years include Hoover (1948), Lichtenberg (1960), and recently, Porter (1990).

Localisation is also explained by Healey and Ilbery (1990) from the perspective of economic geography. They made a common distinction between two types of external economy: localisation economies and urbanization economies. Localisation economies are cost-saving specific to the establishment of a particular industry, such as arise from spatial proximity to the units to which they are linked; while urbanization economies are cost-savings to all firms arising from location in an urban area, such as transport facilities, a range of industrial and office premises, or a pool of cheap labour. It is not always easy to distinguish between them in practice. For
example, with a pool of skilled labour, the skilled element could be classified as a localisation economy, while the labour pool could be considered an urbanization economy. Urbanization economies are related to settlement size: the larger the settlement the greater the potential economies. About the structurally attractive industries Harrington (1995) referred to Porter (1990) and made these comments:

The attractiveness of an industry is not reliably indicated by size, rapid growth, or newness of technology, attributes often stressed by executives and by government planners, but by industry structure. By targeting entry into structurally unattractive industries, developing nations have frequently made poor use of scarce national resources.

It is certain that as long as we are dealing with tourists, location is important. Transportation cost\(^2\) is another issue of where opportunity cost should be taken into account. Harrington (1995) argued that the opportunity cost of serving the market and the danger of losing clients to competitors increases with distance. So we can conclude that Cyprus is more advantageous than the Far East and the Caribbean Islands in terms of transportation for the potential of Asian and European holiday makers. Harrington also suggested that, the more specialized, unique or prestigious is the service provider is, the greater the access to reliable transportation and communication. It is more likely that the provider can maintain distant markets and serve as a basic activity in its local region or country.

It is Marshall (1920) who presented the classic economic analysis of the phenomenon; he identified three distinct reasons for localisation. First, by concentrating a number of firms in an industry in the same place, an industrial center allows a pooled market for workers with specialized skills; this pooled market benefits both workers and firms. Second, an industrial center allows provision of non-traded inputs specific to an industry in greater variety and at lower cost. Finally, because information flows locally more easily than over greater distances, an industrial center generates what we would now call technological spillovers.

\(^2\)The distance of travel is important and related to the cost of travel.
2.2.2 Labour Market Pooling

The pool of labour may sometimes be referred to as labour resources, workforce, manpower, personnel staff, workers or human resources. In literature all have the same meanings.

Because of "pooling", some people may be tempted to assume that the incentive to create a pooled labour market is something like portfolio diversification; that is, it has something to do with risk aversion on the part of workers. No doubt minimizing risk is also an issue, Krugman (1991) did not mention it before. So, even if workers are entirely risk neutral, there will be an efficiency gain from creating a localised industry with a pooled labour market.

Dual labour markets within companies is one of the most common strategies that is contemplated in many countries. These can be identified by core and peripheral workers. Atkinson (1984) is largely responsible for the formalization of the concepts, although there are strong links with Doeringer's and Piore's (1971) concept of the internal labour market. Atkinson (1984) suggested that core workers are full time, permanent employees who receive job security and high earnings in return for performing a wide range of tasks that cut across traditional skills demarcation lines. He considered that these primary labour groups are functionally flexible. They are classified as managerial and professional staff whose skills are in short supply in the external labour market; employees are therefore keen to retain their services. Shortly, they are the ones who are in perfect conditions in terms of money and working life.

Apart from these core employees, there are several groups of peripheral workers. There is a secondary labour market made up full-time employees, but their jobs are less secure, they lack career prospects, and they are often semi-skilled. Labour turnover is high, which means that their employment offers numerical flexibility to employers.

Apart from these, there are also several other groups of numerically flexible employees. The possibilities include part-time workers, temporary workers (on short
term contracts), training scheme placements and home working. In the tourism sector we can sometimes simplify short term contract workers as "seasonal workers".

Because tourism has a seasonality effect, the employment policy is not always for the full time workers. It is mainly dependent on seasonal workers which is costly and difficult to handle when total quality management is concerned. Therefore wage differentiation has to be analyzed and the proximity of the core regions must be taken into consideration when employment takes place (Krugman, 1991).

Considering the size of the labour pool, Healey & Ilbery (1990) emphasized that the normal indicator of labour supply is the size of the labour pool (the number of people available for work). This can affect the location of secondary and tertiary activities, especially during periods of full employment. They pointed out that two measures of the size of the labour pool are usually employed. The first is the participation or activity rate, defined as the proportion of the total population of a given age-group in work. This is influenced by the demographic (age/sex/marital status) structure of an area's population, together with its density and distribution. A second measure is the unemployment rate.

Why do many industries concentrate in only one or two locations? Krugman(1995) said that this is not a new question. By referring to Marshall he tried to answer this question. He argued that Marshall noted how many of his nation's industries were concentrated in particular industrial districts: cutlery in Sheffield, iron working in Birmingham, lace in Nottingham and the key cotton textile industry around Manchester. Marshall (1920) offered an explanation of such concentrations that remains a classic of clarity.

Firstly, a cluster of related firms in the same area provides a large market for people with specialized skills, which means that both workers and firms have some insurance: workers against unemployment and firms against labour shortages. Secondly, a local industrial cluster supports providers of the necessary specialized
services. Lastly, a grouping of firms promotes the exchange of information and thus the advantages of technology.

Ioannides (1995) also referred to the role of the state for the creation of a labour pool. He mentioned that governments promote tourism to generate economic growth and create a labour pool with a certain modicum of human capital.

Krugman (1991) analyzed his model by giving some examples which are helpful to understand. He points out that in order to make a pooled labour market advantageous, the assumption should be that each firm had to choose one location or the other, not both. If each firm could produce in both locations, or for that matter if each firm could be split into two identical firms, one in each place, then the full "portfolio" of firms and workers could be replicated in each location, and the motivation for localisation would be gone. But the most natural justification for the assumption is that there are sufficient economies of scale to militate for a single production site. In this thesis, a product was meant the holiday package, and the firms that are running in the location were the tour operators, travel agencies, airlines, hotels and restaurants.

2.3 Regions and Nations from the Economic Geography Perspectives

Krugman (1991) started with economic geography at the grand level of regional development, and of center versus periphery, largely because he had a simpler model with a more modest issue of industry localisation. Hereafter, we will use the world localisation or localisation theory in a more familiar way. Before explaining the localisation theory, he preferred to explain the meaning of a nation, and the role of political boundaries in economic geography. What is a nation? The dictionary meaning of a nation is a large community of people of mainly common descent, language and history, usually inhabiting a particular territory and under one government. Krugman made a critique and said "a nation is not a region or a single location". That is, when localisation and the emergence of core-periphery patterns are argued, there is no reason to suppose that political boundaries define the relevant
unit over which those external economies apply. Every modern nation restricts labour mobility. Many nations restrict the movement of capital, or at least threaten to do so. Of course, there are some countries where labour can move freely; the European Union is a good example.

Krugman (1994) also compared regions and nations from a different perspective. He said that the differences between regions and nations are quantitative, not qualitative. That is, the same forces are at work in inter-regional and international trade, only their relative importance is different. In particular, regions within a country tend to be more specialized than countries and experience greater factor mobility.

He has pointed out that regions within a country tend to be more specialized and engage in more trade than countries. This is also true when regions are as large as countries. He explained this by using the regions in the USA.

We will now apply this statement to two small islands, the IOM and North Cyprus which are similar to each other. We will make comparisons between these islands in order to understand which one is more specialized in the tourism sector. Before reaching a conclusion, we will try to measure the differences and degree of specialization between their mainland, England and Turkey. Krugman made comparisons with regard to regional employment statistics for the same industries in the USA regions. Firstly, we would make simple modifications to his indication model to compare the employment statistics for the tourism sector of the Northern Cyprus regions and the IOM. Second, we will compare the indices of industrial specialization of the two islands.

Before making the comparison, we would like to clarify the problems of regional economics. According to Krugman (1991), the main difference between regional and national economic issues is the mobility factors of production: highly mobile between regions, less mobile between nations. This difference has two consequences. First, because regions must compete to hold on to mobile factors, the long-run ability of a region to export a good depends on absolute rather than comparative advantage.
Long run-patterns of regional specialization reflect absolute advantage instead of comparative advantage since wages tend to be equalized across regions (Krugman, 1991). Second, movements of capital and especially labour often give rise to cumulative processes of uneven development. This is because one region attracts increasing amounts of industry and employment away from another region and it becomes luckier than the others. So, in short, the success and failure of regions create the concepts of uneven development.

We will try to construct indices of regional/national divergence. These can be such as follows:

Let \( s_i \) be the share of industry \( i \) in total tourism employment in some region/country and let "star" indicate that we are referring to some other region/country. Then the index we use is:

\[
\Sigma |s_i - s_i^*|
\]

Suppose two regions have identical tourism structures, that is, the industry shares of employment were the same for all \( i \). Then the index would, of course, be zero. A little less obviously, if two regions have completely disjointed industry structures, the index would be 2 (because each share in each region would be counted in full). So the index is a rough way of quantifying differences in structures and hence regional specialization. In literature, Rodrik (1982) also measured the structural change and changes in comparative advantage by using the indication method.
Table 2.1 Indices of Tourism Specialization (share of employment) for North Cyprus

<table>
<thead>
<tr>
<th>1993</th>
<th>Nicosia (South)</th>
<th>Famagusta (East)</th>
<th>Kyrenia (North)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>0</td>
<td>0.128</td>
<td>0.581</td>
</tr>
<tr>
<td>E</td>
<td>-</td>
<td>0</td>
<td>0.453</td>
</tr>
<tr>
<td>N</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
</tbody>
</table>


Table 2.1 briefly indicates information about share of employment for North Cyprus tourism industry. We have chosen three economically important cities which are the main tourist potential cities attracting job opportunities. These are Nicosia in the South, Famagusta in the East, and Kyrenia in the North of the Island. The total employment in tourism is accounting for 4234 people according to 1993 figures. Employment in the tourism sector in Kyrenia (Northern Region) is 66.98% (2836) where in Famagusta (Eastern Region) and Nicosia (Southern Region) it is 21.68% (918) and 8.88% (376) respectively. In the Western part of Cyprus (Guzelyurt) it is only 2.46% (104) which is why we omitted this region. When we compare the South with East (Nicosia with Famagusta) we obtain a figure 0.128 which is calculated by subtracting the percentage of tourism employment in Nicosia from percentage of tourism employment in Famagusta (8.88%-21.68%=12.8%). The results obtained are in absolute term (see indices formula on page 35). The same logic is valid for the comparison of Nicosia with Kyrenia (21.68%-66.98%=45.3%) which is a simple mathematical subtraction. This figures indicates that Kyrenia is the most specialised city in tourism employment and Nicosia is the least one.
Table 2.2 Indices of Tourism Specialization for Other Countries

<table>
<thead>
<tr>
<th></th>
<th>NW-England</th>
<th>IOM</th>
<th>S-Turkey</th>
<th>N.Cyprus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NW-Eng.</td>
<td>0</td>
<td>0.043</td>
<td>0.048</td>
<td>0.093</td>
</tr>
<tr>
<td>IOM</td>
<td>-</td>
<td>0</td>
<td>0.091</td>
<td>0.136</td>
</tr>
<tr>
<td>S.Turkey</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>0.045</td>
</tr>
</tbody>
</table>

SPO, Nicosia (1993)
IOM Digest of Economic Statistics (1993)
Turkish Tourism Bulletin (1993), Ankara.

According to 1991 figures the total tourism employment in the IOM was accounting for 16%, in NW England 11.7%, in S. Turkey 6.9% and in North Cyprus 2.4% respectively. When we subtract (11.7%-16%=4.3%) we obtain 0.043 which is the figure in absolute term indicating that the IOM is more specialised than NW England in terms of percentage tourism employment. When we subtract (11.7%-6.9%=4.8%) we obtain 0.048 again in absolute term which the figure represent that the NW England is more specialised than S. Turkey in terms of percentage tourism employment. The same logic also proves that NW England is more specialised than N. Cyprus with 0.093 (11.7%-2.4%=9.3%), the IOM is more specialised than S. Turkey and N. Cyprus with 0.091 (16%-6.9%=9.1%) and 0.136 (16%-2.4%=13.6%) respectively. Finally, S. Turkey is more specialised than N. Cyprus with 0.045 (6.9%-2.4%=4.5%). This indication is a brief description of the comparison between different tourist countries with their percentage tourism employment. From the above index we conclude that the IOM is more specialised in tourism employment than the other countries. We used the southern part of Turkey (the closest periphery to North Cyprus) and Northwest region of England (the closest periphery to the IOM) in which the percentage contribution is relatively lower. On the other hand, North Cyprus is not as specialised as expected in the share of employment in the tourism sector.
Hotels and other tourist accommodation, restaurants, cafes, public houses and bars, night clubs and licensed clubs, baths, saunas, libraries, museums, art galleries, sports and other recreational services provide tourism related jobs explained by the British Tourist Authority (BTA 1994).³

On the other hand, Sessa (1983) listed some of the principal groups of tourism-related jobs as follows:

- Construction of basic infrastructures (e.g. roads, airports, sewage/drainage systems and cultural facilities).
- Maintenance of the basic infrastructures.
- Agricultural and other primary activities.
- Agroprocessing.
- Transport.
- Commercial and complementary services (e.g. banks, insurance, retailing, sports, and cultural services).
- Construction of receptive installations—the tourism superstructure (e.g. accommodation, restaurants, bars and tourist facilities).
- Operation of receptive services.
- Tourism welcoming services.
- Public administration.

³British Tourist Authority will be abbreviated to BTA for the rest of the chapter.
Table 2.3 General Tourism Statistics (1993)

<table>
<thead>
<tr>
<th></th>
<th>Mediterranean</th>
<th>NW-England</th>
<th>IOM</th>
<th>N.Cyprus</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Tourists visited</td>
<td>1,612,927</td>
<td>1,071,840</td>
<td>490,990</td>
<td>452,982</td>
</tr>
<tr>
<td>No. of bedspaces</td>
<td>235,238</td>
<td>101,271</td>
<td>10,613</td>
<td>7,462</td>
</tr>
</tbody>
</table>

ETB, Statistics Yearbook (1994)
IOM Tourism Board (1994)
Turkish Tourism Bulletin (1994)

Table 2.3 gives us general statistical information about the number of tourists visited and number of bedspaces capacity for the above named countries and important tourism regions during 1993. Mediterranean region is the most tourist attractive region in the southern part of Turkey with total 235,238 bedspace capacity. Antalya, Kemer, Side and Fethiye are the most important cities for the whole Mediterranean with a total 1,612,927 tourist visits during 1993. On the other hand, Blackpool and Liverpool are highly attractive cities with many tourist events for the Northwest region. It is the second most visited region, accounting for 1,071,840 tourist visited during 1993 and enrol 101,271 bedspace capacity with 1993 figures. When we compare the IOM with N. Cyprus, almost identical amount of tourist visited both Islands during the same year, however, the IOM suffers from bed climate conditions and North Cyprus from direct transportation. The total bedspace capacity in the IOM is accounting for 10,613 and 7,462 in the North Cyprus. The IOM with 572 km² land has relatively more tourist accommodation than North Cyprus which consist 3298 km² land.
2.4 Core and Periphery

When competition among nations matters, we should ask some important questions: should small countries fear economic integration, lest their industry be pulled into the inevitably larger cores of the neighbours? Should countries pursue policies to ensure that they get their industrial cores? Does the core-periphery model explain uneven development at a national as well as a regional level?

We should not forget that a larger country, having a larger initial population, cannot attract all of industry away from the smaller nation, because countries are not identical to regions. So, we can say that Turkey cannot attract tourism industry from North Cyprus or similarly England from the IOM.

When we think of a large country, it is assumed to consist of many regions but not big regions. Economic integration will not favor regions in the larger country. In the core-periphery model it is possible to integrate regions within the multi-regional framework.

Krugman has assumed a discrete set of regions laid out in a one-dimensional space, because he did not want to worry about an end point, and this space would have to be circular. Six regions are laid out in a circle, with transportation possible only around the circle. Again, there is no possibility of any movement in the middle.

![Diagram](image)

**Figure 2.1 Single Core Structure in a Multi-regional Framework**

Source: Krugman (1991)
Suppose that there are two kinds of people: farmers, who are spread equally among the nations, and workers in manufacturing, who can choose where to live. One possibility is that the economy will form a single core; this is suggested in figure 2.1 by the shading of one region. Alternatively, if transport costs are high, economies of scale weak, and the share of "footloose" production small, manufacturing production may be spread evenly across the regions.

It is also possible to have an economy which supports multiple cores. Figure 2.2 illustrates that shaded circles indicate the formation of two cores at regions 1 and 4. Each core is assumed to have a "hinterland" consisting of the two neighbouring regions.

In order to understand which picture is right, we should remember these assumptions. If transport costs are low, economies of scale is large, and the share of footloose industry in national income is large, the result will be single core; if the transport costs are high, economies of scale is small, and the share of footloose industry in national income is low, the result will be no core at all, because intermediate levels will support a multiple-core structure. It is always necessary to
remember that tastes and technology make two alternatives possible, which means more than one equilibrium structure is possible.

Another hypothetical assumption can be made: the world illustrated in Figure 2.1 and 2.2 which consists of two separate countries: one of four regions, one of two. The boundary is illustrated by the dotted line in Figure 2.2. It is assumed that the two countries initially maintain sufficient barriers to trade and sufficient factor mobility so that their economic geography evolves independently, with the large country developing a core in region 1 and the small country a smaller core in region 2. In this way the two countries merge into a single economic unit.

If this is the hypothesis, then what is the consequence. The consequence has two alternatives. The ultimate equilibrium may have either one core or two. If the integrated economy ends up with only one core, then region 1, with its head start, will presumably attract all the manufacturing away from region 4. But if the integrated economy ends up with two cores, manufacturing in region 4 will actually expand at the expense of region 1, as it gains access to its full natural hinterland.

Figure 2.3 Welfare Level of Core and Periphery Regions
Source: Krugman (1991)
Figure 2.3 illustrates the welfare of the immobile "farmers" in each region as a function of the level of transport cost. When transport costs are high, there will not be a core-periphery pattern. So if the regions are of equal size, their farmers will have the same level of welfare. Lowering transport costs will raise welfare in each, to at least some extent, simply by increasing inter-regional trade. If transport costs fall enough, it is possible to reach the critical point at which the regions become differentiated into a manufacturing core and an agricultural periphery.

It is possible to change the example into manufacturing workers and tourism workers. We can change the assumption to a tourism core and manufacturing periphery or vice versa. It varies according to the terminology we use, but the logic remains the same.

It is important that when that threshold is crossed, it is apparent that whereas immobile factors in the regions which become the core will gain, initially those in the other region will lose because they will now have to import all their manufactured goods.

As long as the transport costs fall, welfare will rise in both regions. When transport costs reach zero, both regions reach a common level of welfare.

Where regions become the periphery, there is a U-shaped relationship between economic integration and welfare. First, the immobile factors in a region would prefer to be in the core rather than the periphery. Second, modest policy actions at the critical point can tip the balance in one region's favor.

2.5 Conclusion

The main object in using Krugman's (1991) location and trade theory in this chapter is to enhance the understanding of the importance of the geographical location of the nations. The possible scenario here is to draw a strong link between Porter's (1990)
National Diamond and Krugman’s (1991) *Location and trade* theories. It is helpful to combine both approaches, because they show that nations can restructure their economies through improving technology, creating labour pooling and establishing core regions before they begin to trade with other nations. Indices are used to identify the regions’ specialization in the tourism sector in the NW of the UK, South Turkey, the IOM and North Cyprus. The IOM is found to be more specialized than North Cyprus and South Turkey (Antalya) is found to be more specialized than North Cyprus in the supply side (accommodation). May be size is not the appropriate measurement parameter to compare South Turkey and North Cyprus, because results may be biased and inconsistent. Though both theorists want to explain the same phenomenon, namely the nation’s economic prosperity, they sometimes contradict each other. That is why we need to be critical of both in the next chapter.
Ch 3: The Critics On Porter’s & Krugman’s Theories

3.1 Introduction

This chapter will consist of two leading theoretical approaches to the North Cyprus’ economic competitiveness in international trade. For the future economic prosperity of nations, Porter (1990) explained a new paradigm of *National Competitive Advantage Theory*. We explained the theory by adopting his *Four Stages of National Competitive Development Model* in the first chapter. From this perspective we have said that tourism is the National Diamond for the North Cyprus economic prosperity. In order to strengthen this idea, we decided to use the *Location Theory* (Krugman, 1991) where economic geography is taken into consideration. The *Core and Periphery Model, Localisation, Labour Pooling, and the Indication Model* proposed by Krugman are explained in the previous chapter in detail.

3.2 Evaluation of the Competitive Advantage Theory

Boscheck (1994) supported Porter’s (1980) competitive advantage theory and pointed out that competitive advantage results from identifying, operationalising and controlling those decisions that result in the most cost-efficient creation of insubstitutability i.e., the elimination of competition. He added that such a competition shelter may result from the provision of a superior resource, product or service, or the prevention of access to alternative and economically viable sources of supply.

He also affirmed that a company’s competitive advantage must either reflect some source of superiority in meeting customers demands or the existence of restraints to trade which prevent the use of alternative suppliers. The first type of advantage is generally considered unobjectionable although it may, as in the case of large-scale “naturally monopolistic” suppliers (such as electricity transmitters), justify some regulatory controls on prices and output. The second type of
advantage, however, is banned because it is considered as resulting from "monopolising behavior" that impedes the efficient working of the market mechanism, requires the maintenance of non-productive investments, and creates an option to extract unjustifiable profits in the long run.

Porter (1990) mentioned that economies of scale and market imperfections are indeed important to competitive advantage in many industries. For example, in global competition, firms from any nation can gain scale economies by selling worldwide. Italian firms reaped the economies of scale in appliances, German firms in chemicals, Swedish firms in mining equipment, and Swiss firms in textile machinery: why not North Cyprus in tourism? We say that tourism is the national diamond for North Cyprus. While Porter is trying to explain the diamond of national advantage using, factor conditions, demand conditions, related and supporting industries, and firms strategy, structure and rivalry; he is against the classical economists.

3.3 Criticism of Classical Economists and an Alternative Approach to Economic Geography

Classical economists like Smith and Ricardo pointed out that a nation will export those goods which make most use of the factors with which it is relatively well endowed. Porter criticised them by saying that this doctrine is at best incomplete and at worst incorrect. Basic factors, such as pool of labour or a local raw material source, do not constitute an advantage in knowledge-intensive industries. Companies can access them easily through a global strategy or circumvent them through technology.

Contrary to conventional wisdom, simply having a general work force that is high school or even college educated represents no competitive advantage in modern international competition. To support competitive advantage, a factor must be highly specialised to an industry's particular needs; a scientific institute specialised in optics, a pool of venture capital to fund software companies. These
factors are more scarce, more difficult for foreign competitors to imitate and they require sustained investment to create.

Porter (1991) is against classical economists, because he says that national prosperity grows out on the capacity of the nation’s industry to innovate and upgrade, but not through a country’s natural endowments, its labour pool, its interest rates, or its currency values as classical economists insist. A nation’s competitiveness depends on the capacity of its industries to innovate and upgrade.

As long as the labour costs, interest rates, exchange rates and economies of scale are the most potent determinants of competitiveness, why cannot we consider the classical economists’ pool of labour as the most important direct tool in the determination of national prosperity. There is no doubt that a nation’s industry to innovate and upgrade is important as far as technology is concerned in manufacturing industries, but it should not be generalised as the exclusive way for enlarging the national prosperity. Where the international economy is concerned, Krugman (1993) had another argument. If we want to understand differences in national growth rates, a good place to start is by examining differences in regional growth; if we want to understand international specialisation, a good place to start is with local specialisation. The geographical issues which economic geographers should worry about are the locations where production is taking place. Especially where service is concerned, this becomes even more important.

In international economics, until the 1980s, there was an almost exclusive emphasis on comparative advantage, rather than on increasing returns, as a formulation for trade. The point was that comparative advantage could be modelled by using models that assumed constant returns and competition, which were the tools at hand.
Increasing returns are no longer something to be avoided or assumed away at all costs. The new intellectual opportunities offered by this revolution in theory have, in turn, transformed a series of other fields. In international economics, the past decade has seen a complete rethinking, with the emergence of a new view in which much trade represents arbitrary specialisation based on increasing returns, rather than an effort to take advantage of exogenous differences in resource productivity. More recently, growth theorists have reintroduced the idea that sustained growth may arise from the presence of increasing returns, and old concepts like the "big push" have regained intellectual respectability. Recently some macroeconomists have suggested that increasing returns play a crucial role in business cycles.

Krugman (1993) underlined that the time had come to use the same new tools to resurrect economic geography as a major field within economics. It is no longer the case that the need to model increasing returns makes a field untouchable. Instead, increasing returns are, at the moment, fashionable. Therefore, Porter’s criticism about classical economists is not strong enough and Krugman’s approach on economic geography is strengthening the labour pool idea where Porter was against. Yet, there is a compromising point between two theorists, that both are defending the nation’s economic prosperity.

The role of domestic rivalry illustrates how the diamond operates as a self-reinforcing system. Vigorous domestic rivalry stimulates the development of unique pools of specialised factors, particularly if the rivals are all located in one city or region. The University of California at Davis has become the world’s leading centre of wine-making research, working closely with the Californian wine industry. Krugman (1993) gave similar explanations and similar examples such as: Detroit emerged as the automotive centre, New York as the garment centre, Grand Rapids as the furniture centre. We would reach the conclusion that Porter (1990) and Krugman (1991) have a compromising point on that subject. Krugman examined
influence and virtually disappeared from economic discourse after it became clear that many of the theory's main insights could not be clearly modelled. Economic geography seems to have fared even worse, as economists shied away from grappling with questions about space—such as the size, location, or even existence of cities—because the "terrain was seen as unsuitable for the tools at hand" (Paul R. Krugman, 1995).

Krugman's geographic model is enlightening in that, it shows that even though regions/countries may have the same demand, technology and endowments characteristics, there may be a tendency towards the concentration of manufacturing activity within only one region (the "industrialised core"), leaving the other region to the production only of agriculture (the "agricultural periphery") mentioned by Massilia (1995).

By economic geography, Krugman (1991) meant "the location of production in space"; that is, that branch of economic which worries about where things happen in relation to one another. According to his argument, countries are normally modelled as dimensionless points within which factors of production can be instantly and costlessly moved from one activity to another, and even trade among countries is usually given a sort of spaceless representation in which transport costs are zero for all goods which can be traded.

Why economic geography (Krugman, 1991) ?

1. Location of economic activity within countries is an important subject in its own right.
2. The lines between international economics are becoming blurred in some important cases.
3. It is the intellectual and empirical laboratory that it provides. The "new" trade, growth, and business cycle theories of the past decade have suggested a world view of economics to us that is very different from that of most pre-1980 theories.

We need to make this explanation, because we realise a difference in Porter's (1990) and Krugman's (1991) national and regional competitiveness. Krugman
made a discrimination between regions and nations. He clarifies that regions are more specialised than countries, and regions have more factor mobility experience than countries. When Porter mentioned national competition, he meant global competition. In the case of the EC market, we should analyse the whole market on a regional basis rather than national, because different industries within the same nation may specialise and become competitive within the EC market as well as the world market.

Another criticism by Krugman (1995) was about the comparison of a country and a region with the same size. A region can be more efficient and more successful because it can be more specialised than the country. When regional territories are considered, then core and periphery concepts should be analysed.

Wallerstein (1974) suggested that the genesis of modern marketing systems rests on the interaction between economies at different levels of development. He observed that the economic system of the sixteenth century, which generated modern industrial capitalism, was made up of three interdependent parts: a developed core in Western Europe, a particularly developed semiperiphery in Southern and Eastern Europe, and an underdeveloped periphery in most of the rest of the world. From this, he argued persuasively that the dynamic of capitalism (or a fully developed market economy) is based on the structural imbalance created by integrating regional economies at different levels of development into a “world system”, which allows the concentration of capital in one part of it. There are probably few who would argue with this part of the formulation. Despite its neglect as a serious theory of economic development by economists, it is certainly one of the more interesting contributions to a modern intellectual history. The question that is open for debate is the degree to which “underdevelopment” develops along with development to become a relatively stable economic adjustment.

Krugman (1991) identified that the core-periphery pattern depends on transportation costs, economies of scale and the share of manufacturing in
national income. Where the transportation costs are concerned, then localisation should be discussed. There are three reasons for localisation:

1. The concentration of several firms in a single location offers a pooled market for workers with industry specific skills, ensuring both a lower probability of unemployment and a lower probability of labour shortage.
2. Localised industries can support the production of nontradeable specialised inputs.
3. Informational spillovers can give clustered firms a better production function than isolated producers.

Krugman (1991) based his assumptions on a two-region model and on two kinds of production: agriculture and manufacture. In agriculture, constant returns to scale, are assumed whereas in manufacture increasing returns to scale are assumed. In all of his explanation the Cobb-Douglas production function and the share of utility is structured. When labour is perfectly mobile between different regions, real wage rates will determine the location of trade. Under some circumstances, labour may tend to migrate out of the regions where there is a larger workforce than in the other region. Then regional convergence takes place. If it is vice versa, regional divergence occurs. Krugman (1979a and 1979b) explained that if we consider the extreme case where no trade in goods is possible, but labour is perfectly mobile, then a more populous region will offer both a greater real wage and a greater variety of goods, thus inducing emigration. For the tourism sector where service is concerned and income is highly elastic, the emigration of labour from one region to another is not desirable. In our thesis where North Cyprus and Turkey are neighbours and labour is perfectly mobile, North Cyprus’ firms should offer higher wages to Turkish labour in order to induce them to emigrate to North Cyprus and work there. North Cyprus is lacking labour, not only in tourism but in the other sectors such as agriculture, construction and manufacturing. In equilibrium, all workers will be concentrated in one region or the other. Whichever region ends
up with the population depends on initial conditions; in the presence of increasing returns, history matters.

Brezis and Krugman (1993) specified that migration has a negative effect on wages in the short run and a positive effect in the long run. As can be appreciated, this chapter is mainly on argumentative concepts. It will conclude with critics mainly on Porter and Krugman.

What endogenous migration concerns, it is explained that in reality, migration is rarely completely exogenous to economic factors. Migrants may choose to stay at home, or to seek alternative destinations, and these choices will depend on the economic opportunities as they perceive them. But in the long run, economic opportunities depend on the increase in the labour supply and in the stock of capital.

3.4 Critic of Mergers and Multinationals

Another weakness in Porter's theory could be mergers. He revealed that a strong antitrust policy, especially for horizontal mergers, alliances, and collusive behavior is fundamental to innovation. Whilst it is fashionable nowadays to call for mergers and alliances in the name of globalisation and the creation of national champions, these often undermine the creation of competitive advantage. Real national competitiveness requires governments to disallow mergers, acquisition, and all alliances which involve industry leaders. Furthermore, the same standards for mergers and alliances should apply to both domestic and foreign companies. Finally, government policy should favor internal entry, both domestic and international, over acquisition. Companies should, however, be allowed to acquire small companies in related industries when the move promotes the transfer of skills that could ultimately create competitive advantage.
However, in Brainard’s (1993) model which studies the consequences of labour mobility and firms’ choices of location manufacturing production, *horizontally integrated multinationals* are considered. Brainard's objective is to extend the work of Krugman (1991) in the case where double-plant firms may coexist with single-plant, exporting firms or where firms in different locations (regions or countries) are all horizontally integrated. Massilia (1995) discovered this reality and tried to explain it with an econometric study in a discussion paper.

When integration was discussed, Caves (1982) specified that the vertically integrated firm internalises a market for an intermediate product, just as the horizontal MNE internalises markets for intangible assets. When a MNE acquires another firm, the risk is reduced by entering foreign markets via an acquisition because of the information stock. He added that there is some evidence that widely diversified companies often set up a process of expanding via acquisition, whether in their national home markets or abroad, and there may be administrative economies of scale in that process itself.

Porter (1980) emphasised that global industries require a firm to compete on a worldwide, coordinated basis or face strategic disadvantage. Some industries which are international, in the sense of being populated by multinational companies, do not have the essential characteristics of a global industry. Industries with multinational companies are not necessarily global industries.

On the one hand, a global enterprise sells a fairly uniform product throughout all around the world. In Porter’s model on the other hand, the MNEs views each of their businesses as independent entities. Thus the MNE has less chance of selling a uniform or standardised product, because of its attention to host-country variety. Of course, what Porter has identified is the polycentric MNE. There are other types of MNEs. Hout, Porter, and Rudden (1991) suggested that in a multidomestic industry, a company’s management tries to operate effectively across a series of worldwide positions, with diverse product requirements, growth rates, competitive environments and political risks.
In contrast, a global industry pits one multinational's entire worldwide system of product and market positions against another. In a global business, management competes worldwide against a few number of other multinationals in the world market.

One of the strongest theorists on multinationals, Markusen (1995) emphasised that multiproduct and multiproduct production, whether horizontal or vertical are generally excluded from the analysis. This is potentially troubling. After all, industries characterised by scale economies and imperfect competition are often dominated by multinationals.

One organising framework was proposed by Dunning (1977, 1981) who suggested that three conditions are needed for a firm to have a strong motive to undertake direct investment. This has become known as the OLI framework: ownership, location, and internalisation. Dunning (1981) pointed out that the foreign market must offer a location advantage which makes it profitable to produce the product in the foreign country rather than simply to produce it at home and export it to the foreign market. Although tariffs, quotas, transport costs and cheap factor prices are the most obvious sources of location advantages, factors such as access to customers can also be important. Indeed, many multinationals are in service industries (e.g. hotels) in which on-site provision of the services is an inherent part of a company's business.1 Helpman (1984) is another leading theorist in the literature on multinationals; he deals with horizontal and vertical integration.

Why do the firms multinationalise? The reasons were given briefly by Helpman (1984):

1. Because of the tax advantage,
2. Because of saving transport costs,

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1It is possible to think of such services as simply being characterised by high transport costs.
3. Because of no tariff restrictions, and
4. Because of playing a central role.

Apart from describing a general equilibrium system and the conditions under which firms choose to become multinational, the theory provides an explanation of trade patterns in which the multinational corporations play a central role. There is intersectoral, intra-industry and intra-firm trade.

A firm that produces a spectrum of varieties of the finished good will use only a small number of varieties of the middle product (here the qualification that the returns to scale are not too strong is important). And if the horizontal span of firms is such that they do not overlap in product space in the sense that no variety is produced by more than one firm, then a bilateral monopoly situation would arise between an independent supplier and the user of the middle product if the latter chooses not to produce intermediate inputs for its own use. This market structure reinforces the rationale for vertical integration that was described above [Williamson (1971), Porter and Spence (1977) and Klein et al. (1978)].

The above paragraph is taken from Helpman's (1985) article in which he developed a new approach on the theory of international trade which predicts elaborate trade patterns whose components include intersectoral, intra-industry and intra-firm trade, with the volume of intra-firm trade consisting of trade in invisible and intermediate inputs. This theory goes a long way towards explaining observed trade patterns by means of general equilibrium models and it can shed light on international policy issues such as tariffs and corporate taxation.

We realise from the literature that Helpman and Krugman (1985) are in the same parallel on vertical integration and Markusen and Hortsmann (1987) on the horizontal integration.

Rugman (1982), who is one of the most famous leading theorists on multinationals, emphasised that internalisation theory demonstrates that the MNE is an organisation which uses its internal market to produce and distribute products in an efficient manner in situations where a regular market fails to operate. In particular, the MNE allocates intermediate products such as knowledge to desirable world markets.
On a parallel track, Dunning (1981) sought to explain the MNE in terms of an *eclectic theory* of international production. There is essentially no substantial difference between the eclectic theory developed by Dunning and the internalisation theory, once the assumption is made that market imperfections are exogenous. The potential difference in the theories arises only if the MNE is assumed to have the power to generate its own firm-specific advantages over time; that is, to endogenise them. In essence, this is not a substantive difference, merely a choice of the suitable method of modelling the MNE.

Rugman (1982) said that MNEs often engage in backward integration to ensure quality control of their goods and services. They then sell to the upper end of the market, where the provision of good quality products is demanded and where a premium for this knowledge advantage can be realized. This occurs (e.g. in the international hotel industry) where buyer uncertainty is reduced by the provision of a good quality service through a worldwide reservation system, mainly for businessmen. In this case the advantage of the MNE lies in its ability to generate sufficient know-how to guarantee a good quality product to consumers.

As long as our thesis is relevant to tourism, we are more interested in the service sector, especially multinationals in the tourist trade. Dunning and McQueen (1982) applied the eclectic theory of the MNE to the international hotel industry. This work complements related papers by Dunning and Norman (1979 and 1981) on the application of the eclectic model to the determination of multinational office location. Both studies examine the conditions under which the theory is relevant in the service sector; they are consequently valuable additions to a literature which has its first focus on the role of MNEs in manufacturing industry. Dunning and Norman (1979 and 1981) take the three eclectic theory conditions (ownership advantages, location and internalisation) and use them to study the location of international offices. One of their interesting findings is that quality control is more difficult and costly for office
services than for international hotel chains and that the fixed costs of FDI\(^2\) in offices are lower than in hotels. Therefore the barriers to FDI are lower for office services than for international hotel chains.

Dunning and McQueen (1982) implemented the eclectic theory in another part of the service sector: the international hotel industry. They identified three conditions as being necessary for multinational activity: ownership, location and internalisation advantages. They found that the eclectic theory broadly explains the patterns of FDI in this industry with the exception of location advantages (which are irrelevant). Ownership advantages operate as a brand name "experience good" in the hotel chains which also internalize knowledge or other types of firm-specific advantages.

Rugman (1982) underlined that the internalisation theory is a more useful explanation for the multinational enterprise than more eclectic approaches, because in the internalisation theory only exogenous environmental parameters are modelled in order to explain the changes in countries' macro economic variables.

Buckley, Newbould and Thurwell (1988) debated the constraints of the 'ideal' market servicing strategy which only exists when proper regard is paid to the constraints on forms of market servicing. For example, exports are not feasible for many firms in tourism, because of the need to perform the service in situ. It is similarly ruled out for bulky or perishable products or when the key activity is location specific, e.g. natural attractions or sunshine. Licensing is often not feasible because of the difficulties of finding a licensee or franchisee with all the right qualities, notably with the ability to exploit the transferred information fully. Firms are also loath to lose their key proprietary advantages by market transfers. FDI faces severe constraints in terms of capital availability and management skills. It is also regarded as highly risky. This is particularly true for small firms and first time foreign investors. Market servicing strategies, therefore, must be

\(^2\) FDI stands for Foreign Direct Investment.
related to the firm's available resources. It is relatively easy for firms to become over-extended if they attempt to penetrate too many foreign markets in too short a time-span. Witt, Brooke and Buckley (1995) also commented on an incremental or step-by-step approach to foreign market entry and stated that this strategy can be based on the identification of markets that are 'close' to home in terms of business practices and conditions, language, lifestyle and historical background, in order to avoid problems of more 'distant' markets, which can be tackled as the firm's international experience grows.

3.4.1 Ownership - Specific Advantages

If we decide to evaluate the net advantages of foreign firms in the hotel industry, we should first examine the nature of the product supplied by the industry. Essentially it has three ingredients.

The first, and most important, is a package of "on premises" services which offer a particular life-style and ambiance for the customer where he is a guest. All hotels provide the basic services of lodgings and food and drink, but the kind and quality of accommodation and substance varies considerably as for other services offered.\(^3\)

The second ingredient is the provision, or arrangement, of before, at the time, or after "off premises" services for their guest, e.g. transport from home or the airport to the hotel, reservations with restaurants and/or other hotels, local excursions and sightseeing tours, booking facilities for theaters, sporting events, etc.

The third component of the product of hoteliers is the extent to which a customer may be assured that the services he is actually being sold are those he

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\(^3\)These include the location of hotel, entertainment, leisure, shopping, conference and business facilities, the extent and quality of housekeeping and restaurant services, the decor and furnishings of public rooms and the general amenities of the hotel. e.g. gardens, provision for children, TV in bedrooms, etc.
expects to obtain. A "trademark" of guarantee may be particularly important where customers are buying a product "sight unseen" and have little real knowledge of what is being offered for sale. Indeed it is characteristic of the international hotel industry that many guests are one-time visitors; and that assessment of the product's ability to satisfy wants can only be experienced after it is bought.

Hotels do not just provide a standard room but a large number of ancillary services catering for the requirements of a particular clientele and this is closely reflected in their choice of the location of the hotel, pricing and marketing strategy. The Holiday Inn e.g., the world's largest international hotel chain,⁴ is generally aimed at the family group and lower-level management staff market. Inter-Continental Hotels and Hilton (respectively the second and third largest) are geared more to meet the needs of the business travelers, while Sheraton (fourth largest) aims for the luxury. Hotels which are closely linked to international tour operators (wholesalers), such as Club Mediterranee, Thomas Hotels, Caledonian Hotel Management, Steigenberger Hotels and Neckerman and Reisen, cater for the middle-level three-star segment of the market. Trusthouse Forte (sixth largest) covers a large part of the range from luxury (e.g. George V, Paris) to small country hotels in England. The international hotel industry can therefore be viewed as producing differentiated products in the same way as, for example, the car or cosmetic industry.

⁴These sequences have been done in 1982 among the world largest hotels, however, the rank has changed a lot within ten years.
Table 3.1 The Largest Hotel Groups And Number Of Bed Capacity (1994 figures)

<table>
<thead>
<tr>
<th>Group</th>
<th>Rooms</th>
<th>Hotels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitality Franchise Systems</td>
<td>354,997</td>
<td>3,413</td>
</tr>
<tr>
<td>Holiday Inn Worldwide</td>
<td>328,679</td>
<td>1,692</td>
</tr>
<tr>
<td>Best Western International</td>
<td>273,804</td>
<td>3,351</td>
</tr>
<tr>
<td>Accor Group</td>
<td>238,990</td>
<td>2,098</td>
</tr>
<tr>
<td>Choice Hotels International Inc.</td>
<td>230,430</td>
<td>2,502</td>
</tr>
<tr>
<td>Marriot Corporation</td>
<td>186,919</td>
<td>750</td>
</tr>
<tr>
<td>ITT Sheraton Corp.</td>
<td>132,361</td>
<td>426</td>
</tr>
<tr>
<td>Hilton Hotel Corp.</td>
<td>94,653</td>
<td>242</td>
</tr>
<tr>
<td>Forte</td>
<td>76,330</td>
<td>871</td>
</tr>
<tr>
<td>Hyatt hotels/Hyatt International</td>
<td>77,579</td>
<td>164</td>
</tr>
<tr>
<td>Carlson/Radisson/Colony</td>
<td>76,069</td>
<td>336</td>
</tr>
<tr>
<td>Promus Cos</td>
<td>75,558</td>
<td>459</td>
</tr>
<tr>
<td>Club Mediterranee SA</td>
<td>63,067</td>
<td>261</td>
</tr>
<tr>
<td>Hilton International</td>
<td>52,979</td>
<td>160</td>
</tr>
<tr>
<td>Sol Group</td>
<td>40,163</td>
<td>156</td>
</tr>
<tr>
<td>Inter-Continental Hotels</td>
<td>39,000</td>
<td>104</td>
</tr>
<tr>
<td>Westin Hotels &amp; Resorts</td>
<td>38,029</td>
<td>75</td>
</tr>
<tr>
<td>New World/Ramada International</td>
<td>36,520</td>
<td>133</td>
</tr>
<tr>
<td>Canadian Pacific Hotels</td>
<td>27,970</td>
<td>86</td>
</tr>
<tr>
<td>Societe du Louvre</td>
<td>27,427</td>
<td>398</td>
</tr>
</tbody>
</table>

Source: Vellas and Becherel (1995)

In the United Kingdom, the major chains are publicly quoted companies (plc). They comprise up nearly 25 per cent of the industry, recording an 11.8 per cent increase from 1988 to 1991. The largest group is Forte with 338 hotels in the UK (29,530 rooms) followed by Mount Charlotted Thistle Hotels with 109 hotels (14,263 rooms) and Queen Moat Houses with 102 hotels (10,434 rooms). Almost 40 per cent of plc rooms are in the five primary UK cities and are concentrated in the middle and upper level of the market. Forte, the 60-year old family-run international hotel dynasty, succumbed to a 3.9 billion hostile bid from Granada, the television-to-motorway service group (Guardian 1996, Jan 24).

Hotels and airlines are good examples of multinationals, as Dunning (1981) clearly stated. Leading international hotel chains are racing to become the first Western hoteliers to open hotels in the Lebanese capital of Beirut after the end of the civil war. The Inter-Continental and Marriot chains were planning to open
luxury hotels in the city, and are due to be followed by other hotel groups over
the next few years such as Forte and Hilton International (The Times, 1995
Nov).

That is to say that MNE "involvement", at least in developed countries, would
be predominantly in hotel reservation and referral systems, backed up by regular
inspection to ensure standards of quality. It is certainly not obvious that the hotel
sector in developed countries suffers from any significant market failure in the
supply of trained personnel which would justify hotels engaging in the high costs
associated with what are often quite elaborate training programs.

3.4.2 Firm - Specific Characteristics of Ownership Advantages

The UNCTC Report (UNCTD, 1982) identified four main groups of
international corporation in the hotel sector:

1. hotel chains associated with airlines,
2. international hotel chains,
3. management advisory companies, and
4. tour operators or travel agents.

Some hotels emphasise their advantages in marketing and concentrate on referral
systems (e.g. Best Western) and franchising (e.g. Holiday Inn). Others regard
themselves as providing a package of professional, managerial and organizational
services which cover every stage of hotel operations (e.g. Hilton International,
which explicitly rejects involvement solely through franchise agreements).

Airline-associated MNE chains have a marketing advantage as being able to
arrange advertising and reservations in conjunction with that of the parent
company airline. Witt, Brooke and Buckley (1995) said that hotel chains
associated with airlines have various arrangements, but most often these are
through a minority equity stake loosely tying the hotel to the airline and enabling
cross marketing to take place and packages to be bought with 'associated' hotels. Specialised international hotel chains are a key component of international operations. Such chains frequently franchise operations which are often ultimately owned by the conglomerate parent company. Specialist international hotel development and management companies appear to be in decline, as explained by the authors named above. Their business has largely been in the developing countries, but with the desire for local participation the franchise has become more popular.

Similarly, hotels associated with tour operators (wholesalers) will also presumably be able to plan for and maintain higher occupancy rates because the parent company is in a central position in channeling tourists towards its own hotel. The tour operator and travel agents who are involved in the international hotel business are enabling to control the accommodation needs of the customers and to package operations. It is to be noted that the ultimate owners of travel firms (like hotel chains) are often conglomerates, whose other interests lie outside the tourism field.

The factors which determine the profitability of MNE involvement in the hotel sector will also broadly determine the profitability of FDI, while the volume and direction of international trade and investment will determine the flows of international business tourists, thereby determining the location of MNE hotels, since they largely cater for this section of the market.

Within the broad picture, firm-specific variations occur. For example, there is reason to suppose that the airline-associated MNEs chain favor countries, and locations within countries, served by the parent company airline. Indeed the airlines’ international hotel operations may be regarded, at least in the initial stage of development, as an important part of the “development arm” of the airline, consolidating market shares on particular routes or indicating commitment to a particular country. Thereby increasing the chance of being

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5 Keller (1987) will be used to explain levels of investment in the next chapter.
offered traffic rights on new and potentially lucrative routes. This was certainly
the case in the early years of Inter-Continental Hotels (operated by PanAm) and
Hilton International Inc. (operated by TWA) and appears to be currently so for
Japan Airlines, Continental Airlines and, to a lesser extent, British Caledonian
and Air France (Meridien Hotels).

The methods of operation of international airlines tend to be wholly owned core
business, combined with a network of joint ventures, minority owned operations
and co-operative technical agreements in business areas bounding the core. The
exception to this rule is the increasing diversification down the marketing chain
into tour operation and the wholesaling and retailing of inclusive tour holidays
and travel packages.

3.4.3 Internalisation Advantage

International tourism would appear to offer substantial benefits from the
horizontal integration of airlines, hotels and tour operators (wholesalers) and
indeed all the major international airlines have tour operating interests. Many
have hotel interests and some of the largest European tour operators have close
associations with charter airlines and operate hotel subsidiaries. However, these
linkages are, with the exception of some tour operator-charter airline links⁶,
generally not significant. For example, although Hilton International is wholly
owned by TWA and Inter-Continental Hotels (ICH) by Pan-Am⁷, these hotel
groups are in fact largely operated as separate professional and specialist
hoteliers in their own right and whilst at first there was a close complement
between the airline’s routes and the location of hotels, this is no longer the case.

Only 22 per cent of Hilton International hotels and 60 per cent of ICH are at or
near destinations served by the parent company airline. Some major airlines, for

⁶E.g. Thomson (the largest UK tour operator organizing over three-quarters of a million inclusive
tour holidays) and Britannia Airways are both part of the International Thomson Organization.
⁷Acquired by Grand Metropolitan Hotels in August 1981.
example British Airways, do not operate any hotels\textsuperscript{8}, while the other airlines\textsuperscript{9} have disposed of some or all of their interests. The only exception they have found is Japan Airlines which owns or manages seven hotels outside Japan and has developed marketing or referral arrangements with 48 others\textsuperscript{10}.

The MNE may also introduce the sophisticated technologies associated with large hotels rather than the simpler technologies of small-scale hotels (which may be more appropriate, particularly for resort tourism) in order to reduce the appropriateness problem and increase the returns of the MNE.

Finally, if our analysis of the industry is correct and in particular if the MNE hotels do not simply produce a “quality” product but a differentiated one as well, then investment in training by the government will be a necessary but not a sufficient condition for a successful indigenous hotel section. Cooperation with an established MNE will also be required both to impart proprietary knowledge and to enable effective marketing of the hotel.

Caves (1982) has emphasised that after describing the arm’s length market for industrial technology, we turn to the transfer of technology by MNEs, which leads into the product life-cycle and overall patterns in the flow of technology and innovations among countries.

Krugman (1979b) presented a model that does not explicitly capture MNE as a capital arbitrator but it develops the general-equilibrium implications of technology transfers. He explained the gains and losses of the technology transfer between the home and foreign country with an assumption of “new goods” (technologically known by home) and “old goods” (are those producible in foreign). In his assumption labour is the only factor which is, immobile between Home and Foreign.

\textsuperscript{8}Although it does have some minor equity participation with some other European airlines in the Penta Group of hotels.

\textsuperscript{9}E.g. KLM, American Airlines.

\textsuperscript{10}All information given above covers the period before 1982. The recent developments are given with the references of the newspapers.
For capital, he assumed that it is internationally mobile and explained the equilibrium condition with its rate of return. Capital movements in Krugman’s model (1979b) are a consequence of technology transfer, not a cause. There is also a sense in which they substitute for technology transfers in making world production as efficient as possible. That is, technology transfers shift the world’s production possibility frontier outward, because they permit producing the existing quantity of the new good at a lower resource cost.

3.5 Conclusion

Porter (1995) in his “Competitive Advantage of the Inner Cities” said that an economic model must begin with the premise that inner city businesses should be profitable and positioned to compete on a regional, national, and even international scale. These businesses should be capable of not only serving the local community but also exporting goods and services to the surrounding economy. The cornerstone of such a model is to identify and exploit the competitive advantages of inner cities that will translate into truly profitable businesses. The real need and the real opportunity is to create wealth. We also understand that Porter is agreeing with Krugman.

In his new model, Porter (1995) stressed on Location and Business Development, and debated on clusters that arise in a particular location for specific historical or geographical reasons; reasons which may cease to matter over time as the cluster itself becomes powerful and completely self-sustaining. In successful clusters such as Hollywood, Silicon Valley, Wall Street, and Detroit, several competitors often push one another to improve products and processes. If location (and the event of history) give rise to clusters, it are clusters that drive economic development. They create new capabilities, new companies, and new industries.

To bring the theory to bear on the inner city, we must first identify the inner city’s competitive advantages and the ways inner city businesses can forge
connections with the surrounding urban and regional economies. There is a
common misconception that the inner city enjoys two main advantages: low cost
real estate and labour. Real estate and labour costs are often higher in the inner
city than in suburban and rural areas. Porter’s ongoing research on urban areas
across the United States identifies four main advantages of the inner city:

1. strategic location,
2. local market demand,
3. integration with regional clusters, and
4. human resources.

Inner cities are located in what should be economically valuable areas. They sit
near congested high rent areas, major business centres, transportation and
communication nodes. As a result, inner cities can offer a competitive edge to
companies which benefit from proximity to downtown business districts,
logistical infrastructure, entertainment or tourist centres, and concentration of
companies. Moreover, in deciding what types of business are appropriate to
locate in the inner city, it is critical to be realistic about the pool of potential
employees.

The most critical aspects of the new economic model - the importance of the
location of the inner city; the connections between the inner city businesses and
regional clusters; and the development of export-oriented businesses - require the
presence of strong logistical links between inner city business sites and the
surrounding economy. Inner city companies without well trained managers
experience a series of predictable problems that are similar to those that affect
many small businesses: weaknesses in strategy development, market
segmentation, customer-needs evaluation, introduction of information
technology, process design, cost control, securing or restructuring financing,
interaction with lenders and government regulatory agencies, crafting business
plans, and employee training.

Location in an economically distressed area and employment of a significant
percentage of its residents should be the qualification for government assistance
and preference programmes. Government entities could also develop a more
strategic approach to developing transportation and communication infrastructures, which would facilitate the movement of goods, employees, customers, and suppliers within and beyond the inner city.

Another modernisation made by Porter and Linde (1995) is about environmental studies. They emphasised that properly designed environmental standards can trigger innovations that lower the total cost of a product or improve its value. Such innovations allow companies to use a range of inputs more productively - from raw materials to energy and labour; thus offsetting the costs of improving environmental impact and ending the stalemate. Ultimately, this enhanced resource productivity makes companies more competitive, not less.

Companies can always innovate at low cost to reduce environmental impact. However, companies show that there are considerable opportunities to reduce pollution through innovations that redesign products, processes, and methods of operation. In the Hotel for example, sewage drainage systems in big complexes causing pollution which is not acceptable for tourists. Administration pays much for building highly innovated systems in order to avoid that sort of risk.

Today globalisation is making the notion of comparative advantage, obsolete. Companies can source low-cost inputs anywhere, and new, rapidly emerging technologies can offset disadvantages in the cost of inputs. Since technology is constantly changing, the new paradigm of global competitiveness requires the ability to innovate rapidly. Porter and Linde (1995) argue that resisting innovation leads to loss of competitiveness in today’s global economy.

This new paradigm has profound implications for the debate about environmental policy; about how to approach it and how to regulate it. The new paradigm has brought environmental improvement and competitiveness together. It is important to use resources productively, whether those resources are natural and physical or human and capital. Environmental progress demands that companies innovate to raise resource productivity; and that is precisely what the new
challenges of global competition demand. Resisting innovation that reduces pollution, as the US car industry did in the 1970s, will lead not only to environmental damage, but also to the loss of competitiveness in the global economy. Developing countries that stick with resource-wasting methods and forgo environmental standards, because they are “too expensive”, will remain uncompetitive, relegating themselves to poverty.

In the case of tourism, a destination which is heavily constructed with huge buildings which harm the environment, especially the green and natural scenery, loses competitiveness and needs a further rejuvenation as we will explain by using Butler’s (1980) Tourist Destination Life Cycle concept in the next chapter. This situation has already been experienced by Spain and South Cyprus.
4.1 The Tourism Phenomena

Tourism has grown in international importance over the last two decades and is one of the largest industries in the world. Tourism has a major economic impact on the wealth and development of many countries - especially small islands. Economic prosperity was achieved quickly in South Cyprus, Malta, Greece, Spain and many other countries due to the mass tourism market. The World Tourism Organisation Secretary General, Francesco Frangialli (WTO, 1998) emphasised that tourism contributes more than 6 percent of the world’s GNP and deriving employment opportunities accounting for over 200 million jobs world-wide. Inbound tourism as an export and an earner of foreign exchange for the host destination countries assumes vital importance. The econometric analysis of tourism demand is going to be explained in chapter 8 and the income and price elasticities will give us better understandings of how host destination countries are progressing from tourism.

4.1.1 The Definition of Tourism

Before defining theoretical definitions of tourism we will explain how tourism started in the world. What is its history? According to Turner and Ash (1975), a Baptist preacher Thomas Cook organised the first excursion train to carry nearly 600 people from Leicester to Loughborough for a temperance meeting on 5th July, 1841. Since then the word “tourism” became popular and in daily use. In fact there are many definitions available for tourism and sometimes it is difficult to give the most correct explanations, but we will try to give some of the selected ones.

Gunn (1988) for example, considers that tourism includes all travelling except commuting. Another definition stresses that tourism involves travelling away from home for leisure purposes. It is therefore seen as a subset of leisure and recreation.
Kelly (1985) writes that tourism is "...recreation on the move, engaging in activity away from home in which the travel is at least part of the satisfaction sought". The World Tourism Organisation defines that tourism includes all travel that involves a stay of at least one night, but less than one year, away from home. This therefore includes travel for such purposes as visiting friends or relatives, or to undertake business. Jafari (1977) defined tourism as the study of man away from his usual habitat, of the industry which responds to his needs, and of the impacts that both he and the industry have on the host's socio-cultural, economic and physical environment. On the other hand, Smith (1988) said that tourism is the aggregate of all businesses that directly provide goods or services to facilitate the home environment. Murphy (1980) defined tourism as an industry which uses the community as a resource, sells it as a product, and, in the process, affects the lives of everyone. Ryan (1993) explained tourism from the supply & demand perspective. According to Ryan, it is a study of the demand for and supply of accommodation and supportive services for those staying away from home, and the resultant patterns of expenditure, income creation and employment. British Tourist Authority (BTA) described tourism as a stay of one or more nights away from home for holidays, visits to friends or relatives, business conferences or any other purpose, except such things as boarding education or semi-permanent employment. Williams & Shaw (1995) brought a different approach to tourism; they differentiated the period of visit. According to their explanation it is usually considered to involve visits of more than 24 hours (but less than one year) for business or recreational purposes and has to be differentiated from shorter visits, known as excursions, whether these involve national or international journeys. Broadly, tourism is a phenomenon variably distributed in space; the location of destinations and markets, and the flow of people, capital, and ideas between the origins and destinations are at the core of the activity. Tourism influences the form, use, and protection of the landscape (Britton 1978). In the tourism literature Williams and Shaw (1995), Dawes and D’Elia (1995), Ioannides (1994, 1995), Leiper (1990) provide the principal definitions of tourism. Tourism can be divided into many different forms on the basis of length of stay, type of transport used, price paid or the number of travellers in the group. Boniface & Cooper (1987) defined *domestic tourism* as those
travelling within their own country and *international tourism* as those travelling to a country other than that in which they normally live. Mainly another currency is used and people speak a different language. But this is not necessarily always true. Boniface and Cooper also differentiated tourism as either *long* or *short haul tourism*. Journeys generally taken over 3,000 kilometres classified as *long haul tourism* and below 3,000 kilometres as *short haul tourism*. Another form of tourism is classified as *holiday tourism* (5 "s" type: sun, sea, sand, shopping and sex) in which touring, sight-seeing and culture is included; *common interest tourism* where as it has a purpose of visiting friends, and relatives, religion, health, or education reasons, and *business tourism*, those attending trade fairs and conferences, or participating in incentive travel schemes (Holloway 1983).

Economic geographers ask the critical question whether tourism is a sector with wide economic, political and social ramification or not (Williams and Montari (1995). It is, for example, as much a form of production as it is of consumption, yet, national geographic bodies, such as the Institute of British Geographers' Economic Geography Study Group, or international geographic bodies such as the IGU's industrial activity commission, have largely ignored tourism, or even hospitality management, as a form of economic activity. Instead, much of the interest in tourism has flowed from cultural and transport geography. Being unbiased, there is a concession for tourism applied by most of the countries in the world and we believe it is rhetoric to ignore tourism.

There is much debate in the literature about leisure, recreation and tourism. The situation becomes more confused because of imprecise terminology. Therefore, there is a need for clarifying the meaning of each of these terms. Sometimes the word *tourism* is confused with *leisure* and *recreation*. Leisure is a measure of time and is usually used to mean the time left over after work, sleep, and personal and household chores have been completed. In other words, leisure is free for individuals to spend as they please. Recreation is normally taken to mean the variety of activities undertaken during leisure time. Basically, recreation refreshes a person's strength and spirit and can include activities as diverse as watching television, or holidaying abroad. If leisure is a measure of time, and recreation embraces the
activities undertaken during that time, then tourism is a kind of activity. The only difference in terminology is recreation based either at home or close to home, or at the opposite extreme travel for tourism where some distance is involved and overnight accommodation may be needed.

4.1.2 The Definition of Tourist

Up until now we have explained tourism, but we have not mentioned anything about the "tourist" yet. Who is the tourist? There are many definitions available about tourists in the tourism literature.

The League of Nations in 1937 recommended that a tourist be defined as someone "who travels for a period of 24 hours or more in a country other than that in which he usually resides. The World Tourism Organisation (previously the International Union of Official Travel Organisations) have, through the UN Conference on International Travel and Tourism (1963), agreed the term "visitors" (Williams and Shaw 1994). This covers two main categories: tourists - temporary visitors staying for at least 24 hours, whose purpose could be defined as either leisure or business; and excursionists - temporary visitors staying less than 24 hours, including cruise ship travellers, but excluding travellers in transit. Such ideas have been greatly extended into the construction of more comprehensive and elaborate classifications that relate types of travellers with scale and purpose of journey. Within this perspective, many trips are multipurpose, involving a range of primary and secondary activities. In Cohen's (1972) initial study he recognised four main types, ranging from the organised mass tourist to the individual mass tourist, the explorer and the drifter. In addition, these groups were also differentiated along the lines of contact with the tourism industry, with mass tourists being termed "institutionalised" and the more individualistic tourists regarded as "non-institutionalised".
4.1.2.1 Cohen’s (1972) Four Types of Tourists

The organised mass tourists are the least adventurous tourists who, on buying their package holiday, remain encapsulated in an "environmental bubble", divorced from the host community as they remain primarily in the hotel complex. Trips not complex and are "organised tours" which are fixed by tour operators. Such tourists make few decisions about their holiday. The individual mass tourists are more or less similar to the organised mass tourist in which tour operators utilise all facilities but they have some control over their own itinerary. They may use the hotel as a base and hire a car for their own trips. However, many will tend to visit the same places as the mass organised tourist in that they will visit the "sight".

The explorers arrange their own trip and attempt to get off the beaten track. Yet they will still have recourse to comfortable tourist accommodation. However, much of their travel will be motivated by a wish to associate with local people, and they will often speak the language of the host community. Nonetheless, the explorers retain many of the basic routines of their own life style.

The drifters will shun contact with the tourist and tourist establishments, and will identify with the host community. They will live with the locals and adopt many of the practices of that community. Income is generated by working within the community, but often through low skilled work, which creates a tendency to mix with the lower socio-economic groups. Mass tourists are generally classified as institutionalised tourists and individual tourists are classified as non-institutionalised tourists. Institutionalised tourists are the ones who enjoy the environment, hotel and bus tours, whereas non-institutionalised tourists are the ones who are not interested in events. They are interested in the host culture. Cohen (1979) explained the typologies of tourists but, within this theoretical framework, he also tried to explain the psychological motivation of the tourist. Bastin (1984) summarised Cohen's five different modes of vacation such as; diversionary mode, recreational mode, experiential mode, experimental mode and existential mode. The diversionary mode is one in which individuals seek nothing more than an escape
from the drudgery and meaninglessness of life in their home countries. The *recreational mode* involves people who wish to experience the host culture, but seek no participation and are content to see the location from tour buses and to view staged events.

The *experiential mode* introduces the idea of cultural validity by arguing that this particular type of traveller is alienated in his own society and is searching for meaning through the lives of others. The *experimental mode* refers to travellers who derive enjoyment and reassurance from others authentic lives, but do not fully commit themselves to the life style of the host culture.

The *existential mode* is that in which tourists have a strong sense of commitment to the host culture, and who alternate between their home residence and their chosen (spiritual) centre. Bastin (1984) implemented Cohen's vacational modes on Jamaica, in which Jamaican tourism is highly dependent on the USA and the growth of mass tourism since the Hotel Incentive Bill of 1968 is closely related with American tourist modes.

### 4.1.2.2 Plog's (1972) Categorization of Tourists

Plog (1972) argued that there was a continuum between types of tourists such as; psychocentric, near psychocentric, midcentric, near allocentric and allocentric tourists. The allocentric is akin to Cohen's explorers in that they seek new destinations and are prepared to take risks in searching for new cultures and places. On the other hand, the psychocentric tourists seek the familiar, and are happier in an environment where there are many tourists who are like-minded. They are not risk-takers and adhere to the proven product, being conservative in choice. Plog identified that these types of tourists would be drawn to a particular destination.
Why do the tourist typology models remain useful? They remain useful for three main reasons:

1. They highlight the broad diversity of tourists, their demands and consumption,
2. They provide an insight into the motivations of tourists and their behaviour,
3. Such perspectives provide a platform from which to explore the relationships between tourist consumption and the socio-cultural fabric of destination areas.

4.2 Butler’s (1980) Tourist Area Life Cycle Model

Butler (1980) explained the tourist area life cycle in six different stages: exploration, involvement, development, consolidation, stagnation and decline. *Exploration* is the first stage in which there are a small number of visitors. Plog’s allocentric or Cohen’s explorer can be used as an example for this stage. The second one, the *involvement stage*, is the stage when the host community begins to respond to the increasing numbers of visitors by providing some facilities. In the later stages of the involvement stage, some of the host community might recognise that tourism will
continue to grow and that, in order to earn more from it, they will have to expand the facilities being provided. They look for commercial sources of finance to provide more facilities. The next stage is the development stage. Butler then assumed that the process continues, and the numbers of tourists coming begin to grow quite significantly. He described this stage as being the one where the community now becomes a tourist resort. Plog's midcentric or Cohen's institutionalised tourist can be relevant with this stage. Consolidation is a stage of take-overs and mergers within the industry as the transport - leisure - accommodation company buy-outs occur. The tourists now being attracted are the "organised mass market" and the "psychocentrics".

*Stagnation* is not a "fashionable" stage. In order to sustain visitor numbers, the tour operators may have to resort to low prices to attract the volume of tourists that they consider necessary to sustain their investment. The last stage is the decline stage. It is the end stage. Profit margins fall and the number of tourists falls because it is more boring for the tourist, and they say that the tourist is looking for new destinations and differences which might be more attractive to them. Rejuvenation is necessary to discover the new alternatives for tourists. As long as we are studying tourism, then our product is a "package" - tour package, in which accommodation, transportation, attractions are included. When tourists buy a package, it means that they accept everything included in it. Therefore, rejuvenation is a kind of progressing stage, or innovation to create a new package, more attractive, noble to the holiday makers, in order to prevent reaching the decline stage.

The model proposed by Butler (1980) has attracted criticism, particularly failing to take into account changes on the demand and supply sides. Cooper (1990) argues that the life-cycle concept is extremely dependent on supply side factors, such as the rate of development, tourist access, government policy and competing resort areas, as well as demand factors. Haywood (1986) and Cooper (1990) also provided
critiques of the difficulties of operationalising the model. Haywood, for example, suggests that there are six major conceptual and measurement decisions concerning the definition of: the areal unit of analysis, the relevant market areas, the shape of the curve, the resort's stage in the life-cycle, the unit of measurement (i.e. numbers of tourists, visitors, overnights, spend etc.), and finding the relevant time frame. He argues that until such issues are fully resolved, the model's applicability to strategy and forecasting is questionable.

Wolfe (1983) offered a similar approach to Butler's in that he more explicitly took environmental changes into account. He used a different curve, but he explained the same ideas. Butler's model is also tested positively by Meyer-Arendt (1987), Van Duijn (1983), also found this model deterministic. Keller (1987) also made a big contribution to Butler's (1980) Tourist Area Life-Cycle model with his Hierarchies of Control and Capital Input model. In his theory, he divided this cycle into four phases. It is possible to distinguish between first *Discovery*, second *Local Control*, third *Institutionalism* and fourth *Crisis Period*.

He argued that tourism development in a peripheral or disadvantaged region will start as a small-scale enterprise. The initial development will involve local entrepreneurs who recognise profit when satisfying the needs of a small group of explorers and drifters or allocentrics. For tourism growth, Keller classified stages as discovery, local, regional, national and international stages on a scale of development within a specified period. At the initial stage, which is the stage of discovery, only a negligible number of visitors are received and they are absorbed into the existing peripheral environment and infrastructure.

During Butler's (1980) involvement stage, which is akin to Cohen's (1972) allocentric and Plog's (1972) drifters, Keller (1987) said that visitor volume reaches a level beyond the capabilities and capacity of the local decision-making. National,
foreign and multinational corporations may perceive the peripheral destination as a good investment opportunity and therefore enforce their presence on the regional and local planning structure in which the period is akin Cohen's consolidation stage. Keller specified the period in which control and decision making is influenced by foreign and multinational developers in the development stage of Butler's model, which is akin to Cohen's organised mass tourist (institutionalism is reached). Subject to national, foreign and multinational developers, the tourism industry is turned into a highly competitive, internationally marketed tourism destination. At this stage, it is not feasible for foreign and multinational corporations to take over the decision-making process through their powers of influence. Stage four, is the crisis period or the stage of stagnation/rejuvenation. During this stage, exploitation and overcrowding of the peripheral destination will have led to a loss of the initial attraction of the region, a subsequent decline in reputation, and consequently a decline in demand. Increased input of further capital and infrastructure will yield little or no added return.

Butler notes three options open at this stage. One is to try and maintain the periphery's image at an established and attractive status quo. The second is to aim for a deliberate decline and ultimate deterioration of the industry, and thus to maximise what profit there remains in the short term. The third is to try to change or elaborate upon the existing image of the destination and to market it as a new product. For the applicability of the model, Keller pointed out that this model is no doubt theoretical and general in nature. It is certain that it will not explain the evolution of every peripheral tourist destination, but then this is not the essence of model development.

He applied this model to a case study of Canada and said that the tourism industry in the island's development is at, or beyond the stage of institutionalism. The objectives of the model are to demonstrate that different typologies of consumers,
producers and regulating authorities are attracted to the peripheral development through time and that, while the development is compatible with the goals and objectives of some authorities and organisations, it involves major adaptations, impacts and change elsewhere down the hierarchy. Impacts will range from positive and constructive to negative and destructive, depending on the stage in the growth cycle, and who judges them. Attitudes and perceptions of impact will vary depending on the "judge's" attitude towards development and economic growth, and which hierarchy and interest group is represented.

As we mentioned, Butler's Hypothetical Tourist Area Life Cycle applied to Canadian Northwest territories and, Keller developed the cycle in an examination of centre/periphery tourism. On the other hand, Cooper and Jackson implemented Butler's (1980) model to the Isle of Man case study. Although the Isle of Man is separated from the mainland UK, it shares many of the characteristics of other UK resorts. Most resorts were products of the popular culture of the late Victorian and Edwardian periods and many now face similar problems of sustaining development.

![Fig. 4.2 The Isle of Man Tourist Area Cycle of Evolution](image)

*Fig. 4.2 The Isle of Man Tourist Area Cycle of Evolution*
*Source: Cooper and Jackson (1989)*
The Isle of Man has been through all the principal stages and is currently facing the problem of stagnation (Figure 4.2) and it needs to determine strategies for rejuvenation in the 1990's (Cooper and Jackson 1985). The take-off into mass tourism development can be dated from the 1880s. Passenger arrivals at Douglas rose from about 90,000 in 1873 to 615,726 in 1913. The period in general was one of unprecedented growth and expansion in the island tourism industry (Birch 1964). Douglas was an important element in the regional pattern of holiday development. The pace of its expansion and the style of the resort were largely determined by the demands of this predominantly working class catchment. However, the changing nature of the tourist product was not simply a result of these pressures. Several agencies, including the Manx Government, the Isle of Man Steam Packet Company and the Douglas Corporation all responsible for encouraging specialisation in provision, as the potential returns from such action became increasingly evident from the rapid rise of other resorts (notably Blackpool) on the English mainland.

Why did the Isle of Man not specialise as much as Blackpool? There are many reasons such as infrastructure investments, distance (transportation costs) for domestic tourists, the relative prices of small hotels on the island. The island has inherent problems which makes it difficult to compete with other tourist destinations, and tourism is likely to continue to decline in relative importance to the Island's economy. The demise of the traditional working class family holiday, and with it the whole infrastructure of dance halls and donkey rides has now partly been off-set by expansion in other areas, most notably the financial sector.

The biggest sector with 35% contribution to the Isle of Man's GDP. There is an apparent inevitability in the cycle of the Isle of Man's tourist development. Rapid expansion and over specialisation led in the long run to inbuilt restrictions on change and rejuvenation and hence eventual decline. But this can only be a partial explanation for the fortunes of the industry. The process of development was constantly influenced by agencies, operating within the framework of a free market economy, which determined the direction the industry followed. In particular, the interplay between the forces of demand and supply, in the late 19th century, had a profound effect on the character of the Isle of Man holiday product. There are some
reasons why the Isle of Man was not appropriate for tourism, as much as Mediterranean islands, after the Second World War. These were as follows:

1. The Isle of Man's geographical situation made it expensive to reach, and it offers no day-trips,
2. The island is dependent on the British domestic long-holiday market,
3. It has failed to respond to changing market demands and effective competitive initiatives elsewhere.
4. Other reasons (e.g. cost, climate, facilities etc.)

By the 1980s, the Isle of Man had approached the decline stage of the tourist area life cycle; the catchment area was restricted and the characteristics of holiday visitors reflected the latter stages of the cycle. By 1986, there were 471,260 arrivals around representing a steady decrease since the peak of 763,145 in the year (1979). The rate of decline decreased significantly in the mid-1980s at a rate of around 2.5% per annum. After 1986, the number of passenger arrivals started to increase steadily and reached to 525,636 in 1990 from 471,260 in 1986. Because of the Gulf crisis, the Isle of Man was also affected by the recession and the number again fell to 485,874 in 1991 and 467,496 in 1992. But the Isle of Man tourist sector and Manx government had previous experience and they achieved above 500,000 after 1993.

According to the Isle of Man official figures in 1994, 513,287 passengers visited the island, 55% travelled by air and 45% by sea. They started developing coach tour services from England, Ireland, Scotland and Wales. This will increase the number of tourists visiting the IOM. It is less costly and more adventurous. Tours offers a wide variety of Island sightseeing tours, both full and half day which provide visitors with an opportunity to discover some of the island's rich heritage and natural beauty. For 1996 ABTA bonded tours (IOM) will provide a wide and varied program quality, value for money holidays with luxury coaches (IOM Courier, 26 Oct. 1995, p.20).
An insecure economic climate encourages late booking and little advance holiday preparation. Here, the added cost of air travel, or the effort of a sea crossing, placed the Isle of Man at a competitive disadvantage. Secondly, demographic trends have reduced demand for traditional family holidays as the number of children under 5 years of age declines (Middleton 1987). Moreover, with the competition from holiday destinations abroad, it is clear that the Isle of Man cannot compete on price or facilities in the mass market and must seek new areas of business. Consumer convenience goods in the Isle of Man are 10% higher than anywhere else on the UK mainland. Only the alcoholic drinks and tobacco prices were some 3.5% lower due to lower excise duties on the Island than in the UK. These goods are classified as luxury goods in general. Therefore, when tourists meet needs, especially basic needs, they will pay more on the IOM than anywhere else on the UK mainland. This makes the Isle of Man relatively less competitive than the other tourist destinations so it has a negative effect on the tourist potential. Apart from higher average price levels, the Isle of Man also experiences three further problems. These are as follows:

1. The range of unbranded (or "own-brand") goods, often sold by larger retail outlets at lower prices, is narrower on the Island than in Northwest England.
2. The availability of larger (and often better value to consumers) packet sizes of foodstuffs is more limited on the island.
3. Certain types of goods (e.g. chill-serve goods) are not as widely available on the island as in Northwest England.

Fuel for vehicles sold on the island is mainly four star leaded petrol (2% more expensive on the island), unleaded petrol (1% more expensive) and diesel (5% more expensive). Consequently all public transportation is relatively more expensive than anywhere else in the UK. Other disadvantages which the Isle of Man shares in common with other small islands is higher stockholding costs. Goods in stock can also deteriorate or go out of fashion. The island wholesalers, retailers and energy suppliers hold on average greater stocks than their mainland counterparts. The first reason are the dangers of interrupted shipments of goods (e.g. through bad weather
or industrial disputes). The second reason is the need to import in economically sized consignments. This, together with the relatively small and fragmented nature of island demand means greater stocks must be held at any given point in time. Lastly, the desire to obtain bulk purchase discounts from suppliers or retail goods and energy suppliers. The Isle of Man has also failed to exploit economies of scale and it has restricted competition. Classic local monopoly conditions are still apparent on the Island.

4.2.1 Rejuvenation strategies for the Isle of Man tourism

We have summarised below ten rejuvenation strategies to overcome the tourism problems where the IOM is currently facing:

1. Marketing is the most important problem for the island's tourism. More effective marketing policies should be developed and advertising and promotion expenditures must be increased.

2. Bigger and attractive stands should be prepared at tourism fairs to attract more tourists in the world travel markets. The IOM has to be more competitive among rivals such as Channel Islands, Jersey and Guernsey.

3. The IOM Department of Tourism and Leisure must have closer relations with the private sector of the industry. A hoteliers, transport companies and restaurateurs consortium has to be developed in different countries. British Tourist Board and England's North Country consortium has to be more active with the IOM tourism department associations. In order to achieve this, more representative relations have to be developed and foreign relations must be strengthened.

4. Brochures published should be delivered to more agencies, and profit margin on package holiday brochures has to be increased.

5. The IOM's marketing budget covers so many activities. The marketing experts have key contacts mainly with the travel industry and media. In addition to consumer and trade activity, the Department operates the IOM Conference Bureau designed to attract corporate or association
meetings to the island. This should be expanded and other islands’ (Malta, S.Cyprus etc.) experiences have to be considered.

6. The IOM’s accommodation is registered and graded with crowns and keys. Crowns are used for full board service accommodation and keys are for self-catering accommodation including campsites and holiday hostels. The maintenance of standards and quality in providing services are very important issues. The Department of Tourism and Leisure should adopt high service standards designed to maintain a balance between first-time and repeat business.

7. Strengthening public relations is necessary for the island tourism development. The IOM’s advertising campaigns in the UK and Ireland are designed to create positive awareness amongst key target groups. Elements within these campaigns include brochure distributing advertisements; magazine advertising to create and sustain awareness through the holiday decision-making period and subject to available finance, television advertising in key regions.

8. Like TT (Tourist Trophy) races and TT festivals which are held annually from late May into early June, other kinds of event should be organised to support tourism. Sporting events taking place in England might be transferred onto the island from time to time. More football fields and stadia should be constructed with all sorts of facilities and, during the break in the football season, many of the foreign teams from abroad could be invited to the island for the preparation of next season. The island weather is quite convenient for the Scandinavian, Mediterranean and other European football teams. This source of tourism is more beneficial because the average night length of stay is much higher than the others. The budget should be allocated to the other art related events as well as heritage events.

9. Air transport costs are relatively higher when compared with Mediterranean destinations. All necessary modernisation should be done on aircraft, and quality and frequency should be improved. More chartered flights must be organised and costs should be reduced. Charter
and day trip operations should be encouraged and supported. Further access to the island by coaches should be encouraged. Travel facilities should remain within the private sector.

10. Funds should be allocated on the basis of priorities. The environment has to be the first priority and all necessary investments must be carried out without any hesitation. Oil and gas exploration is taking place around the island with a possibility of pollution occurring while they are drilling the sea bed. Marine pollution is dangerous for the island coasts and the animals living on the island. The protection of the environment was given a particularly high priority because of all of the IOM acreage lies within 12 miles of its coast line. Licence conditions in this respect, which are based on the UK guidelines for inshore operations, are regarded as especially onerous (Financial Times, 15 Feb., 1996).

4.2.2 Environmental Problems And Sustainable Development In The IOM

We cannot afford to be complacent. The Manx countryside is changing for the worse. The natural heritage is the birthright of the Manx people and the government must protect it for the future generations. We must act now. Traa-di-loar (time enough) won't do (Hendry, 1995).

Hendry (1995) has used strong words to argue that the IOM government must take the opportunity to sign the Rio Convention to show it is willing to work to protect the national heritage in the same way that it protects architectural heritage. Natural heritage is important for the economy, as many tourists visit the IOM to enjoy the countryside and wildlife, inland and at sea. He stressed that it can never be restored once lost, and is too important to be neglected. There is a campaign for recycling (e.g. scrap metal, waste engine oil, CFC gas from old refrigerators, glass bottles and jars, aluminium drink cans, newspaper, etc.) on the island. In 1989 over 2,700 tones of glass, more than 8,300 tones of paper and some 70 tones of aluminium cans have been exported for recycling. A subsidy is provided by the Department of Local Government and Environment for recycling and it costs more than £0.25m per year (IOM Courier, 26 Oct. 1995, p.68). The IOM parliament, Tynwald, has approved an integrated waste management strategy in 1994 (IOM Courier, 26 Oct. 1995, p.67),
which is designed to encourage the reduction, reuse and recycling of waste and to provide an incinerator and associated landfill to dispose of the remaining refuse. The strategy confirms the Tynwald’s (Department of Local Government and the Environment) commitment to provide the IOM inhabitants with:

- municipal incinerator plant, to be in operation by the end of the year 2000, which meets EU standards to prevent air pollution and is designed to recover and utilise energy when practical and economic;
- a landfill site for incinerator residues;
- within the incineration complex, a separate clinical waste incinerator along with facilities for fallen animals and for the witnessed destruction of confidential materials;
- facilities to appropriately support recycling efforts;
- civic amenity sites for the collection of household garden waste and bulk debris; and
- a facility to receive and handle wastes - such as industrial wastes - which require specialist disposal off the island.

And to encourage:

- development of uses for incinerator bottom ash in the building industry;
- the use of community recycling facilities; and
- re-use of as much construction waste as possible, with the remainder going to landfill (not one used for incinerator residues) for reclamation or for use as cover material.

Making laws and enforcing regulations to protect the environment is not sufficient. Education, particularly environmental education, has a significant part to play in helping citizens children, young people and adults from all walks of life to understand the principles of sustainable development and accept that development should lead to social equity, ecological sustainability and economic efficiency (Ventura, 1994). Educating Manx society on environmental issues will help to protect island’s environment and preserve it for future generations. Environmental issues which will have an effect are considered to be as follows:

- Nature conservation zones,
- Sites of ecological importance for nature conservation,
• Manx nature reserves,
• Prevention of the pollution of the waters,
• Protection of coastal areas,
• Sewage treatment,
• The interests of the Manx Museum and National Trust.

4.3 The Development of North Cyprus Tourism

As a result of the political problems, North Cyprus does not enjoy full recognition in the international world, therefore, it has not passed from the first stage to subsequent stages as quickly as South Cyprus. Of course, this situation allowed the Turkish Cypriot market to decrease competition and South Cyprus enjoyed all the benefits of monopoly in the world market. The Product Life Cycle model could easily be applied to all kinds of industrial developments in which Gore (1994) explained as later economists Kojima's (1973) and Yamazawa's (1990) "the catching-up product-cycle pattern of industrial development". After the separation in 1974, there was the great loss in Famagusta, the island's largest resort, and most of the suburb of Varosha - which contained about 6,000 beds (out of 10,796) in hotels and hotel apartments and the main business district. That area was receiving more than 250,000 tourists annually (264,000 in 1973) from all over Europe. But after 1974, Varosha was abandoned as a "restricted zone" until both sides can find a bilateral and bizonal solution.

Lockhart (1994) emphasised that, while Ioannides (1992) was able to claim confidently that the Cyprus government has steered the South Cyprus' tourism industry towards the consolidation stage of Butler's (1980) model, assessment of North Cyprus' position is more difficult. On the one hand, elements of the exploration phase remain, such as the plethora of small-scale locally owned enterprises and the large number of visitors who make their own travel arrangements. On the other hand, there is much evidence, especially since the late 1980s, of new facilities for visitors, wider advertising and growing numbers of
What kind of preventative measures could be taken in order to overcome these shortcomings and shifting from one stage to another? Although tourism has not yet been fully studied, economic development, economic geography and tourism are related matters. Ioannides (1995) mentioned that the tourist industry cannot enhance its legitimacy as a subject for economic geographers until its theoretical underpinnings are strengthened. The Tourism Promotion Bill - 1987 - foresaw a five year development plan which laid emphasis on the expansion of external economic activities. Within this framework, tourism was to become the cornerstone of the economy and an all-out effort would be made to attract investments in the industry and related activities. Some of the incentives included in the Bill, such as: low land rents, import duty exemptions, tax rebates and provision for the repatriation of profits. Islands must also be able to provide infrastructure to support the tourist inflow. In some cases, tourism can actually produce the basic demand that makes it economic to provide a service to the local population.

Apart from air transport, other examples are roads and electricity supply. In other cases, however, lack of infrastructure facilities can prevent the development of industry. This is why North Cyprus tourism has not been developed enough, as Ioannides has explained. Preparing a Tourism Master Plan is the principal way to overcome the shortcomings of the economic problems. We simply argue that North Cyprus must prepare a tourism master plan in order to steer the tourism industry towards the consolidation stage of Butler's model from the development stage.

Fig. 4.3 North Cyprus Tourist Area Cycle of Evolution
We believe that a master plan is the prerequisite for the social and economic success. Such a plan has never been prepared for North Cyprus to guide its tourism in an organised way. The master plan that we will propose, has been presented in an international conference in Malta, organised by the Islands and Small States Institute of the Foundation for International Studies in March 1996 and many of contributions were made by many experts who are working on the same field. Environment issues have not been taken into consideration and unstructured construction has polluted the natural scenery. Economic incentives have not been given for proper and feasible projects. The infrastructure has not been completed and relevant investment opportunities missed out from time to time. The governors always used the excuse of financial problems and defended themselves by having international embargoes. Yet, they employed so many people for the government services and caused perennial salary problems which are more than 50% of the annual budget of the government.

4.3.1 Tourism Master Plan

There are many definitions of tourism planning, but Getz (1992) defined it as a process, based on research and evaluation, which seeks to optimise the potential contribution of tourism to human welfare and environmental quality. In the literature you will find Murphy (1980), Hall (1970), Braddon (1982), and Acerenza (1985) who have written on tourism planning and explained the sources of plans such as:

1. General national plan.
4. Tourism infrastructure plan.
5. National promotion and marketing plan.

These are all at national level. It is also possible to plan at the local level, regional level, inter-regional level, and sectoral level. The most appropriate master plan for
North Cyprus tourism which we found during our research is at regional level. The Isle of Man also planned on regional level and showed the priority for the undeveloped regions which was the potential for the economic and environment developments. Yorucu and Basel (1995) explained that five regional master plans for North Cyprus tourism could be the most appropriate for the environmental and economic developments. All infrastructure investments have to be completed with the policies which will be indicated in the master plan. The regions could be as follows:

1. Karpass Peninsula (Northeast Region).
2. Lefke & Yesilirmak (Northwest Region).
3. Kyrenia (Northern Region).
4. Famagusta & Salamis (Eastern Region).
5. Nicosia (Central Region).

Each region should be separated from other with a boundary and a separate map has to be drawn for each region. Every detail should be shown on the maps and a country physical plan must be composed with them. Finally, all master plans should be combined and integrated into as a single official Tourism Master Plan for North Cyprus. There should be intersectoral relations within the economy, related institutions and associations, municipalities and universities.

Demand analysis (which will be discussed in chapters 5 and 8) is always the first stage of a master plan. North Cyprus is currently having a supply constraint demand (we will use lagged dependent variable in demand estimation) and a master plan will contribute to overcoming the infrastructure shortcomings. The second stage should be the preparation stage. Socio-cultural, economic, environmental protection should be investigated and analysed. There should be a link between the World Tourism Organisation and other International Tourism Organisations to find out what kind of incentives and priorities are given and how are they distributed, what sort of directives they have and how do they adapt? Nation’s advantage always stays second, but they work in a more efficient and specialised way to carry passengers to
the resorts than government institutions. Indirect benefits for the other sectors of the economy are also high. The economic, social, cultural, political, and environmental targets should be defined in the master plan aiming to achieve the objectives set by the physical plan. These plans and targets should be controlled with a feedback system. The relevant actions and unavoidable interventions have to be taken whenever it is necessary. The third step should be the application stage. These can be such as:

1. Tourism destinations should be separated and classified with their qualities and characteristics. Those which are separated should be reserved and safeguarded. These can be as follows:

   - separating rural areas with their characteristic peculiarities,
   - establishing the areas which are predominantly for tourist use (tourist accommodation),
   - establishing coastal areas,
   - creating tourism development areas (gaining the unused zones),
   - fixing the tourist villages and small residential use,
   - organising footpaths and illustrating them on the tourism master plan map,
   - securing the areas defined by an ecological survey as nature conservation zones, nature reserves, and sites of ecological importance for conservation and clarifying them with the boundaries on the master plan map,
   - agreeing the land covered by water and the land which will have future water supply capacity; all kinds of possibilities of pollution affecting the existing water supplies should be investigated and installed on the master plan map; new techniques should be developed for the desalinating existing water potential,
   - demonstrating all overhead high tension lines and electricity distribution networks, radio and television stations, etc., and illustrating them on the master plan map,
   - drawing all traffic roads on the tourism master plan map,
• featuring museums, historical values, and monuments on the master plan map,
• establishing all picnic areas, camping areas, forest and woodland areas and illustrating them on the master plan map,
• sketching sewerage and drainage lines on the master plan map,
• setting up the future development areas may be available for possible tourist accommodation construction and showing them on the master plan map,
• showing open public spaces on the master plan map,
• establishing and illustrating both existing and future game, and sporting facilities areas on the master plan map,
• creating the leisure purpose areas (e.g. festival areas, fair centres etc.),
• showing the Yesilirmak-Gemikonagi railway on the master plan map,
• showing all airports on the master plan map,
• showing harbours and marinas on the master plan map,
• showing all public beaches on the master plan map,
• showing birdwatching hides both for ornithologists or 'twitchers' and drawing them on the master plan,
• showing all rivers, canals, dams on the master plan,
• showing all existing zoos on the master plan map, and
• others.

2. Those tourism areas mentioned above under section 1, should only be used for tourism purposes. All kind of tourism differentiation that we thought has to be applied for tourism services by the master plan.

4.3.2 Policy and Standards of Development

4.3.2.1 Intersectoral Relations

In order to develop and expand tourism there should be a close link between sectors of the state. The tourism master plan can only be applied if close relations can be
established with all the sectors to prepare the strategies and standards. These sectors are as follows:

- Ministry of Education,
- Ministry of Agriculture, Energy and Natural Resources,
- Ministry of Interior,
- Ministry of Transportation,
- Ministry of Youth, Sport and Environment,
- Ministry of Foreign Affairs,
- Municipalities and Local Authorities, and
- Universities and High Schools.

4.3.2.2 Tourism promotion and marketing policies

All sources of promotion for North Cyprus tourism should be carried out and, within this framework, the promotion and marketing strategies must be indicated in the tourism master plan. Technology is part of daily life. All kind of information is available through a network system. Much of this information could be allocated more efficiently and less costlessly all over the world through internet. Advertising should be enlarged and a more effective advert policy has to be applied.

4.3.2.3 Transportation

Transportation should be restructured within the tourism master plan, and both domestic and international transportation has to be renewed. Aiming new transportation policies through foreign investments will solve serious problems, and with the support of technology and finance, a more positive era will start in the transportation sector. Long delays in air transportation has to be eliminated through the acquisition of new aircraft. Public transportation from airports to the cities ought to be expanded.
4.3.2.4 Communication

Information technology on tourism is essential and inevitable. Communication has to be modernised within the master plan and more communication facilities must be provided with the relevant standards. More alternative calling preferences can be given with a single phone machines (e.g., with credit card, coinage, phone cards, swift cards etc.). The postal system must be more frequent and daily. Tourist information offices have to be expanded to the whole cities and villages. Inquiry lines ought to be on duty in 24 hours a day.

4.3.2.5 Education

More attractive education policies should be established by taking the targeted number of tourists and the amount of accommodation into account which will be put into the master plan. This should be renewed periodically with the inquiries of the sector. More skilful personnel (waiters, chefs, receptionists, clerks, porters.) must be trained, educated and expanded. Tourism college education has to be enlarged and more financial supports should be given. The hotel management school should expand for the standard and ordinary level of employees that will be indicated in the master plan.

4.3.2.6 Environment

Tourism as we regarded before is the locomotive sector in the growth of North Cyprus. Although UNDP noted that environmental issues need to be taken into account in designing the future of tourism in North Cyprus, we need to clarify that the tourism master plan has to be prepared whilst considering the threat of tourism to the environment. The first priority must be given to the coastline which is 240 miles (387 km) in length. Ribbon development of the coast would destroy biological and scenic diversity and threaten the coastal ecosystem. All sources of industrial construction, domestic buildings and tourism have to be regulated with a master plan. The turtle beaches (Alagadi and Altinkum) should be protected and conserved
as natural reserves. The question of the creation of a national park in the Karpass Peninsula will be addressed with the careful attention of the environmental aspects. This will be harmonised and regulated with the master plan. All agricultural lands and rural landscapes will also be included as environmental care issues in the master plan. All kinds of prevention to protect forests from fire must be taken within a master plan.

Damage to one ecosystem gives rise to reverberating effects in "downstream" ecosystems. For example, on some islands, removal of forest cover has resulted in declining land and water fauna, increasing soil erosion and sedimentation, and consequent adverse impacts on estuarine and marine resources. Pollution of the sea will always be under the control of the specialists and has to be governed by the Environment Ministry. All sources of wastes and agrochemical coming from the coasts of Egypt, Israel, Lebanon, and Syria are threatening Cyprus' coast, so with the help of Greenpeace all necessary notes will be given. Sewerage systems linked to the sea will be investigated and cancelled by developing new treatment systems. The tourism master plan will also regulate the architectural pollution. The greatest possible harmonisation will be given to the environment through the master plan. All municipal control has to be done on a routine basis and new constructions must involve certain high limits.

The investors have to ascertain all environmental restraints before starting their investment. Monuments and architectural buildings should be restored with their historical originity. Increasing population in North Cyprus causes energy and water shortages in which these sources are scarce as being a small island and having limited resources. Another electricity power supply must be constructed with minimal cost energy inputs and additional water dams for an increasing demand for consumption. Turkish Cypriots recently started to construct a new water dams in Yesilirmak (Limmniti - Northwest region) area and hoping to collect more rainwater which was flowing into the sea and wasted. All streets and roads should be cleaned daily and all paintings including trees ought to be done periodically. A new lightning system must be provided and a brighter environment should be created.
Another important issue which has to be taken into consideration is the marinas. Recently the N. Cyprus government decided to privatise the Kyrenia Marina. Privatising Kyrenia Marina is on the governments’ agenda, however, the project was required to increase the number of existing yacht capacity to seven hundred yachts that it needs another extension to the existing historical breakwater. Yorucu and Basel (1996) strongly criticised this project and are against the policy which will harm the architectural and historical value which does not coincide with environmental ethics. An alternative idea which would be environmentally acceptable is to open new canals for the extra yachts around the Kyrenia Marina. A similar example is available at the Peel Marina in the Isle of Man, or it might be possible to built another marina somewhere which is more convenient.

4.4 Conclusion

The concept of a recognisable cycle in the evolution of tourism is presented, using a basic asymptotic S-curve to illustrate the waving and waning of popularity. The implications of using this model in the planning and management of tourist resources have been discussed in the light of a continuing decline in environmental quality and hence, the attractiveness of many tourist areas. The shape of the curve will vary depending upon supply factors such as the rate of development, access, government policy, and competing destinations; and on the demand factors such as the changing nature of clientele as the destination’s market evolves hand in hand with supply-side developments. At the same time, of course, the shape of the curve must be expected to vary for different areas, reflecting variations in such factors as rate of development, numbers of visitors, accessibility, governmental policies, and numbers of similar competing areas.

The process illustrated in Fig 4.1 has two axes representing the number of visitors and the time. An increase in either direction implies a general reduction in overall quality and attractiveness after capacity levels are reached. Geographical scale is also important for the tourist area life cycle as each country is a mosaic of resorts and
tourist areas (which in turn contain life cycles for hotels, theme parks, etc.). The tourist life cycle is a hypothetical development path dependent upon marketing and managerial actions, rather than independent mechanical process. The model may also be best utilised in descriptive rather than a prescriptive capacity as a rational framework for studying the evolution of tourist destinations through time, taking into account their “complex economic, social and cultural environments”. The model has some strengths as well as some weaknesses in terms of implementation. These are briefly defined by Levitt (1965), Haywood (1986), Meyer-Arendt (1987), France (1994), Pearce (1987), Wilkinson (1990), Cooper and Jackson (1989), Debbage (1990), van Duijn (1983) and Wolfe (1983) such as follows:

**Strengths:**
- it helps to develop and evaluate marketing strategy,
- it helps to sustain large numbers of visitors and profitability,
- it allows consolidation of market share and search for new markets,
- it helps to analyse the patterns of tourism development, and
- it provides a useful conceptual framework within which to study various forms of land-use intensification and environmental improvement and degradation.

**Weaknesses:**
- it does not fit the evolution of every peripheral destination and not all areas experience the stages of the life cycle as clearly as others,
- obtaining historical quantifiable data for testing the hypothesis and modelling the curve for specific areas are not always possible; more than thirty or forty years’ data are necessary to prepare the model and substantiate the general arguments,
- the model is dependent upon the actions of managers as well as the competitive, cultural, social and economic settings of the destination,
- the existence of anomalies can complicate the situation,
- rapidly changing supply and demand factors brings a distorted and scalloped shape to the S-curve of Butler's tourist area life cycle,
• using tourist arrivals for describing the cycle is not always accurate because decline in the number of tourists does not always demonstrate that the destination enters into a decline stage because, in rare cases fewer, high spending individuals may replace a larger number of low-spending package tourists,

• in most cases the resort cycle ignores the effect of seasonal variations and the fact that at different times of the year the destination may appeal to different market segments,

• economic variables such as tourist expenditures may also be misleading if used for describing a destinations' resort cycle,

• the model has focused on internal dynamics of specific resorts, thereby ignoring both the structure of the tourism industry and the competition from other resorts,

• the model assumes a false universalism, and that this is maintained only by failing to take into account differences in the competitive positions or resources of different resorts, and

• the model is culturally and politically specific and, for example, seems inappropriate for application to developing countries.

All in all, with strengths and weaknesses, we believe that Butler's life cycle model is an intellectual discovery and should be seriously discussed for measuring the economic and environmental effects of every tourist destinations.
5.1 Introduction

Demand theories explain the reasons behind both the development and the intensity of tourism flows between countries. Also tourism demand represents the quantity of goods and services that consumers require at a given moment. It is a direct function of per capita income as well as the population's interest in international tourism. Trends in the number of holidays taken and the percentage of total holidays taken abroad are international tourism indicators.

The theory of demand describes the international specialization of countries with respect to internal, regional and international demand. Vellas and Becherel (1995) emphasised that different levels of demand describe various characteristics in the development of international tourism, notably, tourism exchanges between similar countries of high economic development. The theory of demand was formulated by Linder (1961). He noticed that the difference in the levels of factor endowments between countries did not always reflect international exchanges. Indeed, the greatest number of exchanges are often between economies which have similar factors. For instance, in Europe, the most important tourism exchanges are between neighboring countries. This observation led Linder to reject the theory of factor endowments and to develop a new theory of international exchanges based on interior demand or representative demand.

According to Linder (1961), the level of international specialisation of a country is related to the level of domestic demand. In the main tourist-receptor countries (France, the United States, Canada, Germany, Switzerland and the United Kingdom), international tourism demand complements a domestic demand which is high. In fact, the development of international tourism is a result of conditions created by domestic demand. A country's comparative advantage stems from the quality of its infrastructure and superstructure and also from its tourism know-how,
its level of technology and its favourable environment. Therefore, the volume of international tourism will be higher between countries which have similar domestic tourism structures.

Several forms of tourism can be distinguished for a given country: “domestic” tourism involves residents of this country travelling only within this country; “inbound” tourism involves non-residents crossing international frontiers to travel in the given country; and “outbound” tourism involves residents of the given country crossing international frontiers to travel in another country. Archer (1976) said inbound and outbound tourism together comprise “international” tourism. The main aim of this chapter is to explain the international tourism demand model and to define the methodology that will be used in chapter 8 of the estimate of demand regressions for the North Cyprus tourism demand as well as the Isle of Man, UK, Turkey, Malta, and Austria. Archer (1976) emphasised that in economic terms demand can be defined as the quantity of a commodity or service which a community is willing and able to buy during a given time period.

Tourism demand functions embody the relationship between the demand for international tourism and those factors that influence this demand. When estimated this economic relationship permits the impact of each of these factors on tourism demand to be identified. Witt, Brooke and Buckley (1995) stressed that the group of variables which influences international tourism demand will depend upon the purpose of visit taken. The demand for business travel will depend upon where major business centres are located, whereas the demand for visits to friends and relatives will depend upon where close historical and cultural ties exist, which give rise to the location of friends/relatives in foreign countries. As by far the majority of international tourist trips take place for holiday purposes, and it is only for holiday trips that individuals are completely free to choose the destination, transport mode, and so on. In the case of North Cyprus, most of the trips are taking place for a holiday purpose due to the fact that Cyprus has good sand, sea, sun combination. There are two transport modes to the island either by air or by sea. Most of the trips are made by air and mainly from Turkey. Yet, there are connections to the north of
the island from London, Finland, France, Germany, Austria, Israel and some others via Turkey.

Crouch (1994a) pointed out that the growth in the study of international tourism demand parallels the growth in demand itself over the past three decades. An extensive effort was made to collect as many empirical studies of international tourism demand as could be found. In total, eighty studies were identified. No empirical study of the determinants of international tourism demand was found for the period prior to the 1960s. However, during the three decades since, a total of 5 (1960s), 33 (1970s), and 42 (1980s) useful empirical studies were obtained. An additional five studies reported since 1990 were also identified. We are sure a countless number of studies will be published in the near future.


5.2 The Methodology Used

Even though the methodologies employed vary in a number of ways, they all include the most important methodological dimensions: the nature of the demand coefficient estimation method, the functional form of the model, the type of data used, the adaptation of either a single or a simultaneous equation approach, and the ways in which multicollinearity and serial correlation were managed.

Of all existing methodologies, ordinary least-squares (OLS) multivariable regression analysis has been most widely used. Its advantages include the ability to model cause and effect, to carry out "what if" forecasting, and to provide statistical
measures of accuracy and significance. However, Witt and Martin (1989) underlined that regression analyses may be inappropriate in certain cases and are generally more expensive than noncausal models. Econometric forecasting also needs considerable user understanding in order to develop the correct relationships. Although there is much criticism of the demand regression through OLS, we have decided to estimate the international tourism demand model with the OLS technique with a time series data. Crouch (1994) summarised the critiques and comments on this issue and made a list of different methodologies already applied by many of the researchers and practitioners who are related with tourism demand models.

Regression modelling has generally been of three types. Econometric models focus on an analysis of the impact of economic influences on demand. Gravity models adopt a geographic perspective with an emphasis on mass (i.e., population) and distance considerations. Trip generation models are a hybrid of the other two models. The three types differ more in terms of origin than of method, with gravity models being expressed in a more rigid form (Archer 1980, Anastasopoulos 1984).

Intriligator (1978) explained three sources of data analysis which can be used for demand estimates. These are:

1. Time-series data,
2. Cross-section data,
3. Panel data.

Time-series data measure a particular variable during successive time periods on different dates. The time period is often a year (i.e. annual data), but it can be a quarter, a month, or a week (i.e., quarterly, monthly, or weekly data).

Cross-section data measure a particular variable at a given time for different entities. Just as the “time period” can assume different values in time-series data, the “entity” can assume different identities in cross-section data.
Panel data are generally *microdata* pertaining to individual economic agents, such as families or firms. Most of the data available for econometric research is, however, *macrodata*, pertaining to aggregates of individual agents. Microdata are generally preferable to macrodata since they avoid aggregation problems and allow one to estimate models containing behavioural relations applicable to individual agents.
The most commonly specified mathematical form for international tourism demand functions is log linear. Witt and Moutinho (1994) have expressed the multiplicative relationship as follows:

\[ Y = aX_1^{b_1}X_2^{b_2}...X_k^{b_k}e^u \]  

(1)

where
Y is the demand for international tourism

X₁, ..., Xₖ are the influencing variables

u is a random error term

a₀, b₁, ..., bₖ are parameters

e ≡ 2.178 is the base of natural logarithms.

In order to render equation (1) amenable to estimate using the usual technique of ordinary least squares, it is necessary to take logarithms of the variables (to the base e), which yields an equation which is linear in the natural logs (ln) of the variables:

\[
\ln Y = \ln a + b₁ \ln X₁ + b₂ \ln X₂ + \ldots + bₖ \ln Xₖ + u
\]  

(2)

An ordinary least squares regression of ln Y on ln X₁, ..., ln Xₖ yields estimates of the parameters b₁, b₂, ..., bₖ in equations (1) and (2).

The log linear transformation is often employed because the multiplicative model (1) corresponds to the assumption of constant elasticity. The derivative of Y with respect to X₁ in equation (1) yields:

\[
\frac{\partial Y}{\partial X₁} = ab₁ X₁^{b₁} X₂^{b₂} \ldots Xₖ^{bₖ} e^u
\]

\[
= b₁ (aX₁^{b₁-1} X₂^{b₂} \ldots Xₖ^{bₖ} e^u) / X₁
\]

\[
= b₁ Y / X₁
\]

(3)

But the elasticity of Y with respect to X₁ is defined as:

\[
q_{Y/X₁} = \frac{\partial Y}{\partial X₁} \cdot \frac{X₁}{Y}
\]

(4)

Substitution of equation (3) into equation (4) gives

\[
q_{Y/X₁} = b₁
\]

(5)
Hence, \( b_1 \) is the constant elasticity of \( Y \) with respect to \( X_1 \), and in general \( b_j \) is the constant elasticity of \( Y \) with respect to \( X_j \), \( j = 1, 2, \ldots, k \).

Consider the following demand function:

\[
Y = aX_1^{b_1}X_2^{b_2}X_3^{b_3}e^u
\]  

(6)

where

- \( Y \) is the demand for foreign holidays from a given origin to a given destination
- \( X_1 \) is origin country consumers’ disposable income
- \( X_2 \) is the price of a foreign holiday to the destination
- \( X_3 \) is the price of a foreign holiday to a substitute destination

In equation (6) the parameters \( b_1, b_2, \) and \( b_3 \) may be interpreted as elasticities; hence, \( b_1 \) is the income elasticity of demand, \( b_2 \) is the own-price elasticity of demand, and \( b_3 \) is a cross-price elasticity of demand.

If equation (2) is extended to include dummy variables in the set of influencing variables, the new equation becomes:

\[
\ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + \ldots + b_k \ln X_k + b_{k+1}X_{k+1} + \ldots + b_qX_q + u
\]

(7)

where

- \( X_{k+1}, \ldots, X_q \) are dummy variables
- \( b_{k+1}, \ldots, b_q \) are parameters

As the relationship between the dependent and dummy variables is no longer double logarithmic, the coefficients of the dummy variables are interpreted differently- they are not elasticities.
5.3 The Model

The econometric model which Witt and Martin (1987a) developed for the international tourism demand is explained below in logarithmic form. We will modify Witt and Martin's (1987a) model and implement it in our study.

Using an econometric model to estimate tourism demand is very important for this study because, we are interested in seeing group of variables which influences international tourist arrivals from an origin country to a destination country. Demand estimation is important for tourism of Cyprus. Since we are dealing with small island states, especially N. Cyprus, it may be important to select a regression model that will show the effect of supply constraints demand situation. North Cyprus is facing insufficient bed spaces, airline transportation, infrastructure etc. Therefore, a model including lagged dependent variable is inevitable which is expected to pick up the changes in supply constraint situation. From our survey, we found Witt and Martin (1987a) tourism demand model suitable for our study.

Uysal and Crompton (1984) emphasised that income, relative prices, exchange rates and transport costs are important for a tourism demand model. These are the most important parameters which influences tourist arrivals. The larger the real per capita income of a country, the more likely are its citizens to be able to afford to purchase foreign tourism, all things being equal. The effect of relative prices has been suggested an important variable in explaining international tourism flows. There is a contention that tourists are likely to react when there is a change in the ratio between prices in the exporting country to prices in the receiving country or prices in alternative tourist destinations. Nevertheless, as relative prices decline, an increase in the quantity of international tourism services imported by tourist-generating country should be anticipated, ceteris paribus. Exchange rate may have a significance effect on the extent of international travel. The price of foreign currency will influence tourists. Thus, if the price of foreign currency declines, tourists are likely to demand
more services. International tourism is also dependent upon transportation costs. It may be anticipated that an increase in relative transportation costs would result in a decline in international tourism, all things stays the same.

The modifications we intended to do in Witt and Martin's (1987) model is to include income per capita as an explanatory variable rather than disposable income because of the lack of availability of quarterly data. We excluded substitute variables from the original model either due to potential multicollinearity problems or the lack of data availability. Another important modifications we made in our model is to exclude ferry fares variable since we face the lack of data from many countries. Lastly, we aimed to use quarterly data rather than annually for 1976-1995 period and also included seasonal dummies in our regression model. No such a long run quarterly study has been done on particular countries we are concerning therefore, ours will be new contribution for the literature.

We will first estimate demand with OLS and then use cointegration analysis to see long-run equilibrium relationships. Last of all, we will also make demand forecasting and try to find out the most accurate forecasting technique. All empirical study will take place in chapter 7.

\[
\ln \frac{V_{ijt}}{P_{it}} = \alpha_1 + \alpha_2 \ln \frac{\ln N_{it}}{P_{it}} + \alpha_3 \ln CL_{jt} + \alpha_4 \ln EX_{ijt} + \alpha_5 \ln FF_{ijt} + \alpha_6 \ln S_{ijt} + \alpha_7 D_2 + \alpha_8 D_3 + \alpha_9 D_4 + \alpha_{10} DM_1 + \alpha_{11} DM_2 + \alpha_{12} \ln (\frac{V_{ij(t-4)/P_{i(t-4)}}}{P_{i(t-4)}}) + \alpha_{13} (t) + U_{ijt}
\]

\[V_{ijt}\] is the number of visits from origin i to destination j in year t

\[P_{it}\] is the origin i population in year t

\[IN_{it}\] is the real national income in origin i in year t

\[CL_{it}\] is the cost of living for tourists in destination j in year t (1976 prices)

\[EX_{ijt}\] is the rate of exchange between the currencies of origin i and destination j in year t
\( F_{ijt} = \) is the cost of air fares from origin \( i \) to destination \( j \) in year \( t \) (1976 prices)

\( S_{ijt} = \) is the cost of surface transportation from origin \( i \) to destination \( j \) in year \( t \)
(1976 prices)

\( D_2 = \) is a seasonal dummy variable which picks up the effects of the second quarter of each year (if \( t = Q_2 = 1 \) or 0 otherwise)

\( D_3 = \) is a seasonal dummy variable which picks up the effects of the third quarter of each year (if \( t = Q_3 = 1 \) or 0 otherwise)

\( D_4 = \) is a seasonal dummy variable which picks up the effects of the fourth quarter of each year (if \( t = Q_4 = 1 \) or 0 otherwise)

\( DM = \) is a dummy variable which picks up the effects of the economic, sociologic or political crises (e.g. 1979 oil shock, 1986 economic recession, 1991 Gulf crisis, etc.)

\( t = \) is a trend variable

\( \ln(V_{ij(t-4)}/P_{i(t-4)}) \) is a lagged dependent variable term

\( U_{ijt} = \) is the random disturbance term

\( \alpha_1, \alpha_2, ..., \alpha_{13} = \) are unknown parameters

Ong (1995) pointed out that most tourism demand models are based on multiple regression analysis. The models could be specified in a Cobb-Douglas, linear or log linear form. A log linear model is commonly used, but there is no discussion in the literature as to why such a model is superior at explaining variations in the dependent variable of tourism demand models. Most authors cite computational convenience and the ease of interpretation of the parameters as constant elasticities for choosing the log-linear model, but such reasons are not adequate justifications for preferring the log-linear form (McAleer, 1994). On the other hand, Syriopoulos (1995) has emphasised that there is a new approach to studying tourism demand, concerning major tourist origin and destination countries. A flexible, dynamic econometric model, disaggregated on a country-to-country basis, contributes, on the one hand, to rigorous examination of the impact - in the short run and long run - of major
variables anticipated to affect tourism demand, such as income, prices, exchange rates and unpredicted shocks in the international environment (political instability, oil price changes) and, on the other hand, to estimation of both short run and long run elasticity values. The tourist arrivals, tourism receipts/expenditure, tourist nights and tourist trips were used as a measure of tourism demand.

Ong (1995) also underlined that tourism research typically uses tourists’ expenditures, tourist arrivals or total tourist arrivals per capita as the dependent variable to estimate international tourism demand. He continued in a way that the use of tourist arrival figures does not need to account for tourists’ length of stay. However, information on the average length of stay in a country can be useful for policy makers in tourism-related industries for investment and marketing purposes.

Witt and Witt (1992, 1995) also agreed that the demand for international tourism is measured in terms of the number of holiday visits from an origin country to a foreign destination country, or in terms of holiday expenditures by visitors from the origin country in the destination country.

As the level of foreign tourism from a given origin is expected to depend upon the origin population (the higher the number of people resident in a country, the higher the number of trips taken abroad, ceteris paribus), the demand variable is usually expressed in per capita form. Occasionally, however, population features as a separate explanatory variable rather than demand being expressed in per capita form.

Another comment on the dependent variable was made by Archer (1976) that some researchers, notably Blackwell (1970), Bechdolt (1973), Jud and Joseph (1974) and Leaming and De Gennaro (1974), used the actual number of travellers as a measure of existing demand, but the majority preferred to use visitor expenditure figures as a surrogate for tourism demand.
Most researchers experienced considerable difficulty in isolating the numbers or expenditures of pleasure travellers from those of businessmen and visitors travelling for other purposes and, in practice, few made any attempt to disaggregate these figures. In most cases, the tourism expenditure data are taken directly from national balance of payments figures or from the International Monetary Fund's *Balance of Payments Yearbook*; yet these data seriously undercount the true figures since the transportation sector of the accounts omits all payments made by visitors for shipping, insurance, currency exchange and commissions, and air travel in advance of their journeys. Few researchers, however, make any serious attempt to correct for this source of error. Bond and Ladman (1972), Gray (1966), Guthrie (1961), and Oliver (1971) used, as the dependent variable, crude tourism expenditure figures adjusted to an appropriate base year. Others, including Artus (1970), Barry and O'Hagan (1972), Jud and Joseph (1974), and Kwack (1972), deflated the expenditure figures still further by use of consumer price indices to represent the changing price levels faced by tourists in the countries which they visited. This provides a more effective measure of the real value of tourism expenditure.

5.4 Specification Of The Model

5.4.1 Dependent Variables

The number of holiday visits from an origin country to a foreign destination country will be the dependent variable for the model. We will measure the demand for international tourism in terms of the number of visits per capita from an origin country to a destination country.

In the tourism literature number of tourist visits and tourism expenditures are used as dependent variables in tourism demand estimation. Among many studies, number of tourist arrivals are the most commonly used ones. Witt and Martin's (1987) tourism demand model is the most commonly used one by many researchers and practitioners when number of tourist visit estimation becomes preferable.
Tourism expenditure as a dependent variable is estimated by Uysal and Crompton (1984) which is the selected one that is related with the determinants of demand for international tourist flows to Turkey. The paper looks at the theoretical justification for the inclusion of explanatory variables per capita income, relative price index, relative exchange rate, and promotional expenditure in an econometric model to explain major tourist-generating countries (i.e. FR Germany, the USA, France, Italy, the UK and Greece) expenditure in Turkey.

We did not choose expenditures as a dependent variable because of the lack of data availability for quarterly basis by many countries.

5.4.2 Independent Variables

The number of potential demand determinants is large. The selection of appropriate variables will depend on a number of factors, including the countries examined, the time-period investigated, whether a time-series or cross-sectional study is to be attempted, and the type of tourism involved (e.g., business travel, “sunlast” or “wanderlust” pleasure travel, travel for the purpose of visiting friends and relatives). Archer (1976) pointed out that the explanatory variables most commonly used were income levels, relative prices and travel costs. Other variables included in some studies were marketing expenditure, “border” travel and credit restrictions. In one case, population size was included as a separate explanatory variable, but most researchers avoided its use by expressing that the other variables were relevant in per capita terms.
5.4.2.1 Income

In most studies, the income variable which possesses the most significant explanatory power is expressed as disposable income per capita at constant prices. This measure was used, for example, by Artus (1970), Barry and O’Hagan (1972), Blackwell (1970), Bond and Ladman (1972), Gray (1966), Kwack (1972), and Witt and Martin (1987). Jud and Joseph (1974), however, used an index of Gross National Product in one series of regressions and disposable income per capita deflated by the consumer price index in a later series. Oliver (1971) examined several possible measures of income and found that disposable income gave the most satisfactory results. Witt, Brooke and Buckley (1995) emphasised that income is usually included in the model as origin country real income per capita (corresponding to the specification of demand in per capita terms). As holiday visits are under consideration, the appropriate form of the variable is personal disposable income. Witt and Witt (1995) clarified that if (mainly) holiday visits or visits to friends and relatives are under consideration then the appropriate form of the variable is private consumption or personal disposable income, but even if attention focuses on business visits (or they form an important part of the total), then a more general income variable (such as national income) should be used.

Ong (1995) also stressed that the estimation results obtained by various authors show that tourism demand is income elastic, with estimations ranging from 1.0 to greater than 3.4 (see Gunadhi and Chow (1986) and Syriopoulos (1989). Tourism demand can be income inelastic for some destinations in the short run. In the long run, tourism demand is always elastic. Because of data deficiencies we are obliged to interpolate annual series into quarterly series. Some countries have annual GNP and some annual GDP. Therefore interpolation is implemented on both series. The
interpolated series are adjusted with population, and quarterly income per capita figures are used as a proxy for disposable personal income.

Income data are generated from GDP per capita figures but not all countries publish quarterly GDP per capita figures. IFS monthly statistics sources are used for the income data collection, but for countries where quarterly data are not available we used interpolation techniques. Briefly, we used Vangrevelinghe's (1966) two step interpolation process (see Ginsburgh 1973 for details) and Boot, Feibes and Lisman (1967) for minimizing squared first or second differences techniques.

We obtained additional annual actual export series and quarterly actual export series (as related series) from the same IFS sources. We also used the OECD statistics yearbooks for export and GDP per capita data for comparison purposes.

\[ x_i^* = \text{annual actual series (as related series) (published in IFS)} \]

\[ \hat{x}_j = \text{quarterly estimated export series (related series to be founded)} \]

\[ x_j = \text{quarterly actual export series (published in IFS as related series)} \]

\[ Y_j^* = \text{annual actual GDP series (published in IFS - used for regression and slope)} \]

\[ \hat{Y}_j = \text{quarterly estimated GDP series (to be interpolated and found)} \]

\[ Y_j = \text{quarterly final interpolated GDP series (Final Value)} \]

\[ Y_j = \hat{Y}_j + \hat{a}_1 (X_j - \hat{X}_j) \]

model used for interpolation

(a) minimizing squared first differences: boot et all. (1967)

\[ \sum_{i=2}^{4} (x_i - x_{i-1})^2 \]

(b) minimizing squared second differences
Vangrevelinghe (1966) proposed a method in two steps: firstly interpolate by using a purely mathematical method; secondly modulate the figures obtained by the first step, by using a related series. More formally, let

\[ x_i^* \quad (i = 1, 2, \ldots, n) \text{ and } x_j \quad (j = 1, 2, \ldots, n) \]

be the related annual and quarterly series and \( Y_i^* \quad (i = 1, 2, \ldots, n) \) the series to be interpolated. Thus,

(i) interpolate by Lisman and Sandee's method the series \( x_i^* \) and \( y_i^* \); this generated \( \hat{x}_j \) and \( \hat{y}_j \)

(ii) compute an annual least squares equation \( Y_i^* = \hat{a}_0 + \hat{a}_1 x_i^* \)

(iii) compute the interpolated final \( y_j \) as follows

\[ Y_j = \hat{Y}_j + \hat{a}_1 (X_j - \hat{X}_j) \]

First we used twenty annual GDP/head data from IFS and we estimated the quarterly GDPs'/head' by using Boot, Feibes and Lisman's (1967) minimizing squared first differences and minimizing squared second differences techniques (see a and b). Then we combined the predicted quarterly GDP'/head' figures (\( \hat{Y}_j \)) with Vangrevelinghes (1966) interpolation techniques of related export series (\( \hat{a}_1 (X_j - \hat{X}_j) \)) and finally GDP per head (\( Y_j \)) are obtained.

- \( \hat{a}_1 \) is the slope obtained through regression of related annual export series for different countries of origin.
For Belgium, Denmark, France, Germany, Greece, the Netherlands, Switzerland, North Cyprus and Turkey we used interpolated series. For UK, USA, Italy, Austria and Israel we used quarterly actual series. France and Germany have actual quarterly data, but we made interpolation to compare the accuracy of predicted values.

The actual quarterly or interpolated quarterly series as a proxy have some methodological assessments before they are processed. All GDPs in country of origin currency are converted into US dollars by dividing EXR of country of origin.

(For the UK case\(^1\) we multiplied the EXR rather than dividing them because indirect techniques are used in order to convert UK pounds into US dollars). Then GDPs in US dollars are divided by quarterly estimated population\(^2\) of the country of origin. GDP per head in US dollars are then obtained as a proxy variable. Then we divided GDP per head figures by the CPI of the origin country to put them into real terms. After that we took the logarithms.

5.4.2.2 Population

The main justification for not having population as a separate explanatory variable is that its presence may cause multicollinearity problems, as population tends to be highly correlated with income. On the other hand, the procedure adopted whereby demand is specified in per capita terms, in effect, constraints the population elasticity to equal unity (if a log-linear model is under consideration). Although it is

\(^1\) The UK exchange rates are published differently from those of the other countries. Indirect exchange rate calculations have been done and 1 US dollar is given in an equivalent amount of UK pounds whereas in the majority of the other countries the amount of national currency is given in terms of US dollars.

\(^2\) The quarterly population figures are published in the quarterly UN vital population statistics bulletins.
theoretically incorrect to exclude population, it is likely that population changes in generating countries will be small over the short-medium term, and hence the model will only be affected marginally. The population figures are annual estimates. The population figures will give us more reliable estimates when we take the number of holiday visits abroad data into account as well as the income data. This approach will make the ratio of per capita of income and per capita visits that represents more accuracy. All population statistics are available in the IMF *International Financial Statistics Yearbooks*.

5.4.2.3 Own Price

Another explanatory variable, used by many researchers to test the substitution effect between holidays taken in particular countries and other forms of expenditure, including holidays taken elsewhere, is the *relative levels of prices* in the countries concerned. Basically what is needed is an index which measures the disparity between the prices of goods and services (e.g., the price includes the costs of many goods and services like accommodation, travel, restaurant meals, snacks, souvenirs, postage, car rental) in the host country and the prices of the same goods and services in competing destinations including the home countries of the tourists themselves.

The formation of such an index, however, has so far been prevented by the lack of adequate data for many countries, and in consequence most researchers have used consumer price indices as surrogate values. Morley (1994) pointed out that the use of CPI is justified on the grounds of convenience (the data are readily available) and on the argument that tourists' spending is spread over a wide part of the economy and so may approximate the general average consumer spending used to weight prices in the CPI, or that at least the CPI will track tourism price closely.

According to Witt, Brooke and Buckley (1995), there are two elements of price in international tourism: those costs incurred in reaching the destination, and those
costs to be met while at the destination. Transport cost can be measured by using representative air fares between the origin and destination for air travel and representative ferry fares and/or petrol costs for surface travel. Transport cost should enter to our model in terms of foreign destination currency.

It may be possible to measure the cost of tourism in the destination by a specific tourists’ cost of living variable if appropriate data are available. Jud and Joseph (1974) state that "it is appropriate to use a tourist service price index. Unfortunately, no such an index is available for all countries and to compile a reliable one requires more complete data than are available at present". Otherwise, the consumer price index in a country may be used to represent tourists’ cost of living; Martin and Witt (1987) have shown that this is likely to be a reasonable proxy for the cost of tourism variable. Tourists’ cost of living should be specified in real terms in origin currency. Therefore we use the cost of living variable in real terms in our demand estimation model in chapter 8. It is sometimes suggested that exchange rates should also appear as an explanatory variable influencing international tourism demand. Although exchange rates are already incorporated to some extent in the other price variables, in practice people may be more aware of exchange rates than relative costs of living for tourists in the origin and destination countries, and thus pay considerable attention to this price indicator.

Martin and Witt (1988) have also expressed that tourists’ cost of living data are divided by the exchange rate to convert the proxy tourists’ living costs data from destination currency into origin currency. This is then divided by the origin country’s consumer price index to yield a proxy for real tourists’ living costs. Necessary adjustment is made on the cost of living variable before we take the logarithm form. Chapter 8 has the finally adjusted form of the variables and detailed list of the variables can be found in the annex.
5.4.2.4 Substitute Prices

Economic theory suggests that the prices of substitutes may be important determinants of demand. Potential tourists compare the price of foreign holiday with the price of a domestic holiday in reaching their holiday decision. However, they also compare the costs of holidaying in a particular foreign destination with the costs involved in visiting other foreign countries. Thus, substitute travel costs and substitute tourists' living costs may be important determinants of the demand for international tourism to a given destination from a particular origin (Martin and Witt, 1988). Substitute prices can be accommodated in a model through the inclusion of:

(a) a weighted average substitute transport cost variable, and
(b) a weighted average substitute tourists' cost of living variable.

The weights should reflect the relative attractiveness of the various destinations to residents of the origin under consideration, and are often based on previous market shares.

A common form in which substitute prices enter the demand function is by specifying the tourists' cost of living variable in the form of the destination value relative to the origin value, thus merely permitting substitution between tourist visits to the foreign destination under consideration and domestic tourism. The usual justification for this form of relative price index is that domestic tourism is the most important substitute for foreign tourism.

Other studies incorporate substitute prices in a more sophisticated manner. They allow for the impact of competing foreign destinations by specifying the tourists' cost of living variable as a destination value relative to a weighted average value calculated for a set of alternative destinations, or by specifying a separate weighted average substitute destination cost variable. We omit substitute prices from our demand estimation model when we make the necessary modifications.
5.4.2.5 Exchange Rates

Witt and Martin (1987a) underlined that the inclusion of exchange rates as an explanatory variable is not clear cut because of the interrelationship between exchange rates and relative inflation rates. However, as exchange rates can fluctuate more rapidly than relative rates of inflation, many studies have specifically examined the influence of exchange rates on the demand for international tourism (e.g., EIU 1972; Gibbons and Fish 1985; Rosenweig 1985, 1986, 1988; Artus 1970; Chadee and Mieczkowski 1987; Gerakis 1965).

Fluctuating exchange rates can result in several different effects on tourism. The EIU (1975) identified the impacts of an unfavorable change in exchange rates to include (1) less travel abroad, (2) travel to different locations, (3) a reduction in expenditure and/or length of stay, (4) changes in the mode or time of travel, and (5) a reduction in spending by business travellers. Similar reverse effects are recognised by Gerakis (1966) as resulting from a favourable change, namely (1) more spending on things that would have been purchased anyway, (2) spending on additional goods and services, (3) a shift in spending from other destinations, (4) the attraction of new tourists, and (5) the attraction of border shoppers.

It has been found that the exchange rate may have a significant effect on the extent of international travel. The price of foreign currency will influence tourists. Thus, if the price of foreign currency declines, tourists are likely to demand more services, ceteris paribus. Uysal and Crompton (1984) have stressed that, if the price of a vacation in Turkey remained constant in the last two years in terms of Turkish lira, but the price of the Turkish lira declined significantly relative to the German mark in the second year, it would be expected that Germans would purchase more travel services from Turkey in the second year.
Syriopoulos (1995) also mentioned that the specification of the model in a dynamic form permits examination of certain aspects of the exchange rate theory. In the short run, exchange rate differentials may be of particular importance when the tourist is planning a holiday. Tourists are usually more aware of exchange rates than of relative prices, owing to the wider publicity of information about the former. However, although exchange rates in a destination may become favorable to the tourist, this could still be counterbalanced by high inflation rates. So, in the short run, it may be important to study exchange rate effects separately from price effects and in the long run it is important to look at the price impact (relative price changes adjusted for exchange rate effects) that is expected to be more significant for tourism demand. The possibility, then, that national price levels and nominal exchange rate levels may follow different paths in the short run, but may converge towards a common equilibrium path in the long run, is allowed for in the model. Econometrically, this is attained by including nominal prices separately from nominal exchange rates in the short run (change terms), but from effective prices in the long run (level terms), and by testing for the statistical significance of these variables.

*The Exchange rate* of the origin and also destination country in US dollars is obtained as a secondary data from IFS statistics on quarterly basis. The EXR of the origin country in real value is divided by the EXR of the destination country to convert the currency of the visiting country to the home country (EXR_i / EXR_j). Then the logarithm is of course taken.

### 5.4.2.6 Transport Costs

Syriopoulos (1995) has identified that the transportation costs between a destination and an origin, and/or alternative destinations, can be a significant component of the price of a tourism product (Jud and Joseph, 1974; Kliman, 1981). However, the cost of transportation should take account of both the cost of the fare and the value the tourist assigns to the time of the journey (Gronau, 1970).
Transportation costs can be measured as the weighted mean price of all types of transport to the destination, by sea, land and air. The calculation of a transport cost variable was not possible due to the complexity of the fare structure and changes in route networks and departure frequencies.

The economy class air fare of a return (scheduled) trip between the origin's and the destination's capital cities has usually been used for transportation costs. This, however, is not relevant to Mediterranean tourism since a large share of air traffic, covered to a great extent by charter flights, is not destined for capital airports but for regional airports closer to the main tourist resorts and the fares may differ considerably from those to capital cities (Pearce, 1987). A significant share of tourists to the Mediterranean also arrive by means other than aeroplanes (OECD, 1991).

Several authors have suggested that a transport cost variable should be included, but have not incorporated this variable in their models owing to lack of adequate data. However, Gray (1966), Jud and Joseph (1974), Little (1980), Stronge and Redman (1982) and Witt (1980a,b) included a cost of transport variable using either representative fares in real terms or data on expenditure on fares. Jud (1974) used distance as a proxy for the cost of travel in one set of models, while Bond and Ladman (1972) used a weighted average one-directional air fare cost as a proxy for how the cost of a whole trip might vary over time.

In this study, the cost of transport variable is derived as follows. For travel, the economy return air fare is taken as a proxy from the origin country to the foreign destination country. We tried to take capital cities' airports and in some cases we used the busiest airport e.g. Istanbul, even though it is not a capital. This is due to the fact that Istanbul has got more air connections with the rest of the world than Ankara, the capital. For surface travel, petrol (diesel) costs are taken, based on distance between origin and destination major cities. Since we do not have ferry
rates, we are not able to include the cost of ferry crossing in our study. Therefore, the proxy surface cost is not very consistent when island countries are considered. However, when central and north Europe are considered (in which case ferry crossing is not necessary) the proxy will be consistent. The costs are based on an average-sized car carrying two persons. The transport cost variable enters the equations in real terms of the origin currency.

As with other demand determinants, measuring the cost of transportation presents substantial difficulties. Crouch (1994b) has emphasised that problems arise due to different modes (surface, air, sea) and types (e.g., car, train, air-charter, scheduled-air) of travel. Fares vary seasonally and by class of travel. For a long-haul destination like Australia, representative air fares provide a reasonable solution. Measuring the cost of transportation between countries within Europe, however, is very problematic. It is not surprising that numerous studies reject any attempt to account for variations in the cost of transportation.

An appropriate measure of transport cost is the weighted average price of all modes of transport, namely air, sea and land transport. However, it is difficult to construct a meaningful transport cost variable because of the complexity of the fare structure, and inadequate and unreliable data. Furthermore, an increasing proportion of tourists are joining package tours which include air fares and accommodation. Many previous studies, which include transport costs as an explanatory variable in tourism demand models, have realised that the variable is statistically insignificant, has the wrong coefficient sign, and that multicollinearity exists between income and transport costs. Subsequently, the transport cost variable is omitted from the model. However, the problem of misspecification bias may arise as a result of omitting this variable. It is crucial to perform appropriate diagnostic tests to examine the effects of omitting the transport cost variable from tourism demand models.

The Economy Return air fares (YE) for scheduled flights from the capital of the origin country to the capital of the destination country are obtained in the origin
countries currency from the ABC World Airways Guide. The International Civil Aviation Organization at Holborn in London supplied all data to us on quarterly basis. Since there are two price increases in a year (approximately 5% in April) and (approximately 3% in October) we used April’s and November’s publications and we assumed the other two which represent winter and summer seasons to be the same.

Sometimes important destinations are taken rather than the capital city due to the fact they are the busiest airport destinations (e.g. Mexico City in Mexico, Cologne in Germany). Then the (YE) economy air fares are divided by the origin country CPI to adjust with inflation. Then we adjusted the air fare with the EXR of the destination country to convert it into real terms with the destination country’s currency (then the data is converted into US $).

The Surface cost is calculated with different methodological techniques. Firstly, we obtained the diesel fuel prices per liter, tax included, from OPEC in the country of origin currencies. Secondly, we obtained the distances in miles and kilometers from the country of origin’s capital to the destination capital. Thirdly we adopted the assumptions made by Witt and Witt (1992) that the average car consumes 1 gallon of diesel fuel per 30 miles (7.925 miles - 1 liter of diesel). We then converted gallons into litters and kilometers into miles. We also calculated the return distances by multiplying by two. We then multiplied the energy prices, including tax, of the origin country with the total amount of liter of diesel for the RTN distance. The calculated results are adjusted to the origin countries currency through multiplying with the exchange rates of the origin $i$ and then put into real terms by multiplying with the origin $i$’s CPI (see Martin, C. A., 1987).

3 Europe Atlas was used as a source.
5.4.2.7 Dummy Variables

Dummy variables included in econometric models explain international tourism demand to allow for the impact of "one-off" events. These are specially constructed variables which take the value 1 when the event occurs and 0 otherwise. The 1979 oil and 1991 Gulf crises for example are likely to have temporarily reduced international tourism demand and will be used as dummies in our model.

Another example is the political unrest in Turkey in '80-'81 which led to reduced tourism flows to both North Cyprus and Turkey. When the Turkish government devalued the Turkish lira, the number of outward visits from Turkey declined. As a result, North Cyprus was affected, because roughly 80 per cent of the island's visitors are Turkish. It may be helpful to make some more clarifications here. The Turkish visits from Turkey to the island have to be considered as domestic visits, because there are no entry checks on either border. Turkish Lira is the legal tender in both countries and the reduction on the number of Turkish visitors to the Island was due to the effect of the decline in real purchasing power of the lira. The result was the same for the visits from Istanbul to Ankara, or from Istanbul to Antalya.

On the other hand, devaluation had a positive effect on the other countries' outward visits to Turkey and to North Cyprus. This is because of the increase in the values of other currencies (e.g., DM, FIM, US $, £) against the Turkish Lira. This policy increased the number of overseas visitors to Turkey in 1994 and 1995 or increased the average length of stay simultaneously. The same is happening to Greece this year. The recent devaluation in the Greek Drachma (March 1998) led many British tourists to visit Greece due to the strong pound and consequently cheap tourism in Greece. The above examples show the needs of dummies in case of political crisis or economic unrest.
Actually, a potentially wide range of factors might be modelled. Previous research has used them to model the impact of political instability and social conflict, terrorism, travel restrictions, foreign exchange restrictions, changes in duty free allowances, economic recessions, world fairs and sporting events, oil crises and national celebrations. Crouch (1994b) has also affirmed that dummy variables have also been used to account for other changes, such as the use of different data sources or discontinuities in recording methods. In cross-sectional studies, dummy variables have occasionally been incorporated to facilitate the estimation of different demand coefficients by country of origin or destination. Additionally, in time-series studies involving time periods shorter than one year, dummy variables have been used to allow for the effect of seasonality.

5.4.2.8 Trend

A trend term may be included in international tourism demand models if it is relevant. This term mainly represents a steady change in the popularity of a destination country over the period considered as a result of changing tastes, but it also captures the time-dependent effects of all other explanatory variables not explicitly included in the equation, such as changes in air service frequencies and demographic changes in the origins. The trend variable may take on either a positive or negative coefficient. The Isle of Man has faced some 'popularity' problems in the last two decades, since the number of passenger arrivals reduced from 600,000 to 300,000. Referring to the previous chapter, the IOM government has developed some rejuvenation strategies to develop tourism and achieve the previous figures. Yorucu and Jackson (1996) summarised these strategies and explained the IOM tourism with a "tourist area life cycle" model which demonstrates the relationships between the number of tourist arrivals and time of development.
5.4.2.9 Promotional Activity

National tourist offices often spend considerable sums in foreign countries on promoting their country as a tourist destination, as do carriers, particularly airlines. Therefore, promotional expenditure (e.g., advertising, incentives) is expected to play a role in determining the level of international tourism demand and thus should feature as an explanatory variable in the demand function. The appropriate form of the variable is promotional expenditure for the destination in the origin country currency in real terms.

The most difficult part is to obtain the relevant data. Most of the countries' national tourist offices or ministries are reluctant to supply government information to the public even to researchers, as all data is confidential. A further problem concerns the form of the relationship; the impact of advertising on tourism demand may be distributed over time, so that advertising in a given period is likely to influence not only demand in that period but also in subsequent periods, although the effect will diminish with the passage of time. In addition, the effectiveness of a given level of advertising expenditure in influencing the level of international tourism demand may vary across media. In our tourism demand function we excluded the promotional variable because of the data complexity.

5.4.10 Lagged Dependent Variable

The inclusion of a lagged dependent variable as an additional explanatory variable in a regression model will extend the model and make it more understandable. This can be justified first in terms of habit persistence.

After visiting a foreign country, people's knowledge about its characteristics largely increases, so there is much less uncertainty associated with holidaying again in that
country than travelling to a previously unvisited foreign country. As people generally respond to risk aversion, there will be a tendency for them to return to the same country, year after year.

In addition, when people return from a foreign holiday they tell their friends about the trip, so more people increase their knowledge about the holiday alternative. This sort of personal contact is probably a powerful stimulus to buying foreign holidays, because the individual is likely to believe that the personal contact is giving a reasonably independent view of the merits of a holiday.

In addition, with foreign holidays in particular, individuals have to rely a great deal on other people’s opinions since there is much uncertainty present - foreign holidays, unlike most other similarly price goods, cannot be examined in show rooms prior to purchase. As the decision to take a given foreign holiday may result from previous personal experience or contact with other people who have already selected that alternative, the number of people choosing a given holiday in any year depends partly on the numbers who chose it in previous years.

Secondly, the inclusion of a lagged dependent variable may also be justified in terms of supply constraints. Supply constraints may take the form of shortages of hotel accommodation, passenger transportation capacity and trained staff, and these cannot always be increased rapidly. A certain rigidity exists in the foreign holiday market. In terms of growth, time is required to build hotels, train hotel staff and generally increase facilities in the destination. Gujarati (1988) has indicated that if a partial adjustment mechanism is postulated to allow for rigidities in supply, this results in the presence of a lagged dependent variable in the tourism demand function. The following partial adjustment process is therefore postulated:

$$\log \frac{T_t}{P_t} - \log \frac{T_{t-1}}{P_{t-1}} = \lambda \left( \log \frac{T^*_t}{P_t} - \log \frac{T_{t-1}}{P_{t-1}} \right), \quad 0 < \lambda < 1 \quad (A)$$
where * denotes the desired value. 0<λ<1 since there is some adjustment, but it is incomplete. This equation may be rewritten as

\[
\log \frac{T_t}{P_t} = (1 - \lambda) \log \frac{T_{t-1}}{P_{t-1}} + \lambda \log \frac{T_t^*}{P_t}
\]

(B)

where \(T_t\) is the number of visits in year \(t\). \(P_t\) stands for the population in year \(t\). \(T_t^*\), the desired level of holidays in year \(t\), is a function of our previous set of explanatory variables, so model (B) only differs from the basic model (international tourism demand model) by the inclusion of a lagged dependent variable.

The value obtained for the lagged dependent variable, shows that habit persistence and/or constraints on supply play an important role in the foreign holiday market. The estimated income elasticity of value above 1 (\(E_i > 1\) income elastic) implies that foreign holidays are luxuries, and estimated income elasticity of value below 1 (\(E_i < 1\) income inelastic) implies that foreign holidays are necessities.

When income elasticity is allowed to vary across the two sets of origin data in the lagged dependent variable model, the estimated value for one origin data is greater than unity, and for other origin data less than unity. This implies that foreign holidays are luxuries to own country residents but necessities to other country residents.

On the other hand, Syriopoulus (1990) has noted that it is reasonable to accept that the supply of tourism does not impose any constraints on tourism demand. The presence of excess capacity would not be unrealistic, since investment in the tourism sector, as in hotel construction and infrastructure for instance, is built with a view to satisfying not only current but also future consumption. Moreover, during recent years, a shift in the type of accommodation from hotels to self-catering establishments (villas, apartments) has been experienced, which contributes to overcoming any potential accommodation constraints (Zacharatos, 1986). Apart from this, the steady growth of package holidays over recent years implies that prices
of goods and services consumed by tourists are determined in advance and do not respond diversly to the level of tourist inflows.

5.5 Sources Of Data

International tourism demand is generally measured in terms of the number of tourist visits from an origin country to a foreign destination country or in terms of tourist expenditures by visitors from the origin country in the destination country. As tourist expenditure data are generally less reliable than visit data, we have decided to use visit data for our demand estimation model. North Cyprus’, Turkey’s, UK’s, the IOM’s, Malta’s and Austria’s tourism demand will be estimated in chapter 8.

Monthly data on inward tourism for North Cyprus are collected from the Tourism Ministry of North Cyprus and the Prime Ministry State Planning Organization publications (KKTC Turizm Yilligi) and it covers the period 1976 - 1995.

Other monthly data which are supplied by the Austrian Tourist Board are found in Der Aktuelle Ruckblick, Osterreich Werbung Marktforschung and also in the Osterreichische Fremdenverkehrsverbung.

Annual data for Turkey are obtained from the Turkish Tourist Board from the Bulletin of Tourism Statistics (Turizm Istatistik Bulteni) covering the period 1976 - 1995.

Quarterly inward tourism data by overseas visitors to the UK are obtained from the British Tourist Authority from the Tourism Intelligence Quarterly (International Passenger Survey) for the period 1976 - 1995.

The statistics related to Malta and supplied by the Malta National Tourism Organizations are issued monthly for UK residents by the Malta National Tourism
Organizations and for the others by the *Tourism Statistics, Research and Planning Division*.

The IOM Passenger Traffic by area and mode of travel statistics, issued by the *IOM Government-The Treasury*, are supplied monthly from 1985 to 1995. Yearly data are also available from 1888 to 1995, but we are not interested in them since we work on quarterly time series data.

We converted all monthly data into quarterly series in TSP package. We will also make forecasting with different forecasting techniques. There will be more explanations about forecasting in the next chapter.

The statistics about population, exchange rate, national disposable income, and CPI (consumer price index/relative price index) are obtained from the *International Financial Statistics* published by the International Monetary Fund (IMF). For the IOM, *The Treasury* and for North Cyprus, *State Planning Organizations (SPO)* statistics are supplied.

Data about national disposable income are not available for every country. We therefore face difficulties in using national disposable income in our model. We will overcome this shortcoming by using GDP per capita figures as a proxy variable. For countries who do not publish GDP or GNP on a quarterly basis, we will interpolate yearly data as explained in section 5.4.2.1 above.

For transport costs, we obtained air fares from the *ABC World Airways Guide* for the period 1975 - 1992 and from the *Worldwide Fares* for 1992 onwards by the *Air Tariff Publications*. For the Northern Cyprus air fares we used Cyprus Turkish Airlines Statistics.

We also obtained diesel prices from *OPEC/OECD* publications. The cost of the surface travel will be calculated by a different method which is explained above in
section 5.4.2.6. We obtained the distances in kilometers from the origin capital to
the destination capital from Europe atlas.

5.6 The Estimation Of Demand Functions

The tourism demand function may be estimated by regression analysis using
historical data. We are planning to estimate our demand model through regression
analysis using twenty years' quarterly data (eighty observations) covering the period
1976-1995. The OLS (ordinary least-squares) multivariate regression analysis has
been the most widely used approach. Its advantages include the ability to model
cause and effect, to carry out “what if” forecasting, and to provide statistical

measures of accuracy and significance. However, in some cases where the Durbin-
Watson (DW) statistic indicates the presence of autocorrelation (see Durbin and
Watson, 1950, 1951, 1971), the parameter estimates are inefficient and the usual
hypothesis-testing procedures are no longer strictly valid. Therefore, those equations
are re-estimated using the Cochrane-Orcutt (CO) iterative procedure in an attempt to
reduce the likelihood of autocorrelation. Crouch (1994a) has identified that
methodologies employed from different studies state that approximately 84% of the
studies appear to have used ordinary least-squares multiple regression, although
approximately 89% of the studies use some form of regression analysis, including
Cochrane-Orcutt regression, two-stage least-squares regression, and constrained and
Bayesian regression. Other methods employed include quasi-experimental static
group comparison, AIDS (Almost Ideal Demand System, Witt (1977)) system of
demand equations solved by maximum likelihood estimation or the generalized least-
squares method for seemingly unrelated regressions, maximum likelihood, canonical
correlation, variance component modelling of pooled data, and other ad hoc
procedures. You may find more information in the literature about their application
and practices (Judge et al (1988); Griffiths, Hill, and Judge (1993); Gujarati (1988),
(1992)). Witt, Brooke and Buckley (1995) exaggerated that the empirical results
obtained show the estimated quantitative relationship between foreign holiday demand and the influencing factors. The estimation process is as follows:

1. Specify the demand function in mathematical form (say, linear, or more commonly, log linear).
2. Assemble data relevant to the model.
3. Use the data to estimate by regression the quantitative effects of the influencing variables on demand in the past.
4. Carry out tests on the estimated model to see if it is sufficiently realistic.

If the tourism demand function is specified in log-linear form, the estimated coefficients may be interpreted directly as elasticities. It is necessary to evaluate the parameter estimates obtained in a regression model in terms of both sign and magnitude in order to determine whether these estimates are theoretically meaningful. Satisfactory models are defined as those for which a statistically significant F statistic is obtained; "correct" signs are estimated for the coefficients, and the DW statistic indicates the absence (or likely absence) of autocorrelation. If the F statistic indicates that the whole equation is not significantly different from zero at a 5% level, then it is not clear that the model explains any variation in tourism demand and such models are unacceptable. Economic theory imposes restrictions on the signs and values of the parameters in demand functions, and the estimates need to be examined to see whether they satisfy these constraints. For example, foreign holidays are "superior" good and thus a positive income elasticity is expected. In fact, most foreign holidays are regarded as "luxuries" and, in such cases, the magnitude of the income elasticity is expected to exceed unity. Similarly, the own-price elasticity of demand should be negative and cross-price elasticities for substitutes positive. The exchange rate coefficients should have positive signs, the same as the income coefficient. Economic crisis and political unrest, oil and Gulf crisis are dummy variables which are expected to be negative. Changes in consumer tastes may move towards or away from a particular holiday and therefore the trend variable could have a positive (gaining popularity on account of changing tastes) or
negative (losing popularity on account of changing tastes) coefficient. The promotional expenditure (not included here in our tourism demand model) and lagged dependent variable coefficients are both expected to be positive. If an estimated parameter has an “incorrect” sign or does not satisfy the restrictions on magnitude, it should be rejected as it is theoretically implausible. In general, an unexpected parameter sign or size is the result of deficiencies in the model.

The empirical results may also be evaluated in terms of statistical measures of accuracy and significance of the forecasting equations. For example, the \( t \) test can be employed to examine the hypothesis that a particular explanatory variable coefficient is significantly different from zero, or to verify whether the estimated value may simply have been generated by chance. If the hypothesis of a coefficient being equal to zero is true, then the corresponding explanatory variable does not influence the dependent variable and should be excluded from the tourism demand function. However, when a parameter is not statistically significant (say at 5 per cent significance level), this does not prove that there is no relationship between the explanatory and dependent variables. The insignificance of the parameter may be a result of statistical problems. More detailed econometric information will be given in chapter 7 when the empirical results will be obtained.

5.7 Conclusion

The theory of demand describes the international specialisation of countries in respect to internal, regional and international demand. In this chapter, we aimed to explain the theory of demand and also reviewed the literature within the economic discipline. The multivariate regression demand model and the methodology that will be followed is explained with all specifications. The econometric model that will be estimated has a logarithmic form in order to have linearity which corresponds the elasticities. The number of tourist visits from a country of origin to a country of destination will be based on the Witt and Martin (1987) model, which is composed
of income, cost of living, exchange rates, air fares, surface transportation costs, seasonal dummies, breakdown dummies, trend and the lagged dependent variable.

The sources of data used in this study are also explained. The estimation of the demand function will be held through ordinary least squares (OLS) techniques, and Cochrane Orcutt (CO) will be used where autocorrelation and multicollinearity problems exists during the estimation procedure. Durbin Watson (DW) statistics are the major test to identify the presence of autocorrelation and CO procedures will take place where it is necessary for re-estimation to reduce the likelihood of autocorrelation. Finally, the correct signs of every explanatory variable is explained with respect to economic meanings.
Ch 6 : Cointegration Analysis

6.1 Introduction

There are many developments both in econometrics and software application packages; therefore, we decided to bring our research up to date. Kulendran (1996) and Kulendran and King (1997) are the best examples and useful guides for us in the estimation of international quarterly tourist arrivals. They worked on time-series models with strong trends and seasonal components. Kulendran and King (1997) is one of the latest examples in forecasting international quarterly tourist flows by using error correction and time series models. They used Johansen’s (1988) full-information maximum likelihood method to estimate the long-run relationships between tourist arrivals and the factors that influence these arrivals such as income, price and air fare. They tested the possibility of multiple long-run relationships using the Johansen and Juselius’ (1990) test, but, in each case, they only found one relationship. Therefore, Martin and Witt’s (1989) econometric model involved the use of least squares regression to model the level of tourist arrivals in a particular country as a linear function of the factors (such as income, price, air fare and special events) which influence arrivals. This is the basic structure for Kulendran and King’s (1997) cointegration study.

Cointegration is a broad field which needs a lot of research in literature. More than 370 articles and maybe more than a thousand working papers were published on cointegration from 1990 to 1997. We had a broad research on BIDS (Computer Research Network) and we chose some selected papers for a brief literature review. To do integration, stationarity tests (unit root tests) for time series are necessary.

We will use TSP version-7 to run unit root tests (Dickey and Fuller (1979, 1981) stationary) with trend and constant variables. We will also use augmented Dickey Fuller (1981) with four lags. In TSP version-7 (1992), we can only test stationarity and EG cointegration. Since the programme is lacking the Johansen cointegration
test, we decided to use Eviews (Econometric Views) version-2 (1995) which is more comprehensive and user friendly in well structured form for not only forecasting, but for stationary and cointegration tests as well.

6.2 Theoretical Background

We are keen on using recently developed robust time series methods (such as "cointegration analysis"); we will apply the international quarterly tourist arrivals models to Austria, UK, Turkey, Malta, North Cyprus and the Isle of Man. Based on the findings, some theoretical and policy implication will also be drawn. The main aim for using cointegration is to model tourism demand with the standards in the light of recent developments in the area of tourism and also to give a brief understanding of the effect of long term relationships between the exogenous variables on tourism demand. Since non stationary time series data may cause spurious regression results, an appropriate long run modelling strategy, namely "cointegration analysis", should be employed to make sure that the long run relationship, under consideration, is a "genuine" one. We will test about 300 nonstationary data series from 23 different destination countries and also the Johansen (1991) cointegration results in comparison with the Mackinnon (1991) critical t-values. This will show us whether there is a long run relationships between international tourism demand and composition of income, cost of living, exchange rates, air fares and surface costs.

6.3 The Methodology

The time series of econometrics used for the evaluation of international tourism demand model will be applied on this thesis. Both short run and long run elasticities are estimated and short-term elasticity's are obtained through regression analysis. The results are tabulated in chapter 7, as well as long-run elasticities. In this framework, the relationship between the number of tourist arrivals and income,
cost of living, exchange rates, air fares and surface costs is the central point. This analysis is mostly descriptive, supported by relevant tables and figures.

It has been proved that “differencing” results in a loss of some valuable long-run information in the time series data. It is therefore inevitable to use cointegration analysis since there has been an extensive amount of researches on it since the early 1980s. Cointegration analysis within time series econometrics was introduced to the literature in the early 1980s, and has recently become an established method of empirical modelling. Later, the relationship between error correction models and cointegration gained a remarkable importance and was first pointed out by Granger (1981). Advance complex models followed by researchers in recent studies, however, we will focus on single equation case quarterly time series data and we intend to stay non-technical and avoid the specific details. Apart from Engle and Granger (1987), we also used Johansen (1988) (1991) method briefly.

The following recent articles survey the issue of “cointegration” : Bonham and Gangnes (1996), Kulendran (1996), Kulendran and King (1997), Gonsales and Moral (1995) specifically on tourism, Ghathak, Milner and Utkulu (1997), Engle et al. (1993), Bremnes and Saettem (1997), Ramanathan et al. (1997), Ho and Sorensen (1996), Ahmad and Harhurun (1996), Yang and Bewley (1996), Hsiao (1997), Williams and Bessler (1997), Zapata and Rambaldi (1997), Apergis (1997), Masih and Masih (1997), Campos, Ericsson and Hendry (1996), Johansen and Juselius (1990), Osborn (1993) and Utkulu (1994) are some other various studies. The latter emphasised that the basis of cointegration analysis draws on three themes in the recent literature: stationarity, spurious regression and error-correction mechanism (ECM). The key concept underlying the concept of cointegration is the idea of stationarity. Any time series data can be thought of as being generated by a stochastic or random process. Gujarati (1992) pointed out that a stochastic process is said to be stationary if its mean and variance are constant over time and the value of covariance between two time periods depends only on the distance or lag between
the two time periods and not on the actual time at which the covariance is computed.

To explain this statement, let \( Y_t \) be a stochastic time series with these properties:

\[
\text{Mean : } E(Y) = u = \text{constant} \quad \text{(Eq 1)}
\]

\[
\text{Variance : } \text{var}(Y) = E(Y - u)^2 = \sigma^2 \quad \text{(Eq 2)}
\]

\[
\text{Covariance : } \gamma_k = E((Y_t - u)(Y_{t+k} - u)) \text{Cov}(Y_t, Y_{t+k}) = \sigma_j \quad \text{(Eq 3)}
\]

Thus, the means (Eq 1) and the variance (Eq 2) of the stochastic process \( Y_t \) are constant over time, while the value of covariance between periods (Eq 3) depends only on the gap between periods, and not on the actual time at which this covariance is considered. \( Y_k \), the covariance (or autocovariance) at lag \( k \), is the covariance between the values \( Y_t \) and \( Y_{t+k} \) that is, between two \( Y \) values \( k \) periods apart. If \( k = 0 \), we obtain \( Y_0 \), which is the covariance between two adjacent values of \( Y \). If one or more of the conditions above are not held, then \( Y_t \) is said to be nonstationary. The mean, variance and autocovariances are thus independent of time (i.e. remain constant over time). Broadly speaking, if a time series is not stationary in the sense just defined, it is called a nonstationary time series. Sometimes, nonstationarity could be due to a shift in the mean.

### 6.4 Order Of Integration

The degree of integration of a series is closely related with stationarity. A nonstationary series is said to be integrated of order \( d \) {denoted \( Y_t = I(d) \)} if it has to be differenced \( d \) times to be stationary.

---

1 In the time series literature such as a stochastic process is known as a weakly stationary stochastic process.
2 Keep in mind that we are only considering weak stationarity.
3 DSP (difference stationary process) and TSP (trend stationary process) are two mainly used approaches in the literature to reach stationary. In our study we used DSP; that is, stationarity is achieved by successive differencing. We also used constant and trend variables to test the order of integration at four lag levels.
It is still possible to run regressions, even if time series do not satisfy the stationarity assumption, since these regressions could simply be spurious (meaningless). This leads us to the concept of "spurious regression (correlation)". Gujarati (1992) defined the spurious regression concept as the fact that regression of one time series variable on one or more time series variables can often give nonsensical or spurious results. One way to guard against this is to find out if the time series are cointegrated. Utkulu (1994) also mentioned in his study that the possibility of correlation representing a purely mathematical rather than a causal relationship is referred to as spurious correlation. The regression which includes spuriously correlated variables is nonstationary. Charemza and Deadman (1997) accentuated more on spurious regression and are lucid and comprehensible in their explanations.

An alternative test of stationarity that has recently become popular is known as the unit root test. The easiest way to introduce this test is to consider the following model:

\[ Y_t = Y_{t-1} + u_t \]  
(Eq 4)

where \( u_t \) is the stochastic error term that follows the classical assumption, namely, it has zero mean, constant variance \( \sigma^2 \), and is nonautocorrelated. Such an error term is also known as a white noise error term in engineering terminology\(^4\).

If the coefficient of \( Y_{t-1} \) is in fact equal to 1, we face what is known as the unit root problem, i.e. a nonstationary situation\(^5\). Therefore, if we run the regression

\[ Y_t = \rho Y_{t-1} + u_t \]  
(Eq 5)

\(^4\) Note that if \( u_t \) is not only noncorrelated but also independent, then such an error term is called strictly white noise. If the error term is autocorrelated then augmented Dickey-Fuller (ADF) test can easily allow for this contingency.

\(^5\) \( Y_t - Y_{t-1} = u_t \). By using the lag operator \( L \) so that \( L Y_t = Y_{t-1} \), \( L^2 Y_t = Y_{t-2} \), and so on, we can write \( Y_t - Y_{t-1} = u_t \) as \( (1-L)Y_t = u_t \). The term unit root refers to the root of the polynomial lag operator.
and actually find $p = 1$, we say that the stochastic variable $Y_t$ has a unit root. In (time series) econometrics, a time series that has a unit root is known as a *random walk* (time series). A random walk in its turn is an example of a nonstationary time series.

An alternative form of $Y_t = \rho Y_{t-1} + u_t$ is expressed as

$$
\Delta Y_t = (\rho - 1)Y_{t-1} + u_t \\
= \delta Y_{t-1} + u_t
$$

where $\delta = (\rho - 1)$ and where $\Delta$, as we know, is the first difference operator. Note that $\Delta Y_t = (Y_t - Y_{t-1})$. However, now the null hypothesis is that $\delta = 0$. If $\delta$ is in fact 0, we can write eq (6) as

$$
\Delta Y_t = (Y_t - Y_{t-1}) = u_t
$$

Eq (7) refers to the first differences of a random walk time series ($= u_t$) in a stationary time series because by assumption $u_t$ is purely random.

Utkulu (1994) gave a basic definition by referring to Engle and Granger (1987):

*A non stationary series by differencing $d$ times is said to be integrated of order $d$. A time series $X_t$ integrated of order $d$ is denoted $X_t \sim I(d)$. *

For example, if $X_t \sim I(2)$, the first differences of the first differences of $X_t$ achieve stationarity:

$$
\Delta \Delta X_t = \Delta (X_t - X_{t-1}) = (X_t - X_{t-1}) - (X_{t-1} - X_{t-2}).
$$

This operation is termed "second (order) differencing" and the resulting series called "second differences".

The relevant tests for integration level in three categories are visual inspection and sample autocorrelations (correlogram) of the series, integration Durbin-Watson
(IDW) statistic test and regression-based t-tests such as Dickey-Fuller (DF)\textsuperscript{6}, the Dickey-Pantula (DP)\textsuperscript{7}, and Phillips-Perron (1988) tests.

The DF test involves estimating regression equations and carrying out standard t-tables. However, with nonstationary variables, the distribution of these statistics are non standard, and thus special tables derived by simulation are essential\textsuperscript{8}.

If a time series is differenced once and the differenced series is stationary, we say that the original (random walk) series is integrated of order 1, denoted by I(1). Similarly, if the original series has to be differenced twice (i.e. take the first difference of the first difference before it becomes stationary), the original series is integrated of order 2, or I(2). In general, if a time series has to be differenced d times, it is integrated of order d or I(d).

Thus, any time we have an integrated time series of order 1 or greater, we have a nonstationary time series. By convention, if d = 0, the resulting I(0) process represents a stationary time series.

Under the null hypothesis of $\rho = 1$, the conventionally computed $t$ statistic is known as the $\tau$ (tau) statistic, whose critical values are tabulated by Dickey and Fuller on the basis of the Monte Carlo simulations. In the literature the tau test is simply known as the Dickey-Fuller (DF) test. Note that, if the null hypothesis of $\rho = 1$ is rejected (i.e. the time series is stationary), we can use the usual (students) $t$-test.

We may apply the DF test to a model with a number of lagged difference terms. The number of lagged difference terms to include is often determined empirically, the idea being to include enough terms so that the error term in an equation is

\textsuperscript{6} See Dickey and Fuller (1979, 1981).
\textsuperscript{7} See Dickey and Pantula (1987), augmented Dickey-Fuller with lagged differences.
\textsuperscript{8} This is termed "modified $t$-statistic" by Holden and Thompson (1992, p.13)
serially independent. When we apply the DF test with lagged difference, it is called "augmented Dickey-Fuller (ADF) test". The ADF test statistic has the same asymptotic distribution as the DF statistic, so the same critical values can be used.

Most of the examples and definitions used here are taken from Gujarati (1992), since they are easier and less sophisticated to explain.

The ADF test is widely regarded as being one of the most efficient tests for integration level:

\[ \Delta X_t = \lambda X_{t-1} + \sum_{i=1}^{k} \psi_i \Delta X_{t-i} + \epsilon_t \quad \text{Eq (9)} \]

A practical rule for establishing the number of lags for \( \Delta X_{t-1} \) (the value of \( k \)) is that it should be relatively small in order to save degrees of freedom, but large enough to secure the lack of autocorrelation of the error term. One can use the Lagrange Multiplier (LM) tests for serial correlation, the DW test or any of the model selection procedures such as the Akaike Criterion (Charemza and Deadman, 1997)\(^9\) to choose the optimal value for \( k \). Perron (1990), Phillips and Perron (1988) have an alternative correction test (PP-test) for integration level.

Dickey (1993, p.330) has pointed out the importance of seasonality and he referred to Dickey, Hasza and Fuller (1984) when quarterly or monthly stationarity is concerned. He has done a lot of computing work in order to present a motivation to improve our understanding of seasonality and our ability to capture it in a model.

Dickey, Hasza and Fuller (1984) with their model

\[ Y_t = Y_{t-d} + \epsilon_t \quad t = 1, 2, \ldots \quad \text{eq(10)} \]

represented monthly data by \( d = 12 \), and quarterly data by \( d = 4 \). They used the Monte Carlo integration for finite samples to compute unit roots at the deasonal lags for time series data. Another approach was made by Hylleberg, Engle, Granger and

---

\(^9\) See Charemza and Deadman (1997, pp251-252). AIC is used to give the minimum lag level for best model selection.
Yoo (1990) or HEGY. They test economic series for seasonal unit roots. HEGY considered factorisation as:

$$1-B^4 = (1-B)(1+B)(1+B^2)$$

\text{eq}(11)

where \(B\) is the backshift operator. If \(X\) contains unit roots at all the deasonal frequencies \(\theta = 0, 1/4, 1/2, 3/4\), then each of \(X_t-X_{t-1}, X_t+X_{t-1}, X_t+X_{t-2}\), and \(X_t-X_{t-2}\) is nonstationary. Kulendran (1996) is the most recent example to apply HEGY for modelling quarterly tourist flows to Australia using cointegration analysis. For seasonal integration he implemented HEGY on the UK, New Zealand, Japan and the USA.

Osborn (1993) mentioned HEGY in his paper that in an example of a quarterly process with all seasonal unit roots, namely, \(\Delta_q X_t = \varepsilon_t\) where \(\varepsilon_t\) is a zero mean white noise process and since all lags are annual \((X_t = \varepsilon_t + \varepsilon_{t-4} + \varepsilon_{t-8} + ...\)), \(X_t\) for a specific quarter \(Q\) \((Q = 1, 2, 3, 4)\) is influenced only by quarter \(q\) shock. In other words, the four quarters follow independent random walks, so that there are no intra-year links in \(X\) at all.

He has mentioned that to consider the case of \(X\) being conventional an I(1) process except for deterministic seasonal effects. Then the quarterly change,

$$X_t - X_{t-1} = \sum u_{q,dq} + u_t$$

\text{eq}(12)

is stationary after subtraction of its seasonal mean \((d_q\) is the zero/one dummy for quarter \(q\)). Under this situation any two adjacent quarters are cointegrated with \((1, -1)\) as the cointegrating vector and there exists a long-run equilibrium between the seasons. These two possibilities (seasonal differencing versus an I(1) process with deterministic deasonals) are extensively examined by Beaulieu and Miron (1990) for the US and Osborn (1990) for the UK. Ghysels, Lee and Noh (1994) have also contributed to the literature with tests for unit roots in deasonal time series. They are based on the HEGY theorem and they studied some theoretical extensions and a Monte Carlo investigation.
Utkulu (1994) gave a simple example from the economic theory by suggesting a long-run relationship which we changed the assumption and decided to describe with the following equation:

\[ V_t^* = \beta I N_t \]  \hspace{1cm} \text{eq (13)}

where \( C_t^* \) is the long-run equilibrium path (i.e. expected target long-run path according to economic theory) of number of tourist visits; \( V_t \) is the actual number of visits; and \( I N_t \) is the real income per capita. For the simplicity, we referred to Utkulu's (1994) study to explain the theoretical background, however, we will use our own assumption (\( V_i = \) number of visits, \( I N = \) income, \( EX = \) exchange rate, etc.) to test cointegration and to do error-correction mechanism in model selection.

\( V_t^* \), follows, at each instant, an equilibrium path, then by definition from equation (13):

\[ V_t^* - \beta I N_t = 0 \]  \hspace{1cm} \text{eq (14)}

In short, one would not expect \( V \) and \( I N \) to act in accordance to this equilibrium at every point in time, and thus even if equation (13) correctly specify an equilibrium relationship, eq(14) will not hold at all instants. Let stochastic variable \( u_t \) represent deviations of \( V_t \) from its long-run path \( V_t^* \); that is

error correction mechanism (ECM) = \( V_t - V_t^* = V_t - \beta I N_t = u_t \)

or

\[ V_t = \beta I N_t + u_t \]  \hspace{1cm} \text{eq (15)}

where \( u_t \sim I(0) \)

Within the cointegration framework, \( u_t \) in eq(15) is regarded as deviations from the long-run equilibrium path (e.g. see Granger, 1993).

Eviews is a well structured programme for unit root tests and almost all options mentioned here are available in this software programme. We used Eviews and followed the method of the ADF to test stationarity of approximately 256 data series in natural logarithms and quarterly data from 1976 to 1995. The diagnostic statistics
for normality, serial correlation, heteroscedasticity, etc. from the ADF regression gave us satisfactory results.

Utkulu (1994) has also emphasised that "structural changes (breaks)" in a time series can affect the integration level of the series. In short, a structural break in the mean level is a sort of exogenous intervention in the series. See Perron (1990) and Charemza and Deadman (1997) for more details.

It is important to note that, with the Perron integration test, we are not testing the presence of a structural break. Instead, we test whether the order of integration is changed by the structural break. This is, of course, more complicated when the seasonal aspects of the data exist both for the integration and the cointegration tests. Our empirical results suggest that all variables are nonstationary in levels. Most of our series are found to be integrated of order one I(1) and a small number appeared to be integrated of order two I(2).

6.5 Cointegration

Cointegration as a concept was introduced by Granger (1981) and the formal definition was developed by Engle and Granger (1987) and is as follows:

The components of the vector $X_t$ are said to be cointegrated of order $d$, $b$, denoted $X_t \sim \text{VI}(d, b)$, if all components of $X_t$ are $I(d)$; (ii) there exists a vector $\alpha (\neq 0)$ so that $Z_t = \alpha' X_t - I(d - b)$, $b > 0$. The vector $\alpha$ is called the cointegrating vector.

$$V_t = \beta', \text{IN}, \text{CL}, \text{EX}, \text{FF}, S^{10}$$

\[ \text{eq}(16) \]

\[ 10^V\text{=No of visits} \]
\[ \text{IN=Income} \]
\[ \text{EX=Exchange rate} \]
\[ \text{CL=Cost of living} \]
\[ \text{FF=Air fares} \]
\[ S=\text{Surface travel cost} \]
6.5.1 Error-Correction Mechanism: ECM

The error-correction mechanism within the cointegration framework constitutes a case of systematic disequilibrium adjustment process through which $C_t$ and $Y_t$ are prevented from "drifting too far apart".

It is shown by Engle and Granger (1987) that any cointegrated series have an error-correction representation. According to the Granger Representation Theorem (GRT) the reverse is also true, in that cointegration is a necessary condition for ECM to hold.

As a result in practice, for $V_t$ and $IN_t$ to be cointegrated, it is required that:

a) the two series are integrated of the same order

b) there is a linear combination of the two series which is integrated of order zero, denoted

$$u_t = (V_t - \beta IN_t) \sim I(0) \quad \text{eq}(17)$$

In our case, as we mentioned before, the number of variables involved in the long-run relationship is more than two, which means that the problem becomes more complicated. Charemza and Deadman (1997, p.148) mentioned that in a multivariate context if variables in a long-run economic relationship are of a different order of integration (e.g. $V(I(1))$, $IN(I(1))$, $EX(I(2))$, $CL(I(2))$, $FF(I(1))$ and $S(I(2))$) and the order of integration of the dependent variable is lower than the highest order of integration of the explanatory variables, then there should be at least two explanatory variables integrated of this highest order if the necessary condition for stationarity of the error term is to be met. This means we cannot use two $I(2)$ variables as we mentioned above. According to Johansen cointegration test, all variables should have the same order of integration for VAR\(^\text{\footnote{VAR stands for Vector Autoregressive Estimation.}}\) estimation.
It is also possible to discuss causality since the existence of cointegration has some “causal” implications as well. But, we prefer not to be involved in causality in this study.

6.5.2 Testing for cointegration

Let us consider an equation in which the number of visits \( V_t \) is a function of income \( IN_t \)

\[ V_t = \beta \text{IN}_t + u_t \quad \text{(eq18)} \]

We must remember from Engle and Granger (1987) that the integration level test (step 1) reveals that \( V_t \) and \( IN_t \) are integrated of order one. This implies that the first condition for two variables to be cointegrated is met. The critical requirement for the existence of cointegration is that residuals from the estimated cointegrating regression should be integrated of order zero. In this case, the integration level tests such as DF/ADF can be utilised to check whether the estimated residuals, \( \hat{u}_t \), from eq(18) are stationary. The Cointegrating Regression Durbin-Watson (CRDW) test is another test that may still be used as a rough and ready method of evaluating the existence of cointegration.

The CRDW is computed in exactly the same way as the usual DW statistic and expressed as:

\[
\text{CRDW} = \frac{\sum_{i=1}^{n} (\hat{u}_i - \hat{u}_i - 1)^2}{\sum_{i=1}^{n} \hat{u}_i^2} \quad \text{(eq19)}
\]

where \( \hat{u}_t \) denotes the estimated OLS residuals from the cointegrating regression eq(18). The appropriate critical values for the CRDW test are reported by Engle and
Granger (1987) and Engle and Yoo (1991). The main rule is that the null hypothesis of no cointegration is not rejected.

If CRDW > R², the null of no cointegration is more likely to be rejected (Banerjee et al., 1986). Utkulu also proposed that under the null of no cointegration, CRDW should be close to zero and hence the null is rejected if the statistics exceed the corresponding critical values.

The "Residual-Based" tests are the first group of cointegration tests which have been suggested in the literature. They are based on residuals of single and static cointegrating regression. The residual based DF/ADF tests⁰¹² suggested by Engle and Granger (1987) are the most widely used ones. These are briefly as follows:

\[ \Delta \hat{u}_t = \lambda \hat{u}_{t-1} + \varepsilon \] (DF) \hspace{1cm} eq(20)

\[ \Delta \hat{u}_t = \lambda \hat{u}_{t-1} + \sum_{i=1}^{k} \psi_i \Delta \hat{u}_{t-1} + \varepsilon_t \] (ADF) \hspace{1cm} eq(21)

From the above models, we come to the conclusion that \( \hat{u}_t \) is the estimated OLS residual and it is interpreted as the deviation of \( C_t \) from its long-run (equilibrium) path. \( C_t \) and \( Y_t \) are said to be cointegrated if \( \hat{u}_t \sim I(0) \). We should always take into consideration that we have the null of no cointegration against the alternative of cointegration. Therefore, the null should be rejected for \( C_t \) and \( Y_t \) to become cointegrated. There are also other residual-based cointegration tests developed recently, i.e. Phillips and Quilaris (1990) developed the PO test. However, we prefer not to go into detail.

The "System-Based" tests are the second group of cointegration tests which are applied with systems of equations. In this case, the unique cointegrating vector assumption of the single equation residual-based DF/ADF tests is not valid anymore. If there are N variables, there can be at most \( r = N-1 \) cointegrating vectors. In our case we try to test \( V_t \) as dependent and \( IN, CL, EX, FF \) as

---

¹² Engle-Granger test by Mac Kinnon.
independent variables. Our cointegrating vector mostly is $r = 5-1$ ($r = 4$). The Johansen maximum likelihood approach\textsuperscript{13} has dominated the relevant literature. Critical values for the Johansen test can be found in Johansen (1988) and EVIEWS (econometric computer software) can easily deal with the rest of the sophisticated work. It is a well structured programme in which Johansen cointegration tests and vector error correction estimation can easily be obtained. However, it might be more appropriate to use system-based cointegration tests as a supplementary tool, testing the validity of the residual-based test results, since Engle-Granger was criticised by Ghatak, Milner and Utkulu (1997) that has many shortcomings as such it assumes uniqueness of cointegrating vector. In a multivariate context, the number of cointegrating vectors could be more than one. Another shortcomings of the Engle Granger method is that, due to non-normality of the distribution of the estimators of the cointegrating vector, no sensible judgement can be made about the significance of the parameters.

We will use the Johansen (1991) *Maximum Likelihood Estimation* method and we will test the likelihood ratio statistics to see whether cointegrating equations are rejected or accepted. But, of course, there will only be limited test results in the thesis since our research consists of many series and a lot of combinations. It is possible see all details in the Annex which is the second volume of this thesis. It should also be noted that the Johansen method has the main advantage that it enables one to determine the number of existing cointegrating relationships among the variables in hand. As we mentioned earlier, single equation-based approaches assume the uniqueness of the cointegrating vector.

6.5.3 Modelling cointegrated series

ECM (error correction mechanism) is a method to formulate and estimate a model. This is due to prevent the residuals in the long-run relationship not to become larger and larger. For both long-run and short-run equations, there are number of error correction models available in the literature.

\textsuperscript{13} Johansen (1988, 1991); Johansen and Juselius (1990)
6.5.3.1 Estimation: The Engle Granger two-step method (ECM)

The Engle-Granger two-step method is originally designed by Engle and Granger\(^{14}\) (1987) and has received a great deal of attention during the last decade. The first step consists of estimating the long-run equilibrium relationship (i.e. \(y_t = \lambda x_t\)) which is static whereas the second step is the estimation of the dynamic relationship 

\[
\Delta y_t = -\rho_1 u_{t-1} + \text{lagged} \left( \Delta y_t, \Delta x_t \right) + \varepsilon_{1t}
\]

or 

\[
\Delta x_t = -\rho_2 u_{t-1} + \text{lagged} \left( \Delta y_t, \Delta x_t \right) + \varepsilon_{2t}
\]

using the lagged residuals (OLS), i.e. the difference between the estimated \(y_{t-1}\) and actual \(y_{t-1}\) from the first step. This approach is attractive for two reasons. First, it reduces the number of coefficients to be estimated and so reduces the problem of multicollinearity. Second, the first step can be estimated by ordinary least squares and has been shown by Stock (1987) to provide "super-consistent" estimators (i.e. estimators which converge on the true but unknown population parameters with an order of convergence of \(1/\sqrt{n}\), where \(n\) is the number of observations). This implies that the OLS estimators converge on the true values at a faster rate in the non-stationary than in the stationary case. For details, see Holden and Thomas (1992).

Statistical testing of the latter approach is concentrated on standard tests such as \(R^2\), "t"-tests for the estimated coefficients, etc. For estimating of the first step in the Engle and Granger approach, the key test is whether the residuals from the estimated equation are I(0) with \(R^2\) only being important as an indicator of the degree of bias. If the residuals are I(0) then the estimated equation is satisfactory and the variables are cointegrated. It should also be noted that the estimators of the standard errors of the first-step equation are biased and therefore no importance can be attached to the standard statistical tests on \(R^2\) or "t" values of the estimated coefficients unless a correction is applied to eliminate the bias.

\(^{14}\) Granger representation theorem
It is important to note that, in the second step of the ECM, there is no danger of estimating a spurious regression because of the stationarity of the variables. The second step of the ECM is built similarly to the one of Sargan (1964) and DHSY (1978) with the exception that the error correction term is given by the lagged values of the error terms from the first step cointegration regression. As Utkulu (1994) pointed out, the combination of the two steps provides a model incorporating both the static long-run and the dynamic short-run components.

It is also claimed that the two-step approach has the advantage that estimation of the two steps is quite separate so that changes in the dynamic model do not enforce re-estimation of the static model obtained in the first step. This is particularly true in the case of systems estimation when changes in the specification of one equation require re-estimation of the whole system. As such it offers a tractable modelling procedure. On the other hand, it has been criticised in the sense that the estimate of the cointegrating regression equation has rather poor finite sample characteristics. For details see Banerjee et al. (1986), Engle and Yoo (1989).

In the second step all the variables and the residuals are supposed to be I(0) provided that the model is properly specified. Therefore, in practice, most practitioners seem to prefer the latter one due to its simplicity.

6.5.3.2 Engle-Yoo three-step modelling approach

In an alternative attempt to reduce the bias caused by the classical two-step approach, Engle and Yoo (1991) suggested a three-step procedure which is asymptotically equivalent to the maximum likelihood estimation. The two major problems of the two-step EC procedure are briefly explained by Utkulu (1994) as:

(i) Although the long-run static regression gives consistent estimates, they may not be fully efficient.
(ii) Due to non-normality of the distribution of the estimators of the cointegrating vector, no sensible judgement can be made about the significance of the parameters.

The third step corrects the parameter estimates of the first step so that standard tests, such as the t-test, can be applied. For further details see Engle-Yoo (1991). Ghatak, Milner and Utkulu (1997) implemented the same approach to make more sensible judgements on the significance of the explanatory variables in their model. This type of research gave them a chance to be more specific on what categories of export (i.e. manufactured products, fuel or non-fuel primary products) are the driving forces of the export led growth for the Malaysian case. Apart from the Engle-Yoo three-step method, there is the Saikkonen (1991) approach which suggests a new asymptotically efficient estimator which is straightforward to compute using OLS without any initial estimation. The main idea behind Saikkonen (1991) is essentially to remove the asymptotic inefficiency of the OLS estimator by using all the stationary information of the system to explain the short-run dynamics of the cointegration regression.

6.5.3.3 Estimation: The Johansen Method (Maximum Likelihood Method (VAR model))

The approach suggested by Johansen (1988) can be used for two purposes:

(i) for determining the maximum number of cointegrating vectors for the variables of interest, and

(ii) for obtaining the maximum likelihood estimates of the co-integrating vector and adjustment parameters. This is achieved by employing canonical\(^{15}\) correlation methods and utilising the eigen values and eigen vectors revealed by the matrix of correlation coefficient.

\(^{15}\) Canonical correlation may be defined in the following manner. Given two sets of data defined by the matrices \(Y = (Y_1, Y_2, ..., Y_r)\) and \(X = (X_1, X_2, ..., X_s)\) where \(r \leq s\), the object of the procedure is to find those linear combinations of \(Y\) and \(X\) which show the highest degree of correlation (see Gujarati 1992).
Due to the existence of VAR modelling in the Johansen approach (Johansen (1988, 1991)), the concept of cointegration becomes very complex and sophisticated to understand and too difficult to compute. The simplified version is given below. Let us assume that the vector of variables $V$ has the following representation:

$$V_t = \sum_{i=1}^{m} IN_i V_{t,i} + E_t$$  \hspace{1cm} eq (22)$$

Where $V_t$ contains all $n$ variables of the model and $E_t$ is a vector of random errors. This model can also be represented in the form:

$$\Delta V_t = \sum_{i=1}^{m-1} \Gamma_i V_{t,i} + \Pi V_{t,m} + E_t$$  \hspace{1cm} eq(23)$$

where $\Gamma_1 = -I + IN_1 + IN_2 + \ldots + IN_i$ (I is a unit matrix)

$$\Pi = -(I - IN_1 - \ldots - IN_m)$$  \hspace{1cm} eq(24)$$

Matrix $\Pi$ can be represented in a form as such:

$$\Pi = \alpha \cdot \beta'$$  \hspace{1cm} eq(25)$$

where $\alpha$ and $\beta$ are both $n \times r$ matrices. Matrix $\beta$ is called the cointegrating matrix and matrix $\alpha$ is named as the adjustment matrix or the feedback matrix.

The Johansen method makes it easy to estimate the cointegrating vector directly, and also to construct tests for order of cointegration. It is important to note that in VAR model explaining $N$ variables there can be at most $r = N - 1$ cointegrating vectors. One advantage over Engle-Granger, the statistical properties of Johansen procedure are generally better in and cointegration test is of higher power. It is, of course, difficult to compare them directly, since both are grounded within different econometric methodologies. For single equation modelling as a supplementary tool,
the Johansen method is the right approach. It is good for testing the validity of the endo-exogenous variable division. It is also a confirmation test of the single equation model.

Besides the theoretical advantages and superiority, the Johansen method has some shortcomings as such; with a small sample size it cannot be regarded as an appropriate method since the point estimates obtained for the cointegrating vector \( \beta \), may not be particularly meaningful. Apart from this, some additional problems may occur if we don’t have a unique cointegration vector. Some problems may also be seen when the multiple long-run relationship is presumably best seen as an identification problem. There are ways to overcome this problems as like rejecting all but one such cointegrating vector as economically meaningless or alternatively looking for consistent models in the economic theory that consists two or more single equations.

6.6 Forecasting:

Until now not many quarterly estimation has been done in this field, especially for cointegration analysis which we aim to do in the next chapter. Very recently, Kulendran (1996) and, Kulendran and King (1997) have contributed to the literature with tourism demand model which is also built on Witt and Martin (1987) econometric model. Therefore, we would like emphasise that it is new to use cointegration in tourism. No one applied cointegration of tourism demand to particular countries (i.e., N. Cyprus, Malta, The Isle of Man etc.). It is important to note that our study is the only study which is based on small island states and consists quarterly basis data. This is therefore believed to bring better economic understanding when researchers are interested in seeing long-run economic relationship. It is also a unique study which gives comparative idea between large countries and small countries.

These regression equations will help to identify the main determinants of tourism demand. In addition, they may prove useful for forecasting purposes. To assess this
the forecasts produced by the regression equations are compared to those from time series based approaches.

When we are judging the most accurate forecasts from the outcomes, comparisons will be made of forecasts made over particular time horizons. We have seen there are a number of alternative criteria for measuring forecast accuracy - RMSE, MSE, MAE, MSPE, TIC, etc. which can give different rankings so that there is no guarantee that a method that performs well under one criterion is satisfactory under the others. The result is that any conclusion from a given data set should be regarded only as indicators of forecasting ability and not as proof of the correctness or otherwise of the underlying model.

Whereas those using RMSE have argued that large errors should be more heavily penalised. On the other hand, those using MAPE have usually stressed the importance of the use of a standardised measure to facilitate comparisons among flows of differing sizes. It was decided to calculate and use MAPEs in the analysis, as it was felt that it would be interesting to see if the conclusions regarding the ability of various methods to forecast accurately differed when another measure was used, which, although allowing comparisons across differing sizes of flows, did not penalise large errors. Besides RMSE, MAPE also possesses the attribute that it has been used widely in the past, and thus comparisons of how the accuracy of tourism forecasts in this thesis compare with other forecasts or forecasting classification may be made. However, after we obtain the outcomes of our study, the RMSE has shown the superiority among others with its lowest errors, therefore, we decided to present our forecasting ranks under RMSE.

Several alternative measures of forecasting performance are used in the literature. Holden, Peel and Thomson (1994) emphasised that MSE is probably the most popular descriptive measure among others. If we denote the forecast by $F_t$ and the outcomes or actuals by $A_t$, the mean square error for $n$ forecasts and outcomes is defined as


\[ MSE = \frac{1}{n} \sum_{i=1}^{n} e_i^2 \]

or

\[ MSE = \sum (F_t - A_t)^2 / n \]

Because the errors are squared, large errors are given extra weight when MSE is calculated. Thus the cost of making positive and negative errors is assumed to be the same and varies with the size of the error.

An alternative way of expressing the MSE is to let \( e_t \) be the forecast error or \( F_t - A_t \), then, suppressing the subscript \( t \),

\[ MSE = \frac{\sum e^2}{n} = \frac{\sum (e - \bar{e} + \bar{e})^2}{n} \]

\[ = \frac{\sum (e - \bar{e})^2}{n} + \bar{e}^2 \]

The first term is the variance of the forecast error and the second is the square of the mean. Therefore MSE is an increasing function of the variance and mean of the error. Since, like the variance, the units of MSE are the squares of the units of \( F_t \) it is common to take its square root to give the root mean square error (RMSE), defined by

\[ RMSE = \sqrt{\frac{\sum (F_t - A_t)^2}{n}} \]

Often the square root of the MSE, RMSE, is considered, since the seriousness of the forecast error is then denoted in the same dimensions as the actual and forecast values themselves.

Other descriptive measures of forecast accuracy are the mean absolute error (MAE)/mean absolute deviation (MAD), and mean absolute percentage error
(MAPE). Theil inequality coefficient (TIC) is also widely used forecast accuracy in the literature.

6.6.1 Mean absolute deviation/mean absolute error

The mean absolute deviation (MAD) or mean absolute error (MAE) is a measure of overall accuracy which gives an indication of the degree of spread, where all errors are assigned equal weights.

\[
MAD \text{ or } MAE = \frac{1}{n} \sum_{i=1}^{n} |e_i|
\]

where \( |e_i| \) denotes the absolute value of the error and \( n \) denotes the number of forecast.

6.6.2 Mean absolute percentage error

Mean absolute percentage error (MAPE) is the relative measure which corresponds to the MAE, and is given by

\[
MAPE = \frac{1}{n} \sum_{i=1}^{n} \left| \frac{e_i}{V_i} \right| \times 100
\]

Lewis (1982) said that the MAPE is a most useful measure in comparing the accuracy of forecasts between different items or products since it measures relative performance.

If the MAPE calculated value is less than 10 percent, it is interpreted as highly accurate forecasting, between 10 - 20 percent good forecasting, between 20 -50 percent reasonable forecasting and over 50 percent inaccurate forecasting (see Lewis (1982, p.40 for more details).

On the other hand, Choy (1984) used MAPE in his paper which was related with the accuracy and efficiency of forecasting techniques by applying time series regression to forecasting visitor arrivals to the Asia/Pacific region and Hong Kong. He actually compares a naïve forecast with a simple time-series regression. Relative accuracy of time series regression for each forecast area is presented in terms of MAPE and
the percentage increase in accuracy of the time series forecast over naïve forecasts. You may find the obtained results and comments more deeply in his paper.

6.6.3 Theil’s $U$ or Theil’s Inequality Coefficient

Theil’s inequality coefficient (Theil, 1966) is another statistical measure of forecast accuracy. One specification\footnote{There are several variations of Theil’s $U$ inequality. This particular formulation can be thought of as the naïve Theil’s $U$ because it is based upon comparison of one forecast model with the naïve forecast.} of Theil’s $U$ compares the accuracy of a forecast model to that of a naïve model, which simply uses the actual value for the last time period ($Y_t$) as a forecast for $Y_{t+1}$. That is $\hat{Y}_{t+1} = Y_t$ for each time period.

The formula for Theil’s $U$ is

$$U = \frac{\text{RMSE of the forecasting model}}{\text{RMSE of the naïve model}}$$

A Theil’s $U$ greater than 1.0 indicates that the forecast model is worse than the naïve model; a value less than 1.0 indicates that it is better. The closer $U$ is to 0, the better the model. In practice, values of 0.55 or less are very good (Lindberg, 1982; McNees, 1979).

There is a different computational formula which is discussed by Gaynor and Kirkpatrick (1994) with a formula such as:

$$U = \frac{\text{standard error of the forecasting model}}{\text{standard error of the naïve model}}$$

This formula requires that we generate the naïve forecast, compute its standard error, and compare it with the standard error of the forecasting model. As you will recall, the values for Theil’s $U$ range from 0 (no forecast error in the model) to greater than 1 (forecast model performs worse than the simple naïve model). In actuality, the inequality coefficient uses three different derivations of the above formula, each of which is useful in different situation. An alternative method
proposed by Armstrong (1985) was used again by Gaynor and Kirkpatrick (1994) which seems to have its advantages. In this method, it is not necessary to generate the forecast for the naïve model and compute their errors. Therefore an alternative formulation is adopted for calculations that can give the forecast accuracy.

The alternative method for computing Theil’s $U$ is

$$U = \frac{\sqrt{\frac{1}{n} \sum_{t=1}^{n} (\hat{Y}_t - Y_t)^2}}{\sqrt{\frac{1}{n} \sum_{t=1}^{n} \hat{Y}_t^2 + \frac{1}{n} \sum_{t=1}^{n} Y_t^2}}$$

where $\sum_{t=1}^{n} (\hat{Y}_t - Y_t)^2 = \text{the sum of the squared forecast errors; }$

$\sum_{t=1}^{n} \hat{Y}_t^2 = \text{the sum of the squared forecast values } \hat{Y}_t;$

$\sum_{t=1}^{n} Y_t^2 = \text{the sum of the squared actual values } Y_t.$

It is now possible to use the complete sample estimation period $n$, rather than $n-1$, for the calculation of the Theil’s $U$. The numerator of the preceding formula is the RMSE of the forecast model.

The analysis of $U$ remains the same in either method. There is one difference in that the bounds of Theil’s $U$ are now 0 (lower limit) and 1 (upper limit). Once again, the closer $U$ is to 0, the better the model. Conversely, if $U=1$, the model is as bad as it could be!

Finally, we found RMSE to be the best measure among the others for our study.

6.7 Conclusion

We used cointegration analysis in this chapter to model the international tourism demand. The advantage of using cointegration analysis in tourism demand modelling is that this methodology overcomes the problem of “spurious regression”
associated with traditional econometric work. If the unit root tests indicate that the economic variables are stationary, tourism demand models can be estimated by regression analysis. When the economic variables are non-stationary, cointegration analysis should be considered to estimate tourism demand models.

The augmented Dickey-Fuller unit root test proposed by Dickey-Fuller (1981) suggest that the tourist arrivals from origin to destination countries are non-stationary. It is implemented by EVIEWS ADF test including trend and intercept variables at 4 lags. Some series achieved at stationarity level at first difference, however, some needed second differencing. You can see the details in Table-7.5 in chapter 7. Therefore, having identified that the economic variables are non-stationary, Johansen’s Maximum Likelihood technique was found to be the best to estimate long-run elasticities. However, Engle-Granger’s two step and Engle-Yoo’s three step modelling were found to be not preferable due to having some shortcomings. Johansen Maximum Likelihood is preferable to others because it is good for large sample sized data and the number of cointegrating vectors may be more than one, since more than two variables involved in each cointegrating regression. Because the EG approach assumes the uniqueness of the cointegrating vector, we need to employ a system-based Johansen method to check the number of cointegrating vectors. The other reason is the OLS long-run estimates that may be remarkably biased. The last reason is because of the resulting t-statistics which may not be valid due to nonnormality of the distribution.

Although the existence of multiple cointegrating vectors is regarded as an identification problem for single equation cointegrating estimation, this problem, in practise, may be solved by choosing the particular cointegrating vector where the long-run estimates correspond closely (in both magnitude and sign) to those predicted by economic theory and also to those obtained by some other alternative long-run estimation techniques.

Charemza and Deadman (1997) emphasised that while using the cointegration tests; it is not precise that the relationship is really a long-run one, on the contrary it is an
assumption supported by relevant economic theory and cannot be statistically verified. In this sense, whether or not cointegration exists is an empirical question, but beliefs of economists appear to support its existence. Cointegration simply provides a formal framework for testing long-run economic relationships from actual time series data. In the literature, cointegration tests have been implemented on various fields of economic theories, such as; international tourism demand, exchange rate, purchasing power parity, export-led growth, and money markets.

Lastly we will try to judge the most accurate forecasts from the outcomes in the next chapter over particular time horizons.
CH 7: Empirical Findings

7.1 Regression Results

Using an econometric model to estimate tourism demand is very important for this study because, we are interested in seeing group of variables which influences international tourist arrivals from an origin country to a destination country. Demand estimation is important for tourism of N. Cyprus. Since we are dealing with small island states, especially N. Cyprus, it may be important to select a regression model that will show the effect of supply constraints demand situation. North Cyprus is facing insufficient bed spaces, airline transportation, infrastructure etc. Therefore, a model including lagged dependent variable is inevitable which is expected to pick up the changes in supply constraint situation. From our survey, we found Witt and Martin (1987a) tourism demand model suitable for our study.

The modifications we intended to do is to include income per capita as an explanatory variable rather than disposable income because of the lack of availability of quarterly data. We excluded substitute variables from the original model either due to potential multicollinearity problems or the lack of data availability. Another important modifications we made in our model is to exclude ferry fares variable since we face the lack of data from many countries. Lastly, we aimed to use quarterly data rather than annually for 1976-1995 period and also included seasonal dummies in our regression model. No such a long run quarterly study has been done on particular countries we are concerning therefore, ours will be a new contribution for the literature.

The tables displayed below indicate the regression models (coefficient elasticities before adjustments) and best regression models (coefficient elasticities after diagnostic tests) for the selected inbound tourist destinations.
Table 7.1 Regression Models for Malta

<table>
<thead>
<tr>
<th>Origin</th>
<th>Dest</th>
<th>C</th>
<th>In IN</th>
<th>In CL</th>
<th>In EX</th>
<th>In FF</th>
<th>In S</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>DM1</th>
<th>DM2</th>
<th>In V_m/P_m</th>
<th>Trend</th>
<th>R²</th>
<th>R²'</th>
<th>DW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Malta</td>
<td>-39.509</td>
<td>7.250</td>
<td>-0.674</td>
<td>4.650</td>
<td>-7.477</td>
<td>0.902</td>
<td>0.586</td>
<td>-0.972</td>
<td>0.526</td>
<td>-0.367</td>
<td>-0.022</td>
<td>0.108</td>
<td>-0.017</td>
<td>0.900</td>
<td>0.881</td>
<td>1.811</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-3.718)</td>
<td>(3.593)</td>
<td>(-0.486)</td>
<td>(2.730)</td>
<td>(-1.544)</td>
<td>(1.643)</td>
<td>(3.474)</td>
<td>(-2.748)</td>
<td>(0.951)</td>
<td>(-2.102)</td>
<td>(-0.128)</td>
<td>(0.894)</td>
<td>(-1.680)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>Malta</td>
<td>-0.432</td>
<td>0.759</td>
<td>0.006</td>
<td>0.923</td>
<td>-8.021</td>
<td>0.972</td>
<td>0.199</td>
<td>-0.515</td>
<td>0.461</td>
<td>-0.296</td>
<td>-0.271</td>
<td>0.549</td>
<td>-0.014</td>
<td>0.841</td>
<td>0.811</td>
<td>1.172</td>
</tr>
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<td></td>
<td></td>
<td>(-0.110)</td>
<td>(1.077)</td>
<td>(0.007)</td>
<td>(1.133)</td>
<td>(-2.488)</td>
<td>(5.072)</td>
<td>(2.301)</td>
<td>(-3.282)</td>
<td>(2.189)</td>
<td>(-1.975)</td>
<td>(-1.901)</td>
<td>(4.799)</td>
<td>(-2.288)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>Malta</td>
<td>-6.239</td>
<td>0.894</td>
<td>-1.647</td>
<td>-0.182</td>
<td>-1.488</td>
<td>-0.070</td>
<td>0.193</td>
<td>-0.440</td>
<td>0.490</td>
<td>-0.171</td>
<td>-0.099</td>
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<td>0.964</td>
<td>0.958</td>
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<tr>
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<td></td>
<td>(-2.610)</td>
<td>(1.657)</td>
<td>(-2.644)</td>
<td>(-0.325)</td>
<td>(-1.002)</td>
<td>(-0.274)</td>
<td>(2.693)</td>
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The figures in brackets are t-values.
* indicates significance at 5% level.
** indicates significance at 10% level.
*** indicates significance at 20% level.
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Notes:
The figures in brackets are t-values.
* indicates significance at 5% level.
** indicates significance at 10% level,
*** indicates significance at 20% level.
7.1.1 Interpretations of Regression Results

There are four tables illustrated above; in which two of them indicate the regression results before adjusting diagnostic tests and the other two indicate the best regression models after adjusting econometric problems (e.g., multicollinearity, autocorrelation etc.). As we explained before there are 43 origin countries included in the regression model and two destination countries visited. Full details of all these are shown in volume 2. The tables alone show inbound destinations to North Cyprus and Malta. Witt and Witt (1992) emphasise that where small flows are concerned, the data on which the estimation is based may be less reliable and data errors may contribute significantly to errors. For comparative purposes equations are also estimated for inbound tourist flows to the UK, Austria and Turkey. These results are shown in Appendix. In general they support the findings with respect to price and income elasticities discussed in this chapter. (Tourists from particular origin countries seem to exhibit similar behaviour irrespective of destination.). More accurate forecasts may also be expected with large flows because these flows can only occur for well-established destinations (e.g. the UK and Austria). Large fluctuations in travel to such destinations would not be expected, except if, say, civil war broke out. This is partly due to supply constraints - it takes time to build hotels, and organisational inertia - tour operators have established links with hotels which have developed over time.

7.1.2 Economic Interpretations for Malta

In Table 7.2, the estimated income elasticities for inbound flows to Malta range from 0.195 to 6.893 and in four cases it is greater than one. The lower income elasticity for Italy may be a reflection of lower travel costs. The estimated income coefficients suggest that a 1% increase in real income per capita results in a 6.90%, 1.08%, 0.20%, 1.23% and 2.69% increase in the number of tourist arrivals to Malta from Austria, Germany, Italy, the UK and the USA respectively. All t-statistics given for income coefficients show that they are all significant at 5% significance
level except Italy, that it is found significant at 10% significance level. The cost of living variable is used for a proxy for consumer price index and therefore it represents the price elasticity. The price elasticity is greater than one for Germany and Libya. A 1% increase in the Maltese price level causes 1.65% and 1.89% decrease in the tourist arrivals to Malta from Germany and Libya correspondingly. Both coefficients are found significant at 5% significance level. Because of the multicollinearity problems between cost of living and income variables for Austria, Denmark, Italy, the UK and the USA, cost of living variables are excluded from the best regression models. The exchange rates variable was found significant for Austria and the UK and they have elasticity coefficients above unity. A 1% increase in the exchange rates of Austrian Shillings and the UK pounds results 4.51% and 1.46% increase in tourist arrivals to Malta from Austria and the UK particularly.

Air fares and surface transportation costs are price related variables which they both give the price elasticities. For Austria, Denmark, and Germany the air fare variables are found significant. A 1% increase in air fares causes 7.32%, 5.95% and 2.24% decrease in the number of arrivals to Malta from Austria, Denmark and Germany relevantly. The surface cost coefficients are found below unity and elasticity coefficients are representing inelastic price demand for Italy and the UK. A 1% increase in surface travel costs (proxy made from diesel petrol prices - see chapter 5 for details) results 0.27% and 0.60% decrease in tourist arrivals from Italy and the UK to Malta individually. Yet, this is not a strong proxy since we did not include the ferry crossing fares to Malta. However, for central European countries for example, (the tourists travelling from Germany, France, Austria, Belgium, Switzerland to Turkey without ferry crossing or for Austria inbound) surface transportation elasticities are important.

7.1.3 Economic Interpretations for N. Cyprus

The previous analysis focused on Malta with the intention of giving a yardstick to compare North Cyprus. The situation in North Cyprus differs in a number of respects, however. Although both of the islands are situated in Mediterranean sea,
the socio-economic and political circumstances of each country represent different pictures.

So as to understand the current position of North Cyprus in tourism, one has to examine the recent history. The political events took place in Cyprus Island from 1960s onward will shed a great deal of light in our understanding of the attractiveness of North Cyprus to the foreign tourists.

As a result of ongoing political problems between Greek and Turkish communities of the island, North Cyprus is entirely isolated from the world. 1974 war over the island between Greece and Turkey, brought about new political developments for the Turks, yet it did not help them to take their part, officially, in the nations of families in the world. North Cyprus remains as an un-recognised state and is not heard much in the tourism circles because of its undetermined political status. Anyone wish to fly to North Cyprus, has to go through Turkey, and hence any flight set off to North Cyprus has to touch down to Turkish land before landing on North Cyprus as the international regulations require.

North Cyprus, with its historical and scenery beauties including beeches, presents another golden opportunity for world tourism to be explored, yet above mentioned political uncertainties attached to the country as an enigma does not allow that potential to be fulfilled. It is, thus, a fact that political issues discourages people to take their holidays in North Cyprus.

This brings us to another point: the importance of socio-political issues in the decision-making process of economic realities, as tourism is an economic activity despite being a recreational one. Thus, the endogenisation of political circumstances could have been useful in shedding light in our understanding of North Cyprus tourism case. However, we have to acknowledge that that area should remain under the occupation of political economists, and could, possible, be a source of another research inquiry for the future.
Before going any further, it's time to analyse the modest results that our research inquiry has produced. Following analyses based on the results depicted on Table 7.3 and Table 7.4. While Table 7.3 presents regression results for N. Cyprus, the latter is the result of best regression for North Cyprus. As the name suggests, Table 7.4 presents a corrected version of certain statistical problems.

As Table 7.4 shows we search for the impact of income (IN), cost of living (CL), exchange rate (EX), air-fares (FF), surface transportation cost (S), Gulf War (1991) as dummy variables together with supply constraint on the number of tourists visiting North Cyprus from Turkey, UK, Germany, USA and Australia. These origin countries are selected on the basis that these constitute the major tourism source for N. Cyprus. The first equation from Turkey to North Cyprus represents the Turkish passengers who stayed in tourist accommodation only and covers the period from 1983 to 1995. The last equation, however, includes all Turkish passengers travelling abroad regarding the luggage traders.

Our regressions produced following estimated income elasticities: Turkey, 0.562; UK, 0.958; Germany, 1.475; USA, 4.214 and Turkey, 0.672. This, in turn, implies that a 1% increase in real income of the citizens of each country brings about increase in the size of mentioned magnitudes in terms of percentage, e.g. a 1% increase in the income of the citizens of Germany brings about 1.475% increase in the number of German visitors to the country. The lower income elasticities associated with Turkey in particular and with the UK are consistent with the results for Malta. However they may be due to the lower travel cost from Turkey to the island, and to the competition in flight fares from London to the island as there is a great number of Turkish Cypriots settled in the UK. Being originally from the island, income may not constitute a major factor in reaching a decision to visit the island for the Turkish Cypriots in the UK. This applies to the citizens of Turkey as they share the same ethnicity together with island being very close to the mainland Turkey.
We can, now, proceed to check the significance of estimated income coefficients for each countries; The result shows that estimated income coefficients are all significant except that it is significant for the UK at 10% and USA at 20% level of significance.

When we compare the regression in Table 7.3 with the Best regression result in Table 7.4, it will clearly be seen that CL, the cost of living variable, was dismissed by the latter. This is due to the fact that in the first model we found a high degree of multicollinearity between cost of living and income variables for each country, and hence, in the corrected version of the regression model inevitably it was excluded. The same applies to EX, exchange rate as well. The second model, as can be seen from the Table 7.4, only produced result for the USA, which is significant only at 20% level of significance. Bearing in mind the above discussion and the countries that are included in our list, it is clear that some of people travelling from the UK, Turkey and Australia are Turkish or Turkish Cypriots and the reason for travel may not be tourism, e.g. people going back to their home town to visit their parents and relatives etc. Similar elasticities result when considering other destinations, however. For the people going from Turkey, again having the same currency, exchange rate does not play any role in their decisions to go to Cyprus. For the people travelling from the USA to North Cyprus, EX has a low significance, and we can interpret that 1% increase in the value of US Dollar brings about 0.137% increase in the number of people visiting North Cyprus.

Air Fares (FF) was dismissed from the best regression after taking into account the corrections which needed to be carried out to overcome certain econometrics problems. Surface transport cost (S) is important for only Turkey and Germany. Many people from Turkey use means other than flights. As far as Germany is concerned, it has been witnessed that for various reasons, Turkish ethnic people from Germany, travels by car or ferries to the island. Although the estimated coefficients for S are low, particularly for Turkey, they are statistically significant. The signs are as expected to be negative. Accordingly, for instance, a 1% increase in surface costs results in 1.416% reduction in the number of visitors from Germany to the island. The impact of any increase on surface cost on the visitors from
Turkey is rather low. Since this measure as a proxy does not include ferry crossing, therefore for the people coming from Turkey, the surface transportation elasticity is not very strong. This is important as most of the people from Turkey travels to the island by ferry.

Seasonality is an important factor to be taken into account in tourism as the number of tourists varies from one season to another. Because, most of the tourism activity in our times based on the desire to have sun and beach, which makes summer season as the most attractive season to visit a holiday resort. Seasonal dummies are used to capture these effect for all destination countries. Although some of the people fly to N. Cyprus, as explained above, is non-tourism motivated, seasonality still is an important factor in our analysis. This suggests tourism flows are being affected, although it may also be Turkish Cypriots from the UK or Australia would visit their relatives and home in North Cyprus during summer season or may be during the Christmas holiday as it is time the schools have their vocations and most of the adults feel it is the right time to have a family vocation. Therefore, we used seasonal dummies to check whether the seasonality is an important or a significant factor in determining the number of tourist visiting North Cyprus.

In order to see the seasonality in demand we used seasonal dummies (D2, D3 and D4). Quarter 2 stands for April, May and June, quarter 3 stands for July, August and September, and quarter 4 stands for October, November and December. Here the seasonal effects are presumed to shift the intercept of the regression function. Note that the quarterly seasonal effects are represented by three, not four, binary regressors; otherwise, the least square estimators of the regression coefficients would be indeterminate. The representation of seasonal effects in our equations involve only three seasonal dummy variables. Using the four seasonal dummies and the constant together would make it impossible to estimate the OLS regression (perfect multicollinearity). The results will remain unchanged when four dummies are used, one for each of the seasons, but, the constant from the regression equation should be dropped. Instead we can count constant as one, and D2, D3 and D4 as
seasonal dummies for quarter 2, 3 and 4 respectively. For the cointegration tests we used seasonally adjusted series instead of using seasonal dummies.

We used dummy variables to capture the significance of seasonal variations; these are D2, D3 and D4, and D1 being constant. As can be seen from the Table 7.4, all the dummy variables are statistically significant, and the magnitude of dummy coefficients for the UK, Germany, the USA and Australia is rather high for D3 and D4. This could be due to long Christmas holidays and mild climate in the Mediterranean region. On the other hand, although there is seasonality between Turkey and North Cyprus, the magnitude of dummy coefficients are not as high as others. This is could be due to the fact that North Cyprus being very close to mainland island is always accessible easily by Turkish people. Secondly, as the last equation refers to the luggage traders from Turkey, there is no much importance of seasonality in their economic activity.

Seasonality in the number of arrivals perfectly expressed in monthly basis and we converted them into quarterly basis. Seasonal fluctuations may vary from one country to another and geographical situation and climate conditions of the country can determine the flows eventually.

We also used break down dummies for the regression equation and the effect of economic, social and political crises are aimed to be interpreted. (1987 wages demonstration and the effects of 1986 economic recession for Austria, 1986 recession for Italy and the USA, 1991 gulf crisis for Germany and 1979 oil shock for the USA; all take the value 1 for the indicated year and 0 otherwise).

The dummy variables for the Gulf War suggests a negative impact on German tourists. This may be because German visitors are more risk averse in comparison to British tourist. A similar result is found when looking at German and Austrian visitors to Malta. During the same period, there were no changes in British visiting attitudes to N. Cyprus or Malta. This may be because of several reasons:
British tourists are less risk averse. This may be because of serious IRA attacks in England for many years which led many British to live with it. They are used to see many unpredictable violence's and try to protect themselves with strong defence and brave determinism. Therefore, British are risk taker in comparison to Germans which are risk aversers.

British visitors to N. Cyprus may themselves to Turkish Cypriots, with close family ties (see above). Similarly British tourist have cultural ties between Maltese people, because Malta was a colony of Great Britain for many years.

The life styles in Malta and N. Cyprus is very similar in England which may be another positive effect on British visiting attitudes. Therefore, middle age group and old age group tourist are choosing to visit N. Cyprus and Malta and as they feel themselves part of their host community. Germans as contrary do not have this kind of cultural and social ties.

For different dummies, we can add many comments for different countries that some can be affected and some can not. The oil crisis caused very serious economic and social problems (i.e., unemployment, low level of income, inflation etc..) in America and in some other countries. The reduction in income automatically reduced the living standards of people which caused a major reduction in the number of international visits.

The distance to travel from Europe to N. Cyprus and Malta is shorter to travel from America. Therefore, the oil prices in Europe did not have a great influence on cost of transportation for European airline companies than American companies. American passengers affected negatively during 1986 economic recession whereas Danish and German etc., visitors were not. We can reach to a conclusion that sudden shocks in one countries economy may not affect the other country at the same time, therefore, it only affects some origin countries.

As an example of the impact of the Gulf crisis consider the coefficient of the dummy variable for travel from Germany to Malta. The estimated coefficient of the dummy variable relating to the 1991 Gulf crisis is -0.183. This suggest demand for
tourism was only 83% of what it would otherwise have been. This may be shown by focusing solely on the two relevant variables. In 1991

$$\ln \frac{V_t}{P_t} = \ldots -0.183 + \ldots \quad (1)$$

In 1990, i.e. the year before the Gulf crisis

$$\ln \frac{V_{t-1}}{P_{t-1}} = \ldots + 0 + \ldots \quad (2)$$

as the dummy variable takes the value 1 in 1991 and 0 otherwise.

Subtracting equation 2 from 1 yields

$$\ln \left( \frac{\ln \frac{V_t}{P_t}}{\ln \frac{V_{t-1}}{P_{t-1}}} \right) = -0.183$$

or

$$\ln \left( \frac{\ln \frac{V_t}{P_t}}{\ln \frac{V_{t-1}}{P_{t-1}}} \right) = -0.183$$

Taking antilog

$$\frac{V_t}{P_t} / \left( \frac{V_{t-1}}{P_{t-1}} \right) = 0.83$$

Thus a reduction of 17% is indicated. There is also a 30.6%, 25.8%, and 19.7% reduction in demand for tourist flows to Malta from Austria, Italy, and USA respectively as a consequence of wages crisis in Austria during 1987 (DM1), the effects of 1986 economic recession in Italy (DM1) and 1979 oil shock in America (DM1). Similarly, there is 16% reduction in demand for tourist flows to Malta as a consequence of economic recession in 1986(DM2) in the USA.. The sign for breakdown dummies are all negative and the coefficients are all significant.

Due to the each problem associated with each country in the year defined, there was a 41.26% reductions (because of 1986 economic recession), in the number of tourist visiting North Cyprus from Turkey. The reductions for each countries are; from Germany 49.19%, from USA 31.4%, from Australia 78.8 % and from Turkey as the luggage traders case 24.35% as a consequence of 1991 Gulf crisis (DM1). These are the reductions caused by the problems, identified by dummy variables, in each country in certain years, and these reductions is according to the one year before the event occurred. There is also 28.83% reduction in Turkish visitors, %31 in German and 62.28% in American to North Cyprus indicated by (DM2) which is the
consequence of Gulf crisis. This method of calculation is described in the previous case related to Malta.

Trend variable is another issue tested in our regression equations to see whether the number of visitors received by Malta and North Cyprus is a product of long-term trend or is just an occasional. In other words, this will show us whether Malta and North Cyprus are increasing in popularity. When the sign of the coefficient of trend is positive, then we can talk about fashionability and vice versa.

The exact interpretation of the trend variable is as follows, using Germany to Malta (coefficient +0.018) and periods 60 and 61 (1990.4 and 1991.1 as the example:

\[
\ln \frac{V_t}{P_t} = \ldots + 0.018 \times 61 + \ldots \\
\ln \frac{V_{t-1}}{P_{t-1}} = \ldots - 0.018 \times 60 + \ldots
\]

Therefore for any two sequential periods

\[
\ln \left( \frac{V_t}{P_t} \right) - \ln \left( \frac{V_{t-1}}{P_{t-1}} \right) = 0.018
\]

or

\[
\ln \left[ \frac{\left( \frac{V_t}{P_t} \right)}{\left( \frac{V_{t-1}}{P_{t-1}} \right)} \right] = 0.018
\]

Taking antilog

\[
\frac{V_t}{P_t} \div \frac{V_{t-1}}{P_{t-1}} = 1.018
\]

This indicates that demand from Germany to Malta is increasing at 1.8 percent \{(1-1.018)*100\} per quarter in general. In another way, 1991.1 (first quarter) demand would be 1.018 percent of demand in 1990.4 (fourth quarter); thus an increase of 1.8 percent is indicated. There is also, 1%, 1.9%, and 0.4% increase per quarter in demand to Malta from Italy, Libya and the UK correspondingly. However, there is 2.3% and 0.7% decrease in tourism demand to Malta from Austria and USA.

Our results for N. Cyprus show similarly that there is a 1.5% increase per quarter in tourist received from Germany, and 3.1% increase per quarter tourist visiting the
country from Turkey as luggage traders. Although the coefficient values of trend variable is not that high, they are statistically significant.

Trend represents the popularity of the country in which positive trend coefficients refers fashionable and negative refers not fashionable. The lag dependent variable is expected to have positive sign. The estimated coefficients of the lagged dependent variables in Table 7.2, 0.251, (-), 0.472, 0.412, 0.404, 0.182, 0.458, all are between 0 and 1 as stipulated by distributed lag theory. The magnitude of lags coefficient indicates that large part of the number of people choosing a particular holiday in a given year can be predicted on the basis of the number who chose it in the previous year, thus only leaving a small part of this number to be accounted for by the remaining explanatory variables. A problem therefore with the presence of the lagged dependent variable is that it dominates the equation and hence it tends to “swallow up” various other effects. A 1 percent increase in the number of tourist arrivals to Malta in one year results in a 0.25%, (-), 0.47%, 0.41%, 0.40% 0.18% and 0.46% increase in the number of tourist arrivals in the next year from Austria, Denmark, Germany, Italy, Libya, the UK and USA respectively. This is explained as a cause of revisit (risk aversion and habit persistence) and a cause of supply constrained demand. Because of the multicollinearity problem, the size and significance of the variable coefficients in the models may be distorted. For example, as it is explained in chapter 5, the exchange rates variable may sometimes represents costs of living in destination country, therefore, this may mean that if the exchange rates variable does not appear in the model and cost of living remains, the coefficient of the cost of living variable may be biased upwards when cost of living and exchange rates are highly negatively correlated. It is also valid for air fares and surface cost variables since both variables represents price elasticity and relevant to each other, therefore, they also highly negatively correlated. We have obtained high adjusted R^2 values, it implies that the models fit the data well and there can be considerable confidence in the empirical results. For Austria, Denmark, Germany, Italy, the UK and USA, we have 0.88, 0.84, 0.96, 0.96, 0.86, and 0.87 adjusted R^2 values respectively. By contrast, where the R^2 values are not particularly high, caution should be exercised in drawing conclusions. Similarly, statistically
significant coefficients allow for greater confidence. Only Libya has low R\textsuperscript{2} values with 0.61 which needs a particular caution in our study. Most of the equations we practised in the whole study satisfies the diagnostic tests and wherever necessary we made relevant corrections.

The results for N. Cyprus are somewhat different, suggest less habit persistence. However, we have to keep in mind that some of the people visiting North Cyprus, as indicated earlier, are not necessarily motivated with tourism but to visit their home country. As can be seen from the table 7.4, our best regression produced trend values only for Germany and Turkish second equation, namely luggage traders. The coefficients are 0.015 and 0.031 respectively. This implies that the contribution of German and Turkish citizens in the 1% increase in the number of visitors arrived at North Cyprus are 0.15% and 0.31% respectively.

It is time to offer interpretation on the overall significance of our regression equations. We have, in total, six regression equations for North Cyprus, and except for Australia the overall significance is rather high as the coefficient of determinations (R\textsuperscript{2}s) which show the power of our variables in each equation in explaining the total variation is high. This is a valid statement for R\textsuperscript{2}s as well, which are adjusted coefficient of determination. The R\textsuperscript{2} results are as follow; for Turkey is 75.1%, the UK 90%, Germany 90.8%, the USA 70%, Australia 46% and Turkey 88.4%. This means, for example, that our equation for the Turkish luggage traders can explain 88.4% of the total variation in the number of Turkish visitor arriving at North Cyprus. Our equation for Australia shows that our variables fail to capture a great percentage of the variation associated with the number of visitors from Australia as the magnitude of the coefficient of determination is only 46% which means that our equation can only explain the 46% of the variation associated with the visitors from Australia. Therefore, we can suggest that for the Australian visitors we should provide some other variables which are crucial in their decision to take a visit to North Cyprus. However, in overall we can easily state that our equations have been successful in capturing the dynamics of the variation in tourism activity oriented towards North Cyprus.
It is possible to find the long-run relationships between dependent and independent variables in section 7.2 (cointegration) of the same chapter.

7.2 Cointegration

Until now not many quarterly estimation has been done in this field, especially for cointegration analysis. Very recently, Kulendran (1996) and, Kulendran and King (1997) have contributed to the literature with tourism demand model which is also built on Witt and Martin (1987) econometric model. Therefore, we would like emphasise that it is new to use cointegration in tourism. No one applied cointegration of tourism demand to particular countries (i.e., N. Cyprus, Malta, The Isle of Man etc.). It is important to note that our study is the only study which is based on small island states and consists quarterly basis data. This is therefore believed to bring better economic understanding when researchers are interested in seeing long-run economic relationship. It is also a unique study which gives comparative idea between large countries and small countries.

7.2.1 ADF test for unit roots and Interpretations

The first step in cointegration analysis is to identify the order of integration of individual series. This is achieved by using Augmented Dickey Fuller tests (ADF) and the results are shown in Table 7.5.

It is possible to have identical critical values with marginal differences at the same percentage level for different series. However, it will not affect the result of ADF-test. All variables are expressed in logarithms. The relevant critical values are given by Mackinnon (1991). The corresponding critical values, with intercept and trend at 4 lag values for 80 observations at 5 % significance level, are obtained as -3.47. The calculated t-statistics reject a unit root in favour of stationarity when it is above the 5 % critical value (-3.47) which means that stationarity is achieved for the related series. In most of the cases, an augmentation of one appeared to be
sufficient to secure lack of autocorrelation of the error terms. In some cases, however, no augmentation was necessary. Eviews version 2.0 is used for all econometric computations in this study.

Almost all the results suggest the first difference of the series is stationary, indicating that these variables are 1(1). However, some variables appear to be 1(2), that is second difference stationary. You may find the abbreviations of each series in the appendix of the thesis.

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10 % Critical value: -3.1620
7.2.2 Interpretation of Cointegration Results

The unit root tests suggest that it may be possible to identify long run tourism demand equations which cointegrate. The equations presented show some of the results for Malta and North Cyprus.

### Table 7.6 Johansen Maximum Likelihood (ML) procedure: cointegration likelihood ratio (LR) test to determine the number of cointegrating vectors (r), based on maximal eigenvalues of the stochastic matrix. Malta Inbound.

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<td>35.65 At most 2</td>
</tr>
<tr>
<td>r≤3</td>
<td>r=4</td>
<td>0.050</td>
<td>4.917</td>
<td>15.41</td>
<td>20.04 At most 3</td>
</tr>
<tr>
<td>r≤4</td>
<td>r=5</td>
<td>0.013</td>
<td>0.994</td>
<td>3.76</td>
<td>6.65 At most 4</td>
</tr>
</tbody>
</table>

**(** denotes rejection of the hypothesis at 5\% (1\%) significance level.
LR test indicates 1 cointegrating equation(s) at 5\% significance level.

<table>
<thead>
<tr>
<th>Cointegrating equation</th>
<th>Null Hypo.</th>
<th>Alternative Hypo.</th>
<th>Eigenvalue</th>
<th>LR - test statistic</th>
<th>Critical Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5%</td>
</tr>
<tr>
<td>13. UK to MALTA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r=0</td>
<td>r=1</td>
<td>0.374</td>
<td>81.443</td>
<td>68.52</td>
<td>76.07 None**</td>
</tr>
<tr>
<td>r≤1</td>
<td>r=2</td>
<td>0.237</td>
<td>46.196</td>
<td>47.21</td>
<td>54.46 At most 1</td>
</tr>
<tr>
<td>r≤2</td>
<td>r=3</td>
<td>0.151</td>
<td>25.821</td>
<td>29.68</td>
<td>35.65 At most 2</td>
</tr>
<tr>
<td>r≤3</td>
<td>r=4</td>
<td>0.092</td>
<td>13.504</td>
<td>15.41</td>
<td>20.04 At most 3</td>
</tr>
<tr>
<td>r≤4</td>
<td>r=5</td>
<td>0.080</td>
<td>6.261</td>
<td>3.76</td>
<td>6.65 At most 4</td>
</tr>
</tbody>
</table>

**(** denotes rejection of the hypothesis at 5\% (1\%) significance level.
LR test indicates 1 cointegrating equation(s) at 5\% significance level.

In a multivariate context, maximum number of cointegrating vectors can be \( r=N-1 \) where \( N \) represents the number of variables in cointegrating regression. For the critical values reported by EVIEWS 2.0 version, see Osterwald-Lenum (1992). Both the \( \lambda \) max and Trace statistics have been used for testing the number of co-integrating vectors.

#### 7.2.2.1 Interpretation of cointegration results for Malta

They are equations representing Germany and UK quarterly visits to Malta. Since we are interested in small island states, Germany-Malta and the UK-Malta tourism demands were used to estimate the long-run equilibrium relationships between tourist arrivals and factors that influence these arrivals such as income, price, exchange rates and air fare. We tested for the possibility of multiple long-run relationships using Johansen (1991) test and one relationship was found at 5\% significance level in both cases. Table 7.6 provides log-likelihood ratio statistics for determining the number \( r \) of long-run relationships between quarterly tourist
arrivals, income, cost of living, exchange rates and air fare. The number of the long-run relationships is determined sequentially starting with the null hypothesis $r=0$ which is no long-run relationship between quarterly tourist arrivals, income, cost of living, exchange rates and air fares. To reject the null of $r=0$ (no long-run relationship) in favour of the alternative that $r=1$, the calculated value of the statistics should be greater than the 5% critical value. The results tabulated above indicates that the null of $r=0$ (no long-run relationship between tourist arrivals, income, cost of living, exchange rates and air fare) can be rejected in favour of the alternative $r=1$ for Germany. Germany, have one statistically significant long-run relationship between tourist arrivals, income, cost of living, exchange rates and air fare. In the UK case the null of $r\leq 4$ can be rejected in favour of the alternative $r=5$; that means there is precisely one statistically significant long-run relationship between tourist arrivals, income, cost of living, exchange rates and air fare. Whereas, the null of $r=0$, $r\leq 1$, $r\leq 2$, $r\leq 3$, cannot be rejected to the alternative $r=1$, $r=2$, $r=3$, $r=4$ correspondingly (at 5% critical value). The rank of the two matrices $\Pi$ are one.

The first row of the $\beta'$ matrix (cointegrating vector) is:

<table>
<thead>
<tr>
<th></th>
<th>IN</th>
<th>CL</th>
<th>EX</th>
<th>FF</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Germany)</td>
<td>1.000</td>
<td>-9.744</td>
<td>1.485</td>
<td>-6.131</td>
<td>-3.517</td>
</tr>
<tr>
<td></td>
<td>(0.519)</td>
<td>(0.673)</td>
<td>(0.564)</td>
<td>(2.122)</td>
<td></td>
</tr>
<tr>
<td>(The UK)</td>
<td>1.000</td>
<td>-1.917</td>
<td>-0.070</td>
<td>0.259</td>
<td>0.438</td>
</tr>
<tr>
<td></td>
<td>(0.366)</td>
<td>(0.337)</td>
<td>(0.025)</td>
<td>(0.965)</td>
<td></td>
</tr>
</tbody>
</table>

$W_3 = -49.289 + 9.744(IN4) - 1.485(CL10) + 6.131(EX10) + 3.517(FF10)$

$Z_1 = -8.637 + 1.917(IN2) + 0.070(CL1) - 0.259(EX1) - 0.438(FF1)$

which has been standardised so that its first element corresponds to the dependent variable (seasonally adjusted number of tourist arrivals per capita in log form, $W_3$, $Z_1$) in the first equation (see normalised equations in Annex for detail).

The estimated parameters for Germany has correct signs, for income, cost of living and exchange rates and opposite sign for air fares. On the other hand, the UK has
expected signs except cost of living and exchange rates. For Germany, all coefficients exceeds unity which means demand elasticities are elastic. The lower income elasticity for the UK may be a reflection of lower travel costs, whereas more distant destinations generally have high income elasticities (see Kulendran 1996). The estimated income coefficients suggest that a 1% increase in real income results in a 9.74% and 1.92% increase in tourist arrivals to Malta from Germany and the UK respectively. Since we used cost of living as a proxy for consumer price index, the cost of living coefficients gives us the price elasticities. A 1% increase in the Maltese price level causes 1.485% decrease and 0.07% increase in tourist arrivals to Malta from Germany and the UK correspondingly. Having low price elasticity (below unity) in the UK equation reminds us that there is an unanticipated inflation effect. On the other hand, German tourists are insensitive for the price changes in destination country. The exchange rates coefficients have positive sign in Germany and negative in the UK equations. The estimated sign was positive but in the UK case the situation is completely different. British people may change their travelling attitudes if their welfare level increases. In terms of exchange rates, for example, we obtained negative coefficients which means British tourist may prefer to travel long distance destination which is more costly and they may become more insensitive about Mediterranean destinations. Therefore a 1% increase in exchange rates results 0.26% decrease in the number of British arrivals to Malta, however, 6.13% increase in the number of German visits to the same destination. The reverse situation is valid for German tourist for transport costs. The German tourists are insensitive to the changes in the air fares but British do not. This is due to the fact that there are many connections to Malta from the UK since Malta was a British Colony, there are cultural ties between two countries. British people are travelling with chartered flights and many other private airlines are competing on prices since the UK has the greatest share in Maltese tourism sector. Therefore a 1% increase in air fares, results 3.52% increase in the German visits and 0.44% decrease in British visits to Malta. The diagnostic tests are applied for all equations and all matches the necessary limits.

As we mentioned before our equation is \( \ln w_6 = f(\text{in21, cl13, ex13, ff13}) \). Briefly, we listed our group series from, the number of seasonally adjusted quarterly visits,
income per capita, cost of living, exchange rates, and air fares variables in logarithm forms. The same variables are included in different group series and Johansen cointegration tests are applied for another 42 origin countries. The results in detail format are obtained from EVIEWS and included in the ANNEX. However, we decided to select randomly the UK and Germany to examine here and explain the findings in detail.

### Table 7.7 Johansen Maximum Likelihood (ML) procedure: cointegration likelihood ratio (LR) test to determine the number of cointegrating vectors \((r)\), based on maximal eigenvalues of the stochastic matrix. North Cyprus Inbound.

<table>
<thead>
<tr>
<th>Cointegrating equation</th>
<th>Null Hypo.</th>
<th>Alternative Hypo.</th>
<th>Eigenvalue</th>
<th>LR - test statistic</th>
<th>Critical Values 5%</th>
<th>1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. UK to NORTH CYPRUS</td>
<td>(r=0)</td>
<td>(r=1)</td>
<td>0.364</td>
<td>43.411</td>
<td>47.21</td>
<td>54.46 None</td>
</tr>
<tr>
<td></td>
<td>(r=2)</td>
<td></td>
<td>0.214</td>
<td>22.136</td>
<td>29.68</td>
<td>35.65 At most 1</td>
</tr>
<tr>
<td></td>
<td>(r=3)</td>
<td></td>
<td>0.132</td>
<td>10.801</td>
<td>15.41</td>
<td>20.04 At most 2</td>
</tr>
<tr>
<td></td>
<td>(r=4)</td>
<td></td>
<td>0.084</td>
<td>4.17</td>
<td>3.76</td>
<td>6.65 At most 3*</td>
</tr>
</tbody>
</table>

*\((***)\) denotes rejection of the hypothesis at 5% (1%) significance level. LR test indicates 1 cointegrating equation(s) at 5% significance level.

<table>
<thead>
<tr>
<th>Cointegrating equation</th>
<th>Null Hypo.</th>
<th>Alternative Hypo.</th>
<th>Eigenvalue</th>
<th>LR - test statistic</th>
<th>Critical Values 5%</th>
<th>1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. GERMANY to NORTH CYPRUS</td>
<td>(r=0)</td>
<td>(r=1)</td>
<td>0.459</td>
<td>53.370</td>
<td>47.21</td>
<td>54.46 None*</td>
</tr>
<tr>
<td></td>
<td>(r=2)</td>
<td></td>
<td>0.230</td>
<td>24.486</td>
<td>29.68</td>
<td>35.65 At most 1</td>
</tr>
<tr>
<td></td>
<td>(r=3)</td>
<td></td>
<td>0.166</td>
<td>12.189</td>
<td>15.41</td>
<td>20.04 At most 2</td>
</tr>
<tr>
<td></td>
<td>(r=4)</td>
<td></td>
<td>0.074</td>
<td>3.650</td>
<td>3.76</td>
<td>6.65 At most 3</td>
</tr>
</tbody>
</table>

*\((***)\) denotes rejection of the hypothesis at 5% (1%) significance level. LR test indicates 1 cointegrating equation(s) at 5% significance level.

In a multivariate context, maximum number of cointegrating vectors can be \(r=N-1\) where \(N\) represents the number of variables in cointegrating regression. For the critical values reported by EVIEWS 2.0 version, see Osterwald-Lenum (1992). Both the \(\lambda\) max and Trace statistics have been used for testing the number of co-integrating vectors.

#### 7.2.2.2 Interpretation of cointegration results for North Cyprus

The equations given in Table 7.7 are representing the UK and Germany quarterly visits to North Cyprus. The main idea of analysing cointegration equations for tourism demand is to estimate long-run equilibrium relationship between tourist arrivals and factors that influence these arrivals i.e., income, cost of living and exchange rates. Due to lack of data availability, we did not include air fares in our
cointegration equation. Johansen's (1991) test were used to test the possible multiple long-run relationship both in 5% and 1% significance level. Log-likelihood ratio statistics determines one cointegrating equations at 5% level from the UK to N. Cyprus and from Germany to N. Cyprus. The number of the long-run relationship is determined in most usual way starting with the null hypothesis, \( r=0 \), which states that there is no long-run relationship between quarterly visit, income, cost of living etc. To reject the null hypothesis of \( r=0 \) (no long-run relationship) in favour of alternative that is \( r=1 \), the calculated Likelihood Ratio (LR) statistics should be greater than 5% critical value. Therefore our results indicated in Table 7.7 proves that the null hypothesis, \( r=0 \), is rejected in favour of alternative \( r=4 \) for the UK, and in favour of \( r=1 \) for Germany. As a result, the rank of two matrices as explained above give us the following simplified equation:

The first row of the \( \beta' \) matrix (cointegrating vector) is:

<table>
<thead>
<tr>
<th></th>
<th>IN</th>
<th>CL</th>
<th>EX</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>(The UK)</td>
<td>1.000</td>
<td>-2.176</td>
<td>-1.064</td>
<td>0.150</td>
</tr>
<tr>
<td></td>
<td>(0.340)</td>
<td>(0.209)</td>
<td>(0.041)</td>
<td>14.232</td>
</tr>
<tr>
<td>(Germany)</td>
<td>1.000</td>
<td>-0.753</td>
<td>-2.679</td>
<td>-0.342</td>
</tr>
<tr>
<td></td>
<td>(0.414)</td>
<td>(0.519)</td>
<td>(0.127)</td>
<td>8.517</td>
</tr>
</tbody>
</table>

\[
P2 = -14.232 + 2.176(IN21) + 1.064(CL16) - 0.150(EX16)
\]

\[
P3 = -8.517 + 0.753(IN4) + 2.679(CL17) + 0.342(EX17)
\]

The estimated parameters for the UK has correct signs for income per capita (IN) and unexpected wrong signs for the cost of living (CL) and exchange rates (EX). However, for Germany we obtained correct coefficient signs for income and exchange rates, but not for the cost of living. The higher income elasticity for the UK may be a reflection of lower travel costs or an influence of strong family relationships between Turkish Cypriots living in the UK and living in North Cyprus. The estimated income coefficient suggest that a 1% increase in real per capita income results in a 2.17% and 0.75% increase in the number of tourist arrivals to North Cyprus from the UK and Germany respectively. Cost of living variable gives
us the price elasticities as a proxy for consumer price index (CPI) as we explained in section 7.2.2.1. A 1% increase in N.Cyprus price level brings about 1.06% and 2.67% increase in tourist arrivals to North Cyprus from the UK and Germany correspondingly. Having high price elasticity in both equations is a result of having high rate of inflation in North Cyprus. Therefore, the purchasing power parity works for the interest of foreign visitors. Exchanging rates due to inflationary effects gives power to the British and German visitors to buy more tourist services on the Island which plays an important role in the early stages of holiday bookings. The exchange rates coefficients have positive sign for Germany and negative sign for the UK equations. Similar results are obtained from the same countries for Malta Inbound.

As we explained above, British tourists may prefer to travel far destinations if their welfare level becomes better due to exchange rate differences. Then they may become more insensitive about Mediterranean destinations because they think travelling there is always cheaper and easier than going long-haul destinations. For British tourists, therefore, exchange rates does not play a determining role in short-haul travel. A 1% increase in exchange rates is a result of 0.15% decrease in the number of tourist arrivals from the UK to North Cyprus. The reverse is valid for Germans, because they are sensitive the exchange rate effects. Germans expect to have positive effect of having stable Deutch Mark against unstable Turkish Lira. As we explained before, sometimes cost of living is expressed with exchange rate terms. Germans are sensitive to the cost of living in N. Cyprus, therefore, strong and stable Deutch Mark against Turkish Lira is very influential on German travellers in their decision to travel to North Cyprus. A 1% increase in exchange rates is a result of 0.34% increase in the number of German arrivals to North Cyprus. Besides that, both equations satisfies all necessary diagnostic tests.

Econometric theory simply emphasise that a group of non-stationary time series is cointegrated if there is a linear combination of them that is stationary; that is, the combination does not have a stochastic trend. The linear combination is called the cointegrating equation. Its normal interpretation is a long-run equilibrium relationship. If you have $N$ endogenous variables, each of which is first-order integrated (I(1) series; that is, each has a unit root or stochastic trend or random-
walk element), there can be from zero to \( N-I \) linearly independent cointegrating vectors.

The series that we used for Johansen cointegration tests were nonstationary series. For normal tests we used four lag variables and we found at least one cointegrated equation at 5% significance level. In some equations: Austria to Malta, Australia to North Cyprus, Netherlands to Turkey, France to the UK, and Finland to the UK no cointegration was found at four lags level. We tried again at different lag levels and cointegration was found at smaller lag values. If Augmented Dickey-Fuller (ADF) tests show that some of the series are integrated, but the Johansen tests show that the cointegrating rank is \( N \), there may be a contradiction. Some specification error might be responsible for this contradiction. Therefore, econometric theory guides us to use Ramsey Reset stability tests to check if there is any omitted variables in the equation or whether there is any autocorrelation. The necessary tests were applied and specification error was corrected.

7.3 Forecasting Results

To determine the usefulness of the equations presented above for forecasting, comparisons are made of forecasts made over particular time horizons. We have seen there are a number of alternative criteria for measuring forecast accuracy - RMSE, MSE, MAE, MSPE, TIC, etc. which can give different rankings so that there is no guarantee that a method that performs well under one criterion is satisfactory under the others. The result is that any conclusion from a given data set should be regarded only as indicators of forecasting ability and not as proof of the correctness or otherwise of the underlying model.

Most studies which examine forecasting accuracy concentrated upon on MSE/RMSE as measures of accuracy. Fritz et al. (1984) examine the effects of combining forecasts produced using time-series and econometric forecasts of air arrivals into the State of Florida and present MSE for each approach for four different forecast horizons in their paper. Similarly Fujii and Mak (1980) use RMSE to evaluate the forecast in their study which are related with three different
methods of estimating an econometric model to forecast the number of US visitors travelling to Hawaii. Table 7.8, 7.9, and 7.10 therefore present these summary statistics (other measures are shown in volume 2.).
<table>
<thead>
<tr>
<th>Origin countries</th>
<th>DES</th>
<th>HW</th>
<th>ARMA</th>
<th>ECONOMETRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Denmark to Austria</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2. France to Austria</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. UK to Austria</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. Canada to Austria</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. Netherlands to Austria</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>6. USA to Austria</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. Turkey to Austria</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. Austria to Malta</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. Denmark to Malta</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10. Germany to Malta</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11. Italy to Malta</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12. Libya to Malta</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>13. UK to Malta</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>14. USA to Malta</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15. Turkey to N.Cyprus(83)</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>16. UK to N. Cyprus</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>17. Germany to N. Cyprus</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>18. USA to N. Cyprus</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>19. Australia to N. Cyprus</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>20. Turkey to N. Cyprus</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>21. Germany to Turkey</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>22. Austria to Turkey</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>23. France to Turkey</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>24. UK to Turkey</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>25. Italy to Turkey</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>26. USA to Turkey</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>27. N. Cyp to Turk(86-95)</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>28. Israel to Turkey</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>29. Denmark to Turkey</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>30. Switzerland to Turkey</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>31. Greece to Turkey</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>32. Belgium to Turkey</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>33. Netherlands to Turkey</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>34. USA to UK</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>35. Germany to UK</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>36. Austria to UK</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>37. France to UK</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>38. Japan to UK</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>39. Finland to UK</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>40. Spain to UK</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>41. IOM to UK</td>
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7.3.1 Interpretation of Forecasting Results

There are 43 different combinations of visits from origin countries to destination countries in our forecasting study (full details in volume 2) and we summarised the results illustrated above under three forecasting horizons (5, 2 and 1 year periods). You will find a brief explanations based on the simple ratio calculations on total 43 forecasting frequencies. The results for the various forecasting horizons (5, 2 and 1) show that HW\(^1\) has the highest forecasting accuracy based upon the RMSE\(^2\) criteria. HW came first 83.37% of the time (38 out of 43), 97.67% of the time (42 out of 43) and 44.18% of the time (19 out of 43) over the 5, 2 and 1 year forecast periods respectively. However, when short-term (1 year ahead) forecast takes place, HW does not perform so well. Over this short period the econometric models seem to perform quite well (25% of the time), as do the ARMA\(^3\) models (27.90% of the time). Yet, it overall, however, autoregressive forecasting became the second most accurate method with 65.11% of the time (28 out of 43), 67.44% of the time (29 out of 43) and 53.48% of the time (23 out of 43) over the 5, 2, and 1 year forecast periods respectively. For five and two years forecast period, Econometric\(^4\) forecasting became the third best method with 74.41 (32 out of 43) and 67.41 (29 out of 43) percent and DES\(^5\) for 1 year forecast period with 44.18 (19 out of 43) percent. In general DES has been found the least accurate method for five and two years forecast horizon.

The basic idea of the HW method is, to forecast with an explicit linear trend model with "seasonal effects". The method computes recursive estimates of the intercept or permanent component, the trend coefficient, and the seasonal effects. Since our series has seasonal effects, and the magnitudes of the effects do not grow along with the series, then we should use the HW method with additive seasonals. In this case, there were three damping parameters, which we may specified or estimated, in any

\(^1\) HW stand for Holt - Winters Additive Smoothing forecasting method.
\(^2\) RMSE stands for Root Mean Square Error.
\(^3\) Autoregressive forecasting sometimes referred as ARMA or Box and Jenkins Forecasting.
\(^4\) Econometric Forecasting may sometimes referred as 'historical forecasting' or 'actual static' forecasting.
\(^5\) DES stands for Double Exponential Smoothing Forecasts.
combination. On the other hand, HW became the best method while it keeps the seasonality and trend effects eventually. Another interesting findings have been obtained from this study that HW is either the most accurate method with 44.18 (19 out of 43) percent or least accurate one with 55.18 (24 out of 43) percent for only short term (1 year) forecast horizon. Otherwise, it is the most accurate method without any dispute. The size of forecast horizon, the data sample, the origin country and the destination country are all matters when different predictions take place, and therefore, alternative results may be achieved. We shouldn't forget that forecasting depends on assumptions and is not one hundred percent true.

There is an absolute reality we shouldn't neglect that the results may vary from one country to another and the forecasting accuracy is biased if you consider only two alternatives. Yet, with EVIEWS we may sometimes face unavoidable shortcomings. However, Witt and Witt (1992) study demonstrates us almost the similar results when seven different forecasting methods are included in their studies. The package Witt and Witt (1992) used named ORION⁶, is highly expensive and not a basic package. It is a commercial program which gives more comprehensive and better output than EVIEWS. The Additional univariate forecasting methods (Decomposition, Gompertz, and Trend Curve analysis) indicated in Witt and Witt's (1992) study did not perform better results therefore the methods we used are the most preferable methods that many practitioner found ideal for the study. The most recent study in the same field was made by Kulendran and King (1997) to forecast quarterly tourist flows using error correction and time series models.

Overall our regression equations do not seem to perform very well in these forecasting tests. Perhaps this is due to the way in which seasonality and trend incorporated in the models. Alternatively, it may be because of the time horizons chosen, or because time series methods work best (Witt and Witt, 1992). Changes in seasonality sometimes do not led the econometric forecasts to perform better results. There might be the data problems. More clearly, there may be a difference between the theoretical concepts we are trying to measure and the data. Also,

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⁶ ORION is Comshare’s forecasting package. Comshare is a commercial organisation which gave an access to Witt and Witt (1992, pp.8-9) for their study.
published data may to some extend be inaccurate because of incomplete coverage, the “hidden” economy, the use of sample estimates rather census values, and data-processing errors.

We can come to a conclusion that one-year ahead forecasts are more accurate than two-year ahead and five-year ahead forecasts, thus supporting Makridakis’s (1986, p.34) assertion that “Inertia in business and economic trends makes short-term forecasting simpler.....As the time horizon of forecasting increases so do the chances of systematic changes that can affect the future”.

More accurate forecasts may be expected with large flows because these flows can only occur for well-established destinations. Large fluctuations in travel to such destinations would not be expected, except if, say civil war broke out. This is partly due to supply constraints - it takes time to build hotels, to construct new airports, provide enough infrastructure, and organisational inertia- tour operators have established links with hotels which have developed over time. IN some cases vertical integration has taken place with tour operators owning their own hotels. It will be in tour operators’ interests therefore to keep selling holidays to those established resorts, and to a certain extent tourists can only go to those destinations where tour operators offer holidays. Furthermore, once a destination is established a large number of tourists will be return visitors (habit persistence); if they enjoyed their previous holiday to that country, they can reduce the risk of not enjoying their holiday by returning to a place they know they like. These factors have a stabilising effect on large flows which are thus easier to forecast is explained by Witt and Witt (1992).

The accuracy of econometric forecasts are beaten by several others as it happened in previous studies (Witt and Witt (1992)). Being third in most of the cases after HW and ARMA, supports the statement by Makridakis (1986 p.18) that “Econometric models are not necessarily more accurate than time series (extrapolative) models”. A major advantage of econometric models over time-series models is that the former explicitly take into account the impact on the variable to be forecast of changes in
the determining forces, which permits a tourism institution/company to link its forecasting with tactical and strategic plans for the future. Thus a company in the international tourism industry can use econometric forecasting systems to explore the consequences of alternative future policies on tourism demand ("what if" forecasting), which is not possible with time-series methods. The idea of tourism planning for North Cyprus which suffers lack of infrastructure and supply constraint demand situation, econometric forecasting seems inevitable. Therefore, the empirical results on forecasting accuracy in this thesis suggest that this is probably the major role of econometric models in tourism forecasting.

7.4. Conclusion

The main reason why we intended to use demand estimation and forecasting is to see the economic importance and policy implications implemented on small island states. Demand estimation is important for tourism of Cyprus. Since we are dealing with small island states, especially N. Cyprus, it may be important to select a regression model that will show the effect of supply constraints demand situation. As Archer (1976) pointed out "...unfilled airline seats and unused hotel rooms can not be stockpiled and demand must be anticipated and even manipulated". North Cyprus is facing insufficient bed spaces, airline transportation, and airport services, lack of infrastructure etc. Therefore, a model including lagged dependent variable is inevitable which is expected to pick up the changes in supply constraint situation. From our survey, we found Witt and Martin (1987) tourism demand model is suitable for our study. After we estimated demand, we found that there is strong economic relationship between the number of tourist arrivals and income per capita. For example in North Cyprus case, we obtained high income elasticities from Germany (1.475) and in Malta case we obtained high income elasticities from Austria (6.893), Germany (1.076), the UK (1.233) and the USA (2.692). Other than income, price variable was found significant in many cases. For example from Germany to Malta the price coefficient was found highly elastic (-1.649) and from Libya to Malta it is (-1.892). From our forecasting results we reached to a
conclusion that econometric model was not successful for long term forecasting of tourism demand for small island states.

From our discussion of forecasting it should be clear that accurate forecasting requires not only the correct economic theory but also correct decisions at each of the remaining stages in the forecasting procedure. In other words, forecasts are a combination of economic theory and the judgement of the forecasters. From this perspective, the most important determinant of forecasting accuracy is the prediction of future government behaviour and the values of the exogenous variables.

There is no general agreement amongst forecasters as to which method is the best. In so far as comparisons of different techniques have been made, there is a consensus that extrapolation methods are preferred for short-run forecasting, and econometric models for long-run forecasting. However, much of this evidence is based on particular case-studies and it is not clear that the results are generally valid. In fact, in our study econometric models did not prove the best results for long-run forecasting.

When different versions of the same technique are compared, such as the forecasts from different econometric models, the evidence is that, while one organisation may give the best forecasts for a particular variable over a given horizon and for a certain historical period, changing any of these factors results in an alternative forecaster being preferred. Similar evidence occurs for time-series methods. From the results given in Table 7.8 and Table 7.9 we found that econometric forecasts is not the best forecasting method when RMSE forecasting accuracy was used for five and two years ahead forecast horizon.

As a conclusion, econometric models are generally more expensive than univariate time-series methods, and require considerable user understanding in order to develop the correct relationships. In addition, a major problem in attempting to generate accurate forecasts of tourism demand using econometric models is the difficulty of obtaining accurate forecasts of the variables which influence demand.
Hence, in order for it to be worthwhile to use econometric models for the generation of forecasts of international tourism demand, these forecasts must be more accurate than those generated by univariate time-series methods. It has been shown, however, that this is not the case (when accuracy is specified in terms of error magnitude). It appears, therefore, that the main use of econometric models to a practitioner is with respect to the identification of the size of the effects that changes in the explanatory variables are likely to have upon tourism demand, and not as a direct forecasting tool. Econometric forecasting may be used for active ("what if") forecasting, where the consequences of possible changes in the determining forces can be assessed, which is not possible with non-causal forecasting methods. However, their usefulness in passive forecasting is debatable.
Ch 8 : Conclusion

8.1 Summary Of The Research

This chapter concludes the thesis with a summary of important issues that we investigated and empirical findings obtained. The related policy implications give us brief understandings and guidance for the future research on international tourism management and tourism demand. There are three aims in this thesis that we tried to specify clearly. Since we are interested in small island states and our strategies are to develop the small island economies, we firstly pointed out that for most of the small island nations, tourism is the biggest potential and seems the pioneer of the economy. Therefore, Porter’s (1990) National Diamond has been suggested to North Cyprus. This model is very popular and has been in use in many South Asian countries for more than a decade. The diamond is designed with i) Factor Conditions, ii) Demand Conditions, iii) Firm, Strategy, Structure and Rivalry, and vi) Related and Supporting Industries. The diamond is also supported by the Role of Government and Role of Chance mutually. We therefore suggest this model to North Cyprus in chapter one which is competitively advantageous with good sand-sea-sun package offer. Tourism is the only sector that will be the pioneer to overcome the shortcomings of the economy, and create a chance of having economic independency. According to Porter technology and knowledge (know how) are the two most important preconditions in achieving the national advantage. Porter explains the National Competitive Development Model into four distinct stages such as; factor driven, investment driven, innovation driven and wealth driven. The first three stages involve successive upgrading of a nation's competitive advantages and will normally be associated with progressively rising economic prosperity. The fourth stage is one of drift and ultimately decline. These stages, though brought schematics, provide one way of understanding how economies develop, the characteristic problems faced by nation's firms at different points in time, and the forces that propel the economy to advance or cause it to falter. Within this framework, we implemented Butler's (1980) tourist area life cycle theory on North Cyprus and the Isle of Man (chapter 4) to see how Porter’s four stages are achieved over the periods.

The second aim is to support the idea that the location and geography of the small island nations are important when trade is concerned. It is widely debated by Krugman (1992) that transportation cost and labour pooling are important issues that makes the country economically important and advantageous. Since we found Krugman’s
approaches appropriate and valuable for our arguments, we gave a broad explanation in chapter two to make the subject more understandable. By economic geography, Krugman meant "the location of production in space"; that is, that branch of economics that worries about where things happen in relation to one another. According to this argument, countries are normally modelled as dimensionless points within which factors of production can be instantly and costlessly moved from one activity to another, and even trade among countries is usually given a sort of spaceless representation in which transport costs are zero for all goods that can be traded. We thought it will be useful to make a link between Porter's (1990) and Krugman's (1992) approaches in chapter two and three, because they proved that nations can restructure their economies through improving technology, creating skilled labour pooling and establishing core regions before they restart to trade with other nations. Indices measures are used to identify the regions' specialisation in the tourism sector in the NW of the UK, South Turkey, the IOM and North Cyprus. The IOM is found to be more specialised than North Cyprus and South Turkey (Antalya) is found to be more specialised than North Cyprus when tourist premises are compared. Though both theorists want to explain the same phenomenon, namely the nation's economic prosperity, they sometimes contradict each other. That is why we needed to give criticism on both theorists in chapter three.

Porter (1991) is against classical economists, because he says that National prosperity grows out on the capacity of the nation's industry to innovate and upgrade, but not through a country's natural endowments, its labor pool, its interest rates, or its currency values as classical economists insist. A nation's competitiveness depends on the capacity of its industries to innovate and upgrade.

As long as the labor costs, interest rates, exchange rates and economies of scale are the most patent determinants of competitiveness, then why can we not consider the classical economists' pool of labor as the most important direct tool in the determination of national prosperity. There is no doubt that a nation's industry to innovate and upgrade is very important as far as technology is concerned in manufacturing industries, but it should not be generalized as the exclusive way for
growing the national prosperity. Where the international economy is concerned, Krugman (1993a) made another argument and debated on; if we want to understand differences in national growth rates, a good place to start is by examining differences in regional growth; if we want to understand international specialization, a good place to start is with local specialization. The geographical issues that economic geographers should worry about are the locations where production is taking place. Especially where service is concerned, this becomes even more important.

Krugman (1993) has also underlined that the time has come to use the same new tools to resurrect economic geography as a major field within economics. It is no longer the case that the need to model increasing returns makes a field untouchable. Instead, increasing returns are, at the moment fashionable. Therefore, Porter’s criticism about classical economists is not strong enough and Krugman’s approach on economic geography is strengthening the labor pool idea where Porter was against. Yet, there is a compromising point between two theorists, that both are defending the nation’s economic prosperity.

Throughout this research, another principal argument has rested on the tourism’s evolution at any destination which corresponds Butler’s (1980) tourist area life cycle stages. Besides that, we implemented Butler’s life cycle to the Isle of Man as it did by Cooper and Jackson (1990) and we tried to analyse the tourism development from the environment perspective. However, the existing information make it extremely difficult to determine the exact points of transition from one stage to another. Nevertheless, the IOM is experiencing stagnation stage and therefore rejuvenation strategies are developed to save the island’s tourism from declining stage. On the other hand, the same model (Butler 1980) also applied on North Cyprus tourist industry and we developed a *Tourism Master Plan* which consists many development policies as a portfolio for the whole industry. We also tried to explain the multiplier effect of tourism master plan. North Cyprus resort cycle is assumed to move from development to consolidation. Yet, we still argue that North Cyprus has not yet witnessed a prolonged period of development which is characterised by a dramatic
take-off in arrivals from foreign countries, coupled sustained improvements to its infrastructure. Hence, the island has a potential to achieve the consolidation stage if tourism master plan idea have inevitable application. During the transitional period, the island states are facing some problems of infrastructural investments. Government is the initiator in the beginning of at most cases and transnational or multinational corporations follows up in the host country. But, is it beneficial to invite transnational to invest? We discussed the positive and negative consequences in chapter 3. Policy makers in every country must come to the realisation that no longer should domestic elite’s and MNCs reap a major portion of the sector’s profits without bearing at least partial responsibility for the substantial costs that conveys onto host societies. Environmental awareness and sustainability is therefore an important issue that small island states should take into consideration before deciding to expand their industries.

Another main hypothesis undertaken in this thesis is the modelling of tourism demand and has contributed to the rigorous study of variables that affect the demand for tourism. The examination of tourism indicators, such as tourist arrivals, describes the trends in tourism demand as well as the important role in economics. A review of the literature on previous studies of tourism demand provided a background for the approach that has been followed in the thesis. During the forecasting the various quantitative and qualitative approaches are discussed, but emphasis was placed on the single equation econometric study. The discussion in chapter 5 and 6 critically analysed the advantages and limitations of previous studies. Cointegration analysis and Johansen error correction mechanism dominated the thesis and has implemented for the tourism demand models to see the long-run economic relationship. It was concluded that many previous research has paid little or no attention to the provision of a theoretical framework for the proposed models, directly linked to the economic theory of demand for tourism. Cointegration has very recent history in the literature and gained a lot of popularity during the past decade and Kulendran (1996) and Kulendran and King (1997) are the most recent examples on tourism demand modelling. Moreover, empirical inadequacies (e.g. poor diagnostic testing, statistically unreliable results) seem to project some doubt on validity on many of these studies. Variations in tourist arrivals over time are shown to be related to
changes in income, cost of living, exchange rates, airfares, surface costs and seasonality as well as social and political factors. The elasticity values of the demand for tourism differ between tourists of different nationals and the whole results are tabulated in chapter 7.

The effects of price and exchange rate variables are also shown in the previous chapter and exchange rates were found to be an important variable in explaining tourism demand changes both in the long-run and short-run period. Because we had a very large sample and many combinations in our study, we only chose randomly selected countries tourist flows to Malta (Malta inbound) and to North Cyprus (N. Cyprus Inbound) as an example to explain the coefficient elasticities. You can see the details in Table-7.6 and Table-7.7.

8.2 Suggestions For Further Research

To conclude, both regression and cointegration contribute important insights about the determinants of tourism demand as well as useful related policy implications. With respect to a simple or complex forecasting method performing better on less aggregated series, statistical differences between methods generally are few, however Holt-Winters additive smoothing method is always ranked first for the long-term forecast and autoregressive the second. On the other hand, for one year forecast Holt-Winters does not have the highest accuracy (see details in chapter 7). Another hypothesis was made when we analysed overall forecasting accuracy techniques.

We used RMSE as a forecasting accuracy technique and we obtained a disappointing result which econometric forecast is not the best forecasting method in comparison to autoregressive methods for 5 and 2 years forecast horizon. We used aggregated data in our study since it is not always possible to find the disaggregated tourist data especially for the period before 1980. However, there is no evidence that the more complex forecasting methods perform better on the aggregate series. From past research, it had been found that the forecasts of disaggregated air flows are more accurate than the forecast of the aggregated air and surface flows. However, the average forecast error
of the disaggregated surface flows are statistically worse. The deficiencies of data put limitations on forecasting generally and on this thesis in particular. Whenever we faced difficulties to find quarterly data for income, we used interpolation techniques to create our own proxy data. Further research using monthly or weekly series would clearly be of interest.

Tourism demand flows which are less aggregated than those in this thesis could be studied. For example,

1. forecasting tourist flows by private airline company
2. forecasting tourism receipts by private airline company, or
3. forecasting number of people intended to stay overnight in a hotel accommodation etc.

could be examined. Whether it is possible to identify a "best" forecasting method for the number of flows or the receipts, is another question. Archer (1976, 1980, 1987), Uysal and Crompton (1985), Martin and Witt (1987), Witt and Witt (1992) and Kulendran and King (1997) are some of the selected papers and books particularly in this field. Some of the other difficulties you may face is to find expensive and highly complex computer packages that needs a lot of time to learn and practice for forecasting empirical models. Contribution of technology, however, made it easier for the practitioners to compute and analyse the data and complex models.
BIBLIOGRAPHY


FUJII, T. E. and MAK, J. (1980) Forecasting Travel Demand when the Explanatory Variables are Highly Correlated. *Journal of Travel Research*, 18, pp.31-34.


APPENDIX:

a1: Number of tourist arrivals per capita from Denmark to Austria.
a2: Number of tourist arrivals per capita from France to Austria.
a3: Number of tourist arrivals per capita from the UK to Austria.
a4: Number of tourist arrivals per capita from Canada to Austria.
a5: Number of tourist arrivals per capita from the Netherlands to Austria.
a6: Number of tourist arrivals per capita from the USA to Austria.
a7: Number of tourist arrivals per capita from Turkey to Austria.
cl1: Cost of living variable from Denmark to Austria.
cl10: Cost of living variable from Germany to Malta.
cl11: Cost of living variable from Italy to Malta.
cl12: Cost of living variable from Libya to Malta.
cl13: Cost of living variable from the UK to Malta.
cl14: Cost of living variable from the USA to Malta.
cl15: Cost of living variable from Turkey to North Cyprus.
cl16: Cost of living variable from the UK to North Cyprus.
cl17: Cost of living variable from Germany to North Cyprus.
cl18: Cost of living variable from the USA to North Cyprus.
cl19: Cost of living variable from Australia to North Cyprus.
cl2: Cost of living variable from France to Austria.
cl20: Cost of living variable from Turkey to North Cyprus.
cl21: Cost of living variable from Germany to Turkey.
cl22: Cost of living variable from Austria to Turkey.
cl23: Cost of living variable from France to Turkey.
cl24: Cost of living variable from the UK to Turkey.
cl25: Cost of living variable from Italy to Turkey.
cl26: Cost of living variable from the USA to Turkey.
cl27: Cost of living variable from North Cyprus to Turkey.
cl28: Cost of living variable from Israel to Turkey.
cl29: Cost of living variable from Denmark to Turkey.
cl3: Cost of living variable from the UK to Austria.
cl30: Cost of living variable from Switzerland to Turkey.
cl31: Cost of living variable from Greece to Turkey.
cl32: Cost of living variable from Belgium to Turkey.
cl33: Cost of living variable from the Netherlands to Turkey.
cl34: Cost of living variable from the USA to the UK.
cl35: Cost of living variable from Germany to the UK.
cl36: Cost of living variable from Austria to the UK.
cl37: Cost of living variable from France to the UK.
cl38: Cost of living variable from Japan to the UK.
cl39: Cost of living variable from Finland to the UK.
cl4: Cost of living variable from Canada to Austria.
cl40: Cost of living variable from Spain to the UK.
cl41: Cost of living variable from the IOM to the UK.
cl42: Cost of living variable from the UK to the IOM.
cl43: Cost of living variable from EIRE to the IOM.
cl5: Cost of living variable from the Netherlands to Austria.
cl6: Cost of living variable from the USA to Austria.
cl7: Cost of living variable from Turkey to Austria.
cl8: Cost of living variable from Austria to Malta.
cl9: Cost of living variable from Denmark to Malta.
d1: Seasonal dummies.
d2: Seasonal dummies.
d3: Seasonal dummies.
d4: Seasonal dummies.
ex1: Exchange rates variable from Denmark to Austria.
ex10: Exchange rates variable from Germany to Malta.
ex11: Exchange rates variable from Italy to Malta.
ex12: Exchange rates variable from Libya to Malta.
ex13: Exchange rates variable from the UK to Malta.
ex14: Exchange rates variable from the USA to Malta.
ex15: Exchange rates variable from Turkey to North Cyprus.
ex16: Exchange rates variable from the UK to North Cyprus.
ex17: Exchange rates variable from Germany to North Cyprus.
ex18: Exchange rates variable from the USA to North Cyprus.
ex19: Exchange rates variable from Australia to North Cyprus.
ex2: Exchange rates variable from France to Austria.
ex20: Exchange rates variable from the IOM to UK.
ex21: Exchange rates variable from Germany to Turkey.
ex22: Exchange rates variable from Austria to Turkey.
ex23: Exchange rates variable from France to Turkey.
ex24: Exchange rates variable from the UK to Turkey.
ex25: Exchange rates variable from Italy to Turkey.
ex26: Exchange rates variable from the USA to Turkey.
ex27: Exchange rates variable from North Cyprus to Turkey.
ex28: Exchange rates variable from Israel to Turkey.
ex29: Exchange rates variable from Denmark to Turkey.
ex3: Exchange rates variable from the UK to Austria.
ex30: Exchange rates variable from Switzerland to Turkey.
ex31: Exchange rates variable from Greece to Turkey.
ex32: Exchange rates variable from Belgium to Turkey.
ex33: Exchange rates variable from the Netherlands to Turkey.
ex34: Exchange rates variable from the USA to the UK.
ex35: Exchange rates variable from Germany to the UK.
ex36: Exchange rates variable from Austria to the UK.
ex37: Exchange rates variable from France to the UK.
ex38: Exchange rates variable from Japan to the UK.
ex39: Exchange rates variable from Finland to the UK.
ex4: Exchange rates variable from Canada to Austria.
ex40: Exchange rates variable from Spain to the UK.
ex43: Exchange rates variable from the IOM to the UK.
ex5: Exchange rates variable from the Netherlands to Austria.
ex6: Exchange rates variable from the USA to Austria.
ex7: Exchange rates variable from Canada to Austria.
ex8: Exchange rates variable from Austria to Malta.
ex9: Exchange rates variable from Denmark to Malta.
ff1: Cost of air fares from Denmark to Austria.
ff10: Cost of air fares from Germany to Malta.
ff11: Cost of air fares from Italy to Malta.
ff12: Cost of air fares from Libya to Malta.
ff13: Cost of air fares from the UK to Malta.
ff14: Cost of air fares from the USA to Malta.
ff15: Cost of air fares from France to Austria.
ff20: Cost of air fares from the IOM to UK.
ff21: Cost of air fares from Germany to Turkey.
ff22: Cost of air fares from Austria to Turkey.
ff23: Cost of air fares from France to Turkey.
ff24: Cost of air fares from the UK to Turkey.
ff25: Cost of air fares from Italy to Turkey.
ff26: Cost of air fares from the USA to Turkey.
ff27: Cost of air fares from North Cyprus to Turkey.
ff28: Cost of air fares from Israel to Turkey.
ff29: Cost of air fares from Denmark to Turkey.
ff30: Cost of air fares from Switzerland to Turkey.
ff31: Cost of air fares from Greece to Turkey.
ff32: Cost of air fares from Belgium to Turkey.
ff33: Cost of air fares from the Netherlands to Turkey.
ff34: Cost of air fares from the USA to the UK.
ff35: Cost of air fares from Germany to the UK.
ff36: Cost of air fares from Austria to the UK.
ff37: Cost of air fares from France to the UK.
ff38: Cost of air fares from Japan to the UK.
ff39: Cost of air fares from Finland to the UK.
ff40: Cost of air fares from Canada to Austria.
ff41: Cost of air fares from the IOM to the UK.
ff42: Cost of air fares from the UK to the IOM.
ff43: Cost of air fares from EIRE to the IOM.
ff5: Cost of air fares from the Netherlands to Austria.
ff6: Cost of air fares from the USA to Austria.
ff7: Cost of air fares from Turkey to Austria.
ff8: Cost of air fares from Austria to Malta.
ff9: Cost of air fares from Denmark to Malta.
g1: Seasonally adjusted number of tourist arrivals per capita from the USA to the UK.
g2: Seasonally adjusted number of tourist arrivals per capita from Germany to the UK.
g3: Seasonally adjusted number of tourist arrivals per capita from Austria to the UK.
g4: Seasonally adjusted number of tourist arrivals per capita from France to the UK.
g5: Seasonally adjusted number of tourist arrivals per capita from Japan to the UK.
g6: Seasonally adjusted number of tourist arrivals per capita from Finland to the UK.
g7: Seasonally adjusted number of tourist arrivals per capita from Spain to the UK.
g8: Seasonally adjusted number of tourist arrivals per capita from the IOM to the UK.
i1: Number of tourist arrivals per capita from the UK to the IOM.
i2: Number of tourist arrivals per capita from EIRE to the IOM.
in1: Income per capita variable for Belgium.
in10: Income per capita variable for Spain.
in11: Income per capita variable for Switzerland.
in12: Income per capita variable for Turkey.
in13: Income per capita variable for Australia.
in14: Income per capita variable for Austria.
in15: Income per capita variable for Canada.
in16: Income per capita variable for Finland.
in17: Income per capita variable for Israel.
in18: Income per capita variable for Italy.
in19: Income per capita variable for Japan.
in20: Income per capita variable for Denmark.
in21: Income per capita variable for the USA.
in22: Income per capita variable for the IOM.
in23: Income per capita variable for North Cyprus.
in24: Income per capita variable for France.
in25: Income per capita variable for Germany.
in26: Income per capita variable for Greece.
in27: Income per capita variable for Ireland.
in28: Income per capita variable for Libya.
in29: Income per capita variable for Malta.
in30: Income per capita variable for the Netherlands.

j1: Number of tourist arrivals per capita from the UK to the IOM.
j2: Number of tourist arrivals per capita from EIRE to the IOM.
m1: Number of tourist arrivals per capita from Austria to Malta.
m2: Number of tourist arrivals per capita from Denmark to Malta.
m3: Number of tourist arrivals per capita from Germany to Malta.
m4: Number of tourist arrivals per capita from Italy to Malta.
m5: Number of tourist arrivals per capita from Libya to Malta.
m6: Number of tourist arrivals per capita from the UK to Malta.
m7: Number of tourist arrivals per capita from the USA to Malta.
n1: Number of tourist arrivals per capita from Turkey to North Cyprus(83:1-95:4).
n2: Number of tourist arrivals per capita from the UK to North Cyprus.
n3: Number of tourist arrivals per capita from Germany to North Cyprus.

n4: Number of tourist arrivals per capita from the USA to North Cyprus.
n5: Number of tourist arrivals per capita from Australia to North Cyprus.
n6: Number of tourist arrivals per capita from Turkey to North Cyprus(76:1-95:4).
p1: Seasonally adjusted number of tourist arrivals per capita from Turkey to North Cyprus(83:1-95:4).
p2: Seasonally adjusted number of tourist arrivals per capita from UK to North Cyprus.
p3: Seasonally adjusted number of tourist arrivals per capita from Germany to North Cyprus.
p4: Seasonally adjusted number of tourist arrivals per capita from USA to North Cyprus.
p5: Seasonally adjusted number of tourist arrivals per capita from Australia to North Cyprus.
p6: Seasonally adjusted number of tourist arrivals per capita from Turkey to North Cyprus(76:1-95:4).
s1: Surface travel cost from Denmark to Austria.
s10: Surface travel cost from the UK to Malta.
s11: Surface travel cost from Turkey to North Cyprus.
s12: Surface travel cost from the UK to North Cyprus.
s13: Surface travel cost from Germany to North Cyprus.
s14: Surface travel cost from Germany to Turkey.
s15: Surface travel cost from Germany to the UK.
s16: Surface travel cost from Austria to Turkey.
s17: Surface travel cost from Austria to the UK.
s18: Surface travel cost from France to Turkey.
s19: Surface travel cost from France to the UK.
s2: Surface travel cost from France to Austria.
s20: Surface travel cost from the UK to Turkey.
s21: Surface travel cost from the UK to the IOM.
s22: Surface travel cost from Italy to Turkey.
s23: Surface travel cost from Denmark to Turkey.
s24: Surface travel cost from Switzerland to Turkey.
s25: Surface travel cost from Greece to Turkey.
s26: Surface travel cost from Belgium to Turkey.
s27: Surface travel cost from the Netherlands to Turkey.
s28: Surface travel cost from Finland to the UK.
s29: Surface travel cost from Spain to the UK.
s3: Surface travel cost from the UK to Austria.
s4: Surface travel cost from the Netherlands to Austria.
s5: Surface travel cost from Turkey to Austria.
s6: Surface travel cost from Austria to Malta.
s7: Surface travel cost from Denmark to Malta.
s8: Surface travel cost from Germany to Malta.
s9: Surface travel cost from Turkey to Austria.

t1: Number of tourist arrivals per capita from Germany to Turkey.
t10: Number of tourist arrivals per capita from Switzerland to Turkey.
t11: Number of tourist arrivals per capita from Greece to Turkey.
t12: Number of tourist arrivals per capita from Belgium to Turkey.
t13: Number of tourist arrivals per capita from the Netherlands to Turkey.
t2: Number of tourist arrivals per capita from Austria to Turkey.
t3: Number of tourist arrivals per capita from France to Turkey.
t4: Number of tourist arrivals per capita from the UK to Turkey.
t5: Number of tourist arrivals per capita from Italy to Turkey.
t6: Number of tourist arrivals per capita from the USA to Turkey.
t7: Number of tourist arrivals per capita from North Cyprus to Turkey.
t8: Number of tourist arrivals per capita from Israel to Turkey.
t9: Number of tourist arrivals per capita from Denmark to Turkey.
trend: The trend variable.
u1: Number of tourist arrivals per capita from the USA to the UK.
u2: Number of tourist arrivals per capita from Germany to the UK.
u3: Number of tourist arrivals per capita from Austria to the UK.
u4: Number of tourist arrivals per capita from France to the UK.
u5: Number of tourist arrivals per capita from Japan to the UK.
u6: Number of tourist arrivals per capita from Finland to the UK.
u7: Number of tourist arrivals per capita from Spain to the UK.
u8: Number of tourist arrivals per capita from the IOM to the UK.
w1: Seasonally adjusted number of tourist arrivals per capita from Austria to Malta.
w2: Seasonally adjusted number of tourist arrivals per capita from Denmark to Malta.
w3: Seasonally adjusted number of tourist arrivals per capita from Germany to Malta.
w4: Seasonally adjusted number of tourist arrivals per capita from Italy to Malta.
w5: Seasonally adjusted number of tourist arrivals per capita from Libya to Malta.
w6: Seasonally adjusted number of tourist arrivals per capita from the UK to Malta.
w7: Seasonally adjusted number of tourist arrivals per capita from the USA to Malta.
x1: Seasonally adjusted number of tourist arrivals per capita from Germany to Turkey.
x10: Seasonally adjusted number of tourist arrivals per capita from Switzerland to Turkey.
x11: Seasonally adjusted number of tourist arrivals per capita from Greece to Turkey.
x12: Seasonally adjusted number of tourist arrivals per capita from Belgium to Turkey.
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x2: Seasonally adjusted number of tourist arrivals per capita from Austria to Turkey.
x3: Seasonally adjusted number of tourist arrivals per capita from France to Turkey.
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x5: Seasonally adjusted number of tourist arrivals per capita from Italy to Turkey.
x6: Seasonally adjusted number of tourist arrivals per capita from the USA to Turkey.
x7: Seasonally adjusted number of tourist arrivals per capita from North Cyprus to Turkey.
x8: Seasonally adjusted number of tourist arrivals per capita from Israel to Turkey.
x9: Seasonally adjusted number of tourist arrivals per capita from Denmark to Turkey.
z1: Seasonally adjusted number of tourist arrivals per capita from Denmark to Austria.
z2: Seasonally adjusted number of tourist arrivals per capita from France to Austria.
z3: Seasonally adjusted number of tourist arrivals per capita from the UK to Austria.
z4: Seasonally adjusted number of tourist arrivals per capita from Canada to Austria.
z5: Seasonally adjusted number of tourist arrivals per capita from the Netherlands to Austria.
z6: Seasonally adjusted number of tourist arrivals per capita from the USA to Austria.
z7: Seasonally adjusted number of tourist arrivals per capita from the Turkey to Austria.
### Table 1: Regression Models for the IOM

<table>
<thead>
<tr>
<th>Origin</th>
<th>Dest</th>
<th>C</th>
<th>In IN</th>
<th>In CL</th>
<th>In EX</th>
<th>In FF</th>
<th>In S</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>DM1</th>
<th>DM2</th>
<th>In V1/P14</th>
<th>Trend</th>
<th>R²</th>
<th>R*²</th>
<th>DW</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>IOM</td>
<td>35.895</td>
<td>-10.187</td>
<td>0.878</td>
<td>0.722</td>
<td>-32.888</td>
<td>1.670</td>
<td>1.973</td>
<td>-4.570</td>
<td>5.030</td>
<td>-0.684</td>
<td>0.176</td>
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<td>-0.041</td>
<td>0.908</td>
<td>0.867</td>
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<tr>
<td></td>
<td></td>
<td>(2.739)</td>
<td>(-2.124)</td>
<td>(0.140)</td>
<td>(1.003)</td>
<td>(-2.300)</td>
<td>(0.766)</td>
<td>(5.427)</td>
<td>(-5.915)</td>
<td>(5.556)</td>
<td>(-1.321)</td>
<td>(0.667)</td>
<td>(-0.116)</td>
<td>(-0.552)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EIRE</td>
<td>IOM</td>
<td>4.947</td>
<td>0.959</td>
<td>5.624</td>
<td>5.101</td>
<td>5.711</td>
<td>1.493</td>
<td>-4.160</td>
<td>4.657</td>
<td>-0.271</td>
<td>-0.556</td>
<td>0.317</td>
<td>-0.052</td>
<td>0.936</td>
<td>0.906</td>
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<td></td>
<td></td>
<td>(0.642)</td>
<td>(0.240)</td>
<td>(0.818)</td>
<td>(0.778)</td>
<td>(0.748)</td>
<td>(2.556)</td>
<td>(-2.991)</td>
<td>(2.803)</td>
<td>(-0.631)</td>
<td>(-1.519)</td>
<td>(1.565)</td>
<td>(-0.637)</td>
<td></td>
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</table>

### Table 2: Best regress. Models for the IOM

<table>
<thead>
<tr>
<th>Origin</th>
<th>Dest</th>
<th>C</th>
<th>In IN</th>
<th>In CL</th>
<th>In EX</th>
<th>In FF</th>
<th>In S</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>DM1</th>
<th>DM2</th>
<th>In V1/P14</th>
<th>Trend</th>
<th>R²</th>
<th>R*²</th>
<th>DW</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>IOM</td>
<td>-1.323</td>
<td>1.434</td>
<td>-3.147</td>
<td>3.459</td>
<td>-1.123</td>
<td>0.301</td>
<td>0.895</td>
<td>0.880</td>
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The figures in brackets are t-values.
* indicates significance at 5% level.
** indicates significance at 10% level.
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Notes:
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The figures in brackets are t-values.
* indicates significance at 5% level.
** indicates significance at 10% level.
*** indicates significance at 20% level.
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6. DATA DISKS (All data are in db formats - in 3.5 inches HD diskettes)

Disk 1  Data files are in db formats under data subdirectory
Disk 2  Data files are in db formats with natural logarithms under adjust subdirectory
ABBREVIATIONS

Disk 1: ("Data" subdirectory)

All data files are listed in alphabetical order. They are all saved in db format and can be used in TSP, EVIEWS, LOTUS and EXCEL.

aaauscpi: Adjusted quarterly consumer price index for Austria (1976 prices).
aabecpi: Adjusted quarterly consumer price index for Belgium (1976 prices).
aaacpi: Adjusted quarterly consumer price index for for Canada (1976 prices).
aaadecpi: Adjusted quarterly consumer price index for Denmark (1976 prices).
aafincpi: Adjusted quarterly consumer price index for Finland (1976 prices).
aafracpi: Adjusted quarterly consumer price index for France (1976 prices).
aagercpi: Adjusted quarterly consumer price index for Germany(1976 prices).
aagrecpi: Adjusted quarterly consumer price index for Greece(1976 prices).
aaci: Turkey-Germany return air tariff in US dollars adjusted with origin’s CPI.
aacl0: Netherlands-Turkey return air tariff in US dollars adjusted with origin’s CPI.
aacl1: Netherlands-Austria return air tariff in US dollars adjusted with origin’s CPI.
aacl2: Netherlands-Austria return air tariff in US dollars adjusted with origin’s CPI.
aacl3: Turkey-Austria return air tariff in US dollars adjusted with origin’s CPI.
aacl4: Belgium-Turkey return air tariff in US dollars adjusted with origin’s CPI.
aacl5: Germany-UK return air tariff in US dollars adjusted with origin’s CPI.
aacl6: Germany-Turkey return air tariff in US dollars adjusted with origin’s CPI.
aacl7: Denmark-Austria return air tariff in US dollars adjusted with origin’s CPI.
aacl8: Denmark-Turkey return air tariff in US dollars adjusted with origin’s CPI.
aacl9: Finland-UK return air tariff in US dollars adjusted with origin’s CPI.
ac1: Turkey-Germany return air tariff in US dollars adjusted with origin’s CPI.
ac10: Turkey-Germany return air tariff in US dollars adjusted with origin’s CPI.
ac31: Italy-Malta return air tariff in US dollars adjusted with origin’s CPI.
ac32: Austria-Turkey return air tariff in US dollars adjusted with origin’s CPI.
ac33: France-UK return air tariff in US dollars adjusted with origin’s CPI.
ac34: Austria-UK return air tariff in US dollars adjusted with origin’s CPI.
ac35: Austria-Malta return air tariff in US dollars adjusted with origin’s CPI.
ac36: Turkey-Netherlands return air tariff in US dollars adjusted with origin’s CPI.
ac37: Turkey-Greece return air tariff in US dollars adjusted with origin’s CPI.
ac38: Turkey-Denmark return air tariff in US dollars adjusted with origin’s CPI.
ac39: Turkey-UK return air tariff in US dollars adjusted with origin’s CPI.
ac4: Ireland-the IOM return air tariff in US dollars adjusted with origin’s CPI.
ac40: Turkey-France return air tariff in US dollars adjusted with origin’s CPI.
ac41: Turkey-Italy return air tariff in US dollars adjusted with origin’s CPI.
ac42: Belgium-Turkey return air tariff in US dollars adjusted with origin’s CPI.
ac43: UK-Spain return air tariff in US dollars adjusted with origin’s CPI.
ac44: UK-USA(New York) return air tariff in US dollars adjusted with origin’s CPI.
ac45: UK-Japan return air tariff in US dollars adjusted with origin’s CPI.
ac46: UK-USA(Washington) return air tariff in US dollars adjusted with origin’s CPI.
ac47: Malta-Denmark return air tariff in US dollars adjusted with origin’s CPI.
ac48: Malta-UK return air tariff in US dollars adjusted with origin’s CPI.
ac49: Malta-USA return air tariff in US dollars adjusted with origin’s CPI.
ac5: Germany-Malta return air tariff in US dollars adjusted with origin’s CPI.
ac50: Malta-Italy return air tariff in US dollars adjusted with origin’s CPI.
ac51: Malta-Libya return air tariff in US dollars adjusted with origin’s CPI.
ac52: Malta-Austria return air tariff in US dollars adjusted with origin’s CPI.
ac53: USA-Turkey return air tariff in US dollars adjusted with origin’s CPI.
ac54: USA-Malta return air tariff in US dollars adjusted with origin’s CPI.
ac55: USA-Austria return air tariff in US dollars adjusted with origin’s CPI.
ac56: USA-UK return air tariff in US dollars adjusted with origin’s CPI.
ac57: Austria-Netherlands return air tariff in US dollars adjusted with origin’s CPI.
ac58: Austria-Denmark return air tariff in US dollars adjusted with origin’s CPI.
ac59: Austria-Turkey return air tariff in US dollars adjusted with origin’s CPI.
ac60: Austria-UK return air tariff in US dollars adjusted with origin’s CPI.
ac61: Austria-Canada return air tariff in US dollars adjusted with origin’s CPI.
ac62: UK - the IOM return air tariff in US dollars adjusted with origin’s CPI.
ac63: The IOM- UK return air tariff in US dollars adjusted with origin’s CPI.
ac64: EIRE - the IOM return air tariff in US dollars adjusted with origin’s CPI.
ac65: The IOM - EIRE return air tariff in US dollars adjusted with origin’s CPI.
ac66: The IOM- Scotland return air tariff in US dollars adjusted with origin’s CPI.
ac67: Scotland - the IOM return air tariff in US dollars adjusted with origin’s CPI.
ac68: The IOM - N. Ireland return air tariff in US dollars adjusted with origin’s CPI.
ac69: North Cyprus - UK return air tariff in US dollars adjusted with origin’s CPI.
ac7: UK - Turkey return air tariff in US dollars adjusted with origin’s CPI.
ac70: Turkey - North Cyprus return air tariff in US dollars adjusted with origin’s CPI.
ac71: N.Cyprus - Turkey (lst.) return air tariff in US dollars adjusted with origin’s CPI.
ac72: Israel-Turkey return air tariff in US dollars adjusted with origin’s CPI.
ac8: Malta - Germany return air tariff in US dollars adjusted with origin’s CPI.
ac9: Austria- USA return air tariff in US dollars adjusted with origin’s CPI.
ad1: Automobile diesel prices per litre(included tax)on quarterly basis for Australia.
ad10: Automobile diesel prices per litre (included tax) on quarterly basis for Ireland.
ad11: Automobile diesel prices per litre (included tax) on quarterly basis for Italy.
ad12: Automobile diesel prices per litre (included tax) on quarterly basis for Japan.
ad13: Automobile diesel prices per litre (included tax) on quarterly basis for the Netherlands.
ad14: Automobile diesel prices per litre (included tax) on quarterly basis for Spain.
ad15: Automobile diesel prices per litre (included tax) on quarterly basis for Switzerland.
ad16: Automobile diesel prices per litre (included tax) on quarterly basis for Turkey.
ad17: Automobile diesel prices per litre (included tax) on quarterly basis for the UK.
ad18: Automobile diesel prices per litre (included tax) on quarterly basis for the USA.
ad2: Automobile diesel prices per litre (included tax) on quarterly basis for Austria.
ad3: Automobile diesel prices per litre (included tax) on quarterly basis for Belgium.
ad4: Automobile diesel prices per litre (included tax) on quarterly basis for Canada.
ad5: Automobile diesel prices per litre (included tax) on quarterly basis for Denmark.
ad6: Automobile diesel prices per litre (included tax) on quarterly basis for Finland.
ad7: Automobile diesel prices per litre (included tax) on quarterly basis for France.
ad8: Automobile diesel prices per litre (included tax) on quarterly basis for Germany.
ad9: Automobile diesel prices per litre (included tax) on quarterly basis for Greece.
asa: Gross Domestic Product for Israel in millions of Israel Shekels only.
aupop: Quarterly estimated population for Austria.
aupopsa: Seasonally adjusted quarterly estimated population for Austria.
aypop: Quarterly estimated population for Australia.
bepop: Quarterly estimated population for Belgium.
capop: Quarterly estimated population for Canada.
depop: Quarterly estimated population for Denmark.
e1: Calculated surface transportation cost for Denmark to Austria return in US dollars adjusted with origin’s currency prices.
e10: Calculated surface transportation cost for the UK to Malta return in US dollars adjusted with origin’s currency prices.
e11: Calculated surface transportation cost for Turkey to N. Cyprus return in US dollars adjusted with origin’s currency prices.
e12: Calculated surface transportation cost for the UK to N. Cyprus in US dollars adjusted with origin’s currency prices.
e13: Calculated surface transportation cost for Germany to N. Cyprus in US dollars adjusted with origin’s currency prices.
e14: Calculated surface transportation cost for Germany to Turkey in US dollars adjusted with origin’s currency prices.
e15: Calculated surface transportation cost for Germany to the UK in US dollars adjusted with origin’s currency prices.
e16: Calculated surface transportation cost for Austria to Turkey in US dollars adjusted with origin’s currency prices.
e17: Calculated surface transportation cost for Austria to the UK in US dollars adjusted with origin’s currency prices.
e18: Calculated surface transportation cost for France to Turkey in US dollars adjusted with origin’s currency prices.
e19: Calculated surface transportation cost for France to the UK in US dollars adjusted with origin’s currency prices.
e2: Calculated surface transportation cost for France to Austria in US dollars adjusted with origin's currency prices.
e20: Calculated surface transportation cost for the UK to Turkey in US dollars adjusted with origin's currency prices.
e21: Calculated surface transportation cost for the UK to the IOM in US dollars adjusted with origin's currency prices.
e22: Calculated surface transportation cost for Italy to Turkey in US dollars adjusted with origin's currency prices.
e23: Calculated surface transportation cost for Denmark to Turkey in US dollars adjusted with origin's currency prices.
e24: Calculated surface transportation cost for Switzerland to Turkey in US dollars adjusted with origin's currency prices.
e25: Calculated surface transportation cost for Greece to Turkey in US dollars adjusted with origin’s currency prices.
e27: Calculated surface transportation cost for the Netherlands to Turkey in US dollars adjusted with origin's currency prices.
e28: Calculated surface transportation cost for Finland to the UK in US dollars adjusted with origin's currency prices.
e29: Calculated surface transportation cost for Spain to the UK in US dollars adjusted with origin's currency prices.
e3: Calculated surface transportation cost for the UK to Austria in US dollars adjusted with origin’s currency prices.
e4: Calculated surface transportation cost for the Netherlands to Austria in US dollars adjusted with origin’s currency prices.
e5: Calculated surface transportation cost for Turkey to Austria in US dollars adjusted with origin’s currency prices.
e6: Calculated surface transportation cost for Austria to Malta in US dollars adjusted with origin’s currency prices.
e7: Calculated surface transportation cost for Denmark to Malta in US dollars adjusted with origin’s currency prices.
e8: Calculated surface transportation cost for Germany to Malta in US dollars adjusted with origin’s currency prices.
e9: Calculated surface transportation cost for Italy to Malta in US dollars adjusted with origin’s currency prices.
exr1: Quarterly adjusted exchange rates (in real terms) for Austria.
exr10: Quarterly adjusted exchange rates (in real terms) for the USA.
exr11: Quarterly adjusted exchange rates (in real terms) for Canada.
exr12: Quarterly adjusted exchange rates (in real terms) for Finland.
exr13: Quarterly adjusted exchange rates (in real terms) for Greece.
exr14: Quarterly adjusted exchange rates (in real terms) for Japan.
exr15: Quarterly adjusted exchange rates (in real terms) for the Netherlands.
exr16: Quarterly adjusted exchange rates (in real terms) for Switzerland.
exr17: Quarterly adjusted exchange rates (in real terms) for Australia.
exr2: Quarterly adjusted exchange rates (in real terms) for Belgium.
exr3: Quarterly adjusted exchange rates (in real terms) for Denmark.
exr4: Quarterly adjusted exchange rates (in real terms) for France.
exr5: Quarterly adjusted exchange rates (in real terms) for Germany.
exr6: Quarterly adjusted exchange rates (in real terms) for Israel.
exr7: Quarterly adjusted exchange rates (in real terms) for Italy.
exr8: Quarterly adjusted exchange rates (in real terms) for Spain.
exr9: Quarterly adjusted exchange rates (in real terms) for Turkey.
fipop: Quarterly estimated population for Finland.
frpop: Quarterly estimated population for France.
gepop: Quarterly estimated population for the United Germany.
gepop1: Quarterly estimated population for West Germany.
gnp1: Gross Domestic Product for Australia in billions of AUS Dollars.
gnp11: Gross Domestic Product for UK in billions of UK Pounds.
gnp12: Gross Domestic Product for France in billions of French Francs.
gnp2: Gross Domestic Product for Austria in billions of Austrian Shillings.
gnp3: Gross Domestic Product for Canada in billions of Canadian Dollars.
gnp4: Gross Domestic Product for Finland in billions of Finnish Markka.
gnp5: Gross Domestic Product for Germany in billions of Deutch Mark.
gnp6a: Gross Domestic Product for Israel in millions of New Shekels (Israelie pounds, then Shekels and lastly New shekels. See ASA.db)
gnp7: Gross Domestic Product for Italy in billions of Italian Lire.
gnp8: Gross Domestic Product for Japan in billions of Japanese Yen.
gnp9: Gross Domestic Product for USA in billions of US Dollars.
grpop: Quarterly estimated population for Greece.
ingp1: Interpolated Gross Domestic Product for Belgium in billions of Belgian Francs.
ingp10: Interpolated Gross Domestic Product for Spain in billions of Spanish Pesetas.
ingp11a: Interpolated Gross Domestic Product for Switzerland in billions of Kroner.
ingp12a: Interpolated Gross Domestic Product for Turkey in billions of Turkish Lira.
ingp13: Interpolated Gross Domestic Product for N. Cyprus in millions of T. Lira.
ingp14: Interpolated Gross Domestic Product for the IOM in billions of IOM Pounds.
ingp2: Interpolated Gross Domestic Product for Denmark in billions of Danish Kroner.
ingp4: Interpolated Gross Domestic Product for Germany in billions of Deutch Mark.
ingp5: Interpolated Gross Domestic Product for Greece in billions of Greek Drahmas.
ingp6: Interpolated Gross Domestic Product for Ireland in billions of Irish Pounds.
ingp7: Interpolated Gross Domestic Product for Libya in billions of Dinars.
ingp8: Interpolated Gross Domestic Product for Malta in billions of Maltese Lira.
impop1: Quarterly estimated population for the Isle of Man.
impop1sa: Seasonally adjusted quarterly estimated population for the Isle of Man.
ing1: GDP per capita in US dollars for Belgium in real terms.
ing10: GDP per capita in US dollars for Spain in real terms.
ing11: GDP per capita in US dollars for Switzerland in real terms.
ing12: GDP per capita in US dollars for Turkey in real terms.
ing13: GDP per capita in US dollars for Australia in real terms.
ing14: GDP per capita in US dollars for Austria in real terms.
ing15: GDP per capita in US dollars for Canada in real terms.
ing16: GDP per capita in US dollars for Finland in real terms.
ing17: GDP per capita in US dollars for Israel in real terms.
ing18: GDP per capita in US dollars for Italy in real terms.
ing19: GDP per capita in US dollars for Japan in real terms.
ing2: GDP per capita in US dollars for Denmark in real terms.
inc20: GDP per capita in US dollars for the USA in real terms.
inc21: GDP per capita in US dollars for the UK in real terms.
inc22: GDP per capita in US dollars for the IOM in real terms.
inc23: GDP per capita in US dollars for N. Cyprus in real terms.
inc3: GDP per capita in US dollars for France in real terms.
inc4: GDP per capita in US dollars for Germany in real terms.
inc5: GDP per capita in US dollars for Greece in real terms.
inc6: GDP per capita in US dollars for Ireland in real terms.
inc7: GDP per capita in US dollars for Libya in real terms.
inc8: GDP per capita in US dollars for Malta in real terms.
irexr: Quarterly adjusted exchange rates (in real terms) for Ireland.
irpop: Quarterly estimated population for Ireland.
ispop: Quarterly estimated population for Israel.
itpop: Quarterly estimated population for Italy.
japop: Quarterly estimated population for Japan.
liexr: Quarterly adjusted exchange rates (in real terms) for Libya.
lipop: Quarterly estimated population for Libya.
maexr: Quarterly adjusted exchange rates (in real terms) for Malta.
mapop: Quarterly estimated population for Malta.
ncpoppsa: Seasonally adjusted quarterly estimated population for N. Cyprus.
ncpop: Quarterly estimated population for North Cyprus.
nepop: Quarterly estimated population for the Netherlands.
qau1: Quarterly arrivals from Denmark to Austria.
qau1sa: Seasonally adjusted quarterly arrivals from Denmark to Austria.
qau2: Quarterly arrivals from France to Austria.
qau2sa: Seasonally adjusted quarterly arrivals from France to Austria.
qau3: Quarterly arrivals from the UK to Austria.
qau3sa: Seasonally adjusted quarterly arrivals from the UK to Austria.
qau4: Quarterly arrivals from Canada to Austria.
qau4sa: Seasonally adjusted quarterly arrivals from Canada to Austria.
qau5: Quarterly arrivals from the Netherlands to Austria.
qau5sa: Seasonally adjusted quarterly arrivals from the Netherlands to Austria.
qau6: Quarterly arrivals from the USA to Austria.
qau6sa: Seasonally adjusted quarterly arrivals from the USA to Austria.
qau7: Quarterly arrivals from Turkey to Austria.
qau7sa: Seasonally adjusted quarterly arrivals from Turkey to Austria.
qim3: Quarterly arrivals from the UK to the IOM.
qim3sa: Seasonally adjusted quarterly arrivals from the UK to the IOM.
qim4: Quarterly arrivals from EIRE to the IOM.
qim4sa: Seasonally adjusted quarterly arrivals from EIRE to the IOM.
qm1: Quarterly arrivals from Austria to Malta.
qm1sa: Seasonally adjusted quarterly arrivals from Austria to Malta.
qma2: Quarterly arrivals from Denmark to Malta.
qma2sa: Seasonally adjusted quarterly arrivals from Denmark to Malta.
qma3: Quarterly arrivals from Germany to Malta.
qma3sa: Seasonally adjusted quarterly arrivals from Germany to Malta.
qma4: Quarterly arrivals from Italy to Malta.
qma4sa: Seasonally adjusted quarterly arrivals from Italy to Malta.
qma5: Quarterly arrivals from Libya to Malta.
qma5sa: Seasonally adjusted quarterly arrivals from Libya to Malta.
qma6: Quarterly arrivals from the UK to Malta.
qma6sa: Seasonally adjusted quarterly arrivals from the UK to Malta.
qma7: Quarterly arrivals from the USA to Malta.
qma7sa: Seasonally adjusted quarterly arrivals from the USA to Malta.
qnc1sa: Seasonally adjusted arrivals from Turkey to North Cyprus (1983.1-1995.4).
qnc2: Quarterly arrivals from the UK to North Cyprus.
qnc2sa: Seasonally adjusted quarterly arrivals from the UK to North Cyprus.
qnc3: Quarterly arrivals from Germany to North Cyprus.
qnc3sa: Seasonally adjusted quarterly arrivals from Germany to North Cyprus.
qnc4: Quarterly arrivals from the USA to North Cyprus.
qnc4sa: Seasonally adjusted quarterly arrivals from USA to North Cyprus.
qnc5: Quarterly arrivals from Australia to North Cyprus.
qnc5sa: Seasonally adjusted quarterly arrivals from Australia to North Cyprus.
qnc6sa: Seasonally adjusted quarterly arrivals from Turkey to North Cyprus (1976.1-1995.4).
qtr1: Quarterly arrivals from Germany to Turkey.
qtr10: Quarterly arrivals from Switzerland to Turkey.
qtr11: Quarterly arrivals from Greece to Turkey.
qtr11sa: Seasonally adjusted quarterly arrivals from Greece to Turkey.
qtr12: Quarterly arrivals from Belgium to Turkey.
qtr12sa: Seasonally adjusted quarterly arrivals from Belgium to Turkey.
qtr13: Quarterly arrivals from the Netherlands to Turkey.
qtr13sa: Seasonally adjusted quarterly arrivals from the Netherlands to Turkey.
qtr1sa: Seasonally adjusted quarterly arrivals from Germany to Turkey.
qtr2: Quarterly arrivals from Austria to Turkey.
qtr2sa: Seasonally adjusted quarterly arrivals from Austria to Turkey.
qtr3: Quarterly arrivals from France to Turkey.
qtr3sa: Seasonally adjusted quarterly arrivals from France to Turkey.
qtr4: Quarterly arrivals from the UK to Turkey.
qtr4sa: Seasonally adjusted quarterly arrivals from the UK to Turkey.
qtr5: Quarterly arrivals from Italy to Turkey.
qtr5sa: Seasonally adjusted quarterly arrivals from Italy to Turkey.
qtr6: Quarterly arrivals from the USA to Turkey.
qtr6sa: Seasonally adjusted quarterly arrivals from the USA to Turkey.
qtr7: Quarterly arrivals from North Cyprus to Turkey.
qtr7sa: Seasonally adjusted quarterly arrivals from North Cyprus to Turkey.
qtr8: Quarterly arrivals from Israel to Turkey.
qtr8sa: Seasonally adjusted quarterly arrivals from Israel to Turkey.
qtr9: Quarterly arrivals from Denmark to Turkey.
qtr9sa: Seasonally adjusted quarterly arrivals from Denmark to Turkey.
quk8: Quarterly arrivals from the IOM to the UK.
quk8sa: Seasonally adjusted quarterly arrivals from the IOM to the UK.
sppop: Quarterly estimated population for Spain.
swpop Quarterly estimated population for Switzerland.
ta1: Ankara - Cologne single way air tariff in origin’s currency.
ta10: Ankara - Basel single way air tariff in origin’s currency.
ta11: Amsterdam- Ankara single way air tariff in origin’s currency.
ta12: Amstaeerdam - Vienna single way air tariff in origin’s currency.
ta13: Ankara- Vienna single way air tariff in origin’s currency.
ta14: Brusells- Ankara single way air tariff in origin’s currency.
ta15: Cologne- London single way air tariff in origin’s currency.
ta16: Cologne - Ankara single way air tariff in origin’s currency.
ta17: Copenhagen- Vienna single way air tariff in origin’s currency.
ta18: Copenhagen- Ankara single way air tariff in origin’s currency.
ta19: Helsink London single way air tariff in origin’s currency.
ta2: Athens - Ankara single way air tariff in origin’s currency.
ta20: Copenhagen - Malta single way air tariff in origin’s currency.
ta21: Istanbul - Vienna single way air tariff in origin’s currency.
ta22: London- Valetta single way air tariff in origin’s currency.
ta23: London- Vienna single way air tariff in origin’s currency.
ta24: London-Ankara single way air tariff in origin’s currency.
ta25: Paris - Ankara single way air tariff in origin’s currency.
ta26: Madrid- London single way air tariff in origin’s currency.
ta27: Paris - Vienna single way air tariff in origin’s currency.
ta28: Ottawa-Vienna single way air tariff in origin’s currency.
ta29: Tokyo-London single way air tariff in origin’s currency.
ta3: Basel-Ankara single way air tariff in origin’s currency.
ta30: Rome-Ankara single way air tariff in origin’s currency.
ta31: Rome-Valetta single way air tariff in origin’s currency.
ta32: Vienna-Ankara single way air tariff in origin’s currency.
ta33: Paris-London single way air tariff in origin’s currency.
ta34: Vienna-London single way air tariff in origin’s currency.
ta35: Vienna-Malta single way air tariff in origin’s currency.
ta36: Ankara-Amsterdam single way air tariff in origin’s currency.
ta37: Ankara-Athens single way air tariff in origin’s currency.
ta38: Ankara-Copenhagen single way air tariff in origin’s currency.
ta4: Belfast - Ronaldsway(IOM) single way air tariff in origin’s currency.
ta40: Ankara-Paris single way air tariff in origin’s currency.
ta41: Ankara-Rome single way air tariff in origin’s currency.
ta42: Brusells - Istanbul single way air tariff in origin’s currency.
ta43: London-Madrid single way air tariff in origin’s currency.
ta44: London-New York single way air tariff in origin’s currency.
ta45: London-Tokyo single way air tariff in origin’s currency.
ta47: Valetta-Copenhagen single way air tariff in origin’s currency.
ta48: Valetta-London single way air tariff in origin’s currency.
ta49: Valetta-Mexico City single way air tariff in origin’s currency.
ta5: Cologne-Valetta single way air tariff in origin’s currency.
ta50: Valetta - Rome single way air tariff in origin’s currency.
ta51: Valetta-Tripoli single way air tariff in origin’s currency.
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ta52</td>
<td>Valetta-Vienna single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta53</td>
<td>Mexico City-Ankara single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta54</td>
<td>Mexico City-Valetta single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta55</td>
<td>Mexico City-Vienna single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta56</td>
<td>New York-London single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta57</td>
<td>Vienna-Amsterdam single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta58</td>
<td>Vienna-Copenhagen single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta59</td>
<td>Vienna-Istanbul single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta60</td>
<td>Ercan-Ankara single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta61</td>
<td>Vienna-London single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta62</td>
<td>London-Ottawa single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta63</td>
<td>London-Ronaldsway (IOM) single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta64</td>
<td>Dublin-Ronaldsway single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta65</td>
<td>Ronaldsway-Dublin single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta66</td>
<td>Ronaldsway-Glasgow single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta67</td>
<td>Glasgow-Ronaldsway single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta68</td>
<td>Ronaldsway-Belfast single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta69</td>
<td>Ercan-London single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta70</td>
<td>London-Izmir single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta71</td>
<td>Ercan-Istanbul RTN air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta72</td>
<td>Tel Aviv-Istanbul RTN air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta73</td>
<td>Tripoli-Valetta single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta74</td>
<td>Valetta-Cologne single way air tariff in origin's currency.</td>
</tr>
<tr>
<td>ta75</td>
<td>Vienna-Washington single way air tariff in origin's currency.</td>
</tr>
</tbody>
</table>

**trpop**: Quarterly estimated population for Turkey.  
**trpopsa**: Seasonally adjusted quarterly estimated population for Turkey.  
**uk1**: Quarterly arrivals from the USA to the UK.  
**uk1sa**: Seasonally adjusted quarterly arrivals from the USA to the UK.  
**uk2**: Quarterly arrivals from Germany to the UK.  
**uk2sa**: Seasonally adjusted quarterly arrivals from Germany to the UK.  
**uk3**: Quarterly arrivals from Austria to the UK.  
**uk3sa**: Seasonally adjusted quarterly arrivals from Austria to the UK.  
**uk4**: Quarterly arrivals from France to the UK.  
**uk4sa**: Seasonally adjusted quarterly arrivals from France to the UK.  
**uk5**: Quarterly arrivals from Japan to the UK.  
**uk5sa**: Seasonally adjusted quarterly arrivals from Japan to the UK.  
**uk6**: Quarterly arrivals from Finland to the UK.  
**uk6sa**: Seasonally adjusted quarterly arrivals from Finland to the UK.  
**uk7**: Quarterly arrivals from Spain to the UK.  
**uk7sa**: Seasonally adjusted quarterly arrivals from Spain to the UK.  
**ukexr**: Quarterly adjusted exchange rates (in real terms) for the UK.  
**ukpop**: Quarterly estimated population for the UK.  
**ukpopsa**: Seasonally adjusted quarterly estimated population for the UK.  
**uspop**: Quarterly estimated population for the USA.  
**y15**: Annual quarterly totals income per capita in US dollars for Canada.  
**y17**: Annual quarterly totals income per capita in US dollars for Israel.  
**y18**: Annual quarterly totals income per capita in US dollars for Italy.
y19: Annual quarterly totals income per capita in US dollars for Japan.
y20: Annual quarterly totals income per capita in US dollars for the USA.
y21: Annual quarterly totals income per capita in US dollars for the UK.
y22: Annual quarterly totals income per capita in US dollars for the IOM (interpo).
y23: Annual quarterly totals income per capita in US dollars for N. Cyprus (interpo).
y5: Annual quarterly totals income per capita in US dollars for Greece.
y8: Annual quarterly totals income per capita in US dollars for Malta.
ya1: Annual quarterly totals income per capita in US dollars for Belgium.
ya10: Annual quarterly totals income per capita in US dollars for Spain.
ya11: Annual quarterly totals income per capita in US dollars for Switzerland.
ya12: Annual quarterly totals income per capita in US dollars for Turkey.
ya13: Annual quarterly totals income per capita in US dollars for Australia.
ya14: Annual quarterly totals income per capita in US dollars for Austria.
y16: Annual quarterly totals income per capita in US dollars for Finland.
y12: Annual quarterly totals income per capita in US dollars for Denmark.
y13: Annual quarterly totals income per capita in US dollars for France.
y14: Annual quarterly totals income per capita in US dollars for Germany.
y17: Annual quarterly totals income per capita in US dollars for Libya.
ya9: Annual quarterly totals income per capita in US dollars for the Netherlands.
DISK 2: ("Adjust" subdirectory)

Disk 2 includes the final form of data series which we used for estimating equations. All series are in logarithmic forms except dummies (d1, d2, d3) and trend.

a1: Number of tourist arrivals per capita from Denmark to Austria.
a2: Number of tourist arrivals per capita from France to Austria.
a3: Number of tourist arrivals per capita from the UK to Austria.
a4: Number of tourist arrivals per capita from Canada to Austria.
a5: Number of tourist arrivals per capita from the Netherlands to Austria.
a6: Number of tourist arrivals per capita from the USA to Austria.
a7: Number of tourist arrivals per capita from Turkey to Austria.
c11: Cost of living variable from Denmark to Austria.
c10: Cost of living variable from Germany to Malta.
c111: Cost of living variable from Italy to Malta.
c112: Cost of living variable from Libya to Malta.
c113: Cost of living variable from the UK to Malta.
c114: Cost of living variable from the USA to Malta.
c115: Cost of living variable from Turkey to North Cyprus.
c116: Cost of living variable from the UK to North Cyprus.
c117: Cost of living variable from Germany to North Cyprus.
c118: Cost of living variable from the USA to North Cyprus.
c119: Cost of living variable from Australia to North Cyprus.
c12: Cost of living variable from France to Austria.
c120: Cost of living variable from Turkey to North Cyprus.
c121: Cost of living variable from Germany to Turkey.
c122: Cost of living variable from Austria to Turkey.
c123: Cost of living variable from France to Turkey.
c124: Cost of living variable from the UK to Turkey.
c125: Cost of living variable from Italy to Turkey.
c126: Cost of living variable from the USA to Turkey.
c127: Cost of living variable from North Cyprus to Turkey.
c128: Cost of living variable from Israel to Turkey.
c129: Cost of living variable from Denmark to Turkey.
c13: Cost of living variable from the UK to Austria.
c130: Cost of living variable from Switzerland to Turkey.
c131: Cost of living variable from Greece to Turkey.
c132: Cost of living variable from Belgium to Turkey.
c133: Cost of living variable from the Netherlands to Turkey.
c134: Cost of living variable from the USA to the UK.
c135: Cost of living variable from Germany to the UK.
c136: Cost of living variable from Austria to the UK.
c137: Cost of living variable from France to the UK.
c138: Cost of living variable from Japan to the UK.
c139: Cost of living variable from Finland to the UK.
c14: Cost of living variable from Canada to Austria.
c140: Cost of living variable from Spain to the UK.
cl41: Cost of living variable from the IOM to the UK.
cl42: Cost of living variable from the UK to the IOM.
cl43: Cost of living variable from EIRE to the IOM.
cl5: Cost of living variable from the Netherlands to Austria.
cl6: Cost of living variable from the USA to Austria.
cl7: Cost of living variable from Turkey to Austria.
cl8: Cost of living variable from Austria to Malta.
cl9: Cost of living variable from Denmark to Malta.
d1: Seasonal dummies.
d2: Seasonal dummies.
d3: Seasonal dummies.
d4: Seasonal dummies.
ex1: Exchange rates variable from Denmark to Austria.
ex10: Exchange rates variable from Germany to Malta.
ex11: Exchange rates variable from Italy to Malta.
ex12: Exchange rates variable from Libya to Malta.
ex13: Exchange rates variable from the UK to Malta.
ex14: Exchange rates variable from the USA to Malta.
ex15: Exchange rates variable from Turkey to North Cyprus.
ex16: Exchange rates variable from the UK to North Cyprus.
ex17: Exchange rates variable from Germany to North Cyprus.
ex18: Exchange rates variable from the USA to North Cyprus.
ex19: Exchange rates variable from Australia to North Cyprus.
ex2: Exchange rates variable from France to Austria.
ex20: Exchange rates variable from the IOM to UK.
ex21: Exchange rates variable from Germany to Turkey.
ex22: Exchange rates variable from Austria to Turkey.
ex23: Exchange rates variable from France to Turkey.
ex24: Exchange rates variable from the UK to Turkey.
ex25: Exchange rates variable from Italy to Turkey.
ex26: Exchange rates variable from the USA to Turkey.
ex27: Exchange rates variable from North Cyprus to Turkey.
ex28: Exchange rates variable from Israel to Turkey.
ex29: Exchange rates variable from Denmark to Turkey.
ex3: Exchange rates variable from the UK to Austria.
ex30: Exchange rates variable from Switzerland to Turkey.
ex31: Exchange rates variable from Greece to Turkey.
ex32: Exchange rates variable from Belgium to Turkey.
ex33: Exchange rates variable from the Netherlands to Turkey.
ex34: Exchange rates variable from the USA to the UK.
ex35: Exchange rates variable from Germany to the UK.
ex36: Exchange rates variable from Austria to the UK.
ex37: Exchange rates variable from France to the UK.
ex38: Exchange rates variable from Japan to the UK.
ex39: Exchange rates variable from Finland to the UK.
ex4: Exchange rates variable from Canada to Austria.
ex40: Exchange rates variable from Spain to the UK.
ex43: Exchange rates variable from the IOM to the UK.
ex5: Exchange rates variable from the Netherlands to Austria.
ex6: Exchange rates variable from the USA to Austria.
ex7: Exchange rates variable from Canada to Austria.
ex8: Exchange rates variable from Austria to Malta.
ex9: Exchange rates variable from Denmark to Malta.
ff1: Cost of air fares from Denmark to Austria.
ff2: Cost of air fares from Germany to Austria.
ff3: Cost of air fares from Austria to Turkey.
ff4: Cost of air fares from France to Austria.
ff5: Cost of air fares from the UK to Austria.
ff6: Cost of air fares from the USA to Malta.
ff7: Cost of air fares from Turkey to Austria.
ff8: Cost of air fares from Malta to Turkey.
ff9: Cost of air fares from the UK to Malta.
ff10: Cost of air fares from Germany to Malta.
ff11: Cost of air fares from Italy to Malta.
ff12: Cost of air fares from Libya to Malta.
ff13: Cost of air fares from the UK to Malta.
ff14: Cost of air fares from the USA to Malta.
ff15: Cost of air fares from France to Malta.
ff16: Cost of air fares from the IOM to UK.
ff17: Cost of air fares from Germany to Turkey.
ff18: Cost of air fares from Austria to Turkey.
ff19: Cost of air fares from France to Turkey.
ff20: Cost of air fares from the UK to Turkey.
ff21: Cost of air fares from Italy to Turkey.
ff22: Cost of air fares from Malta to Turkey.
ff23: Cost of air fares from France to Turkey.
ff24: Cost of air fares from the UK to Turkey.
ff25: Cost of air fares from Italy to Turkey.
ff26: Cost of air fares from the USA to Turkey.
ff27: Cost of air fares from North Cyprus to Turkey.
ff28: Cost of air fares from Israel to Turkey.
ff29: Cost of air fares from Denmark to Turkey.
ff30: Cost of air fares from the UK to Austria.
ff31: Cost of air fares from Switzerland to Turkey.
ff32: Cost of air fares from Greece to Turkey.
ff33: Cost of air fares from Belgium to Turkey.
ff34: Cost of air fares from the Netherlands to Turkey.
ff35: Cost of air fares from the USA to the UK.
ff36: Cost of air fares from Austria to the UK.
ff37: Cost of air fares from France to the UK.
ff38: Cost of air fares from Japan to the UK.
ff39: Cost of air fares from Finland to the UK.
ff40: Cost of air fares from Canada to Austria.
ff41: Cost of air fares from the IOM to the UK.
ff42: Cost of air fares from the UK to the IOM.
ff43: Cost of air fares from EIRE to the IOM.
ff44: Cost of air fares from the Netherlands to Austria.
ff45: Cost of air fares from the USA to Austria.
ff46: Cost of air fares from Spain to the UK.
ff47: Cost of air fares from Turkey to Austria.
ff48: Cost of air fares from Malta to Austria.
ff49: Cost of air fares from the USA to the UK.

gl: Seasonally adjusted number of tourist arrivals per capita from the USA to the UK.
g2: Seasonally adjusted number of tourist arrivals per capita from Germany to the UK.
g3: Seasonally adjusted number of tourist arrivals per capita from Austria to the UK.
g4: Seasonally adjusted number of tourist arrivals per capita from France to the UK.
g5: Seasonally adjusted number of tourist arrivals per capita from Japan to the UK.
g6: Seasonally adjusted number of tourist arrivals per capita from Finland to the UK.
g7: Seasonally adjusted number of tourist arrivals per capita from Spain to the UK.
g8: Seasonally adjusted number of tourist arrivals per capita from the IOM to the UK.
i1: Number of tourist arrivals per capita from the UK to the IOM.
i2: Number of tourist arrivals per capita from EIRE to the IOM.
in1: Income per capita variable for Belgium.
in10: Income per capita variable for Spain.
in11: Income per capita variable for Switzerland.
in12: Income per capita variable for Turkey.
in13: Income per capita variable for Australia.
in14: Income per capita variable for Austria.
in15: Income per capita variable for Canada.
in16: Income per capita variable for Finland.
in17: Income per capita variable for Israel.
in18: Income per capita variable for Italy.
in19: Income per capita variable for Japan.
in2: Income per capita variable for Denmark.
in20: Income per capita variable for the USA.
in21: Income per capita variable for the UK.
in22: Income per capita variable for the IOM.
in23: Income per capita variable for North Cyprus.
in3: Income per capita variable for France.
in4: Income per capita variable for Germany.
in5: Income per capita variable for Greece.
in6: Income per capita variable for Ireland.
in7: Income per capita variable for Libya.
in8: Income per capita variable for Malta.
in9: Income per capita variable for the Netherlands.
j1: Number of tourist arrivals per capita from the UK to the IOM.
j2: Number of tourist arrivals per capita from EIRE to the IOM.
m1: Number of tourist arrivals per capita from Austria to Malta.
m2: Number of tourist arrivals per capita from Denmark to Malta.
m3: Number of tourist arrivals per capita from Germany to Malta.
m4: Number of tourist arrivals per capita from Italy to Malta.
m5: Number of tourist arrivals per capita from Libya to Malta.
m6: Number of tourist arrivals per capita from the UK to Malta.
m7: Number of tourist arrivals per capita from the USA to Malta.
n1: Number of tourist arrivals per capita from Turkey to North Cyprus(83:1-95:4).
n2: Number of tourist arrivals per capita from the UK to North Cyprus.
n3: Number of tourist arrivals per capita from Germany to North Cyprus.
n4: Number of tourist arrivals per capita from the USA to North Cyprus.
n5: Number of tourist arrivals per capita from Australia to North Cyprus.
n6: Number of tourist arrivals per capita from Turkey to North Cyprus(76:1-95:4).
p1: Seasonally adjusted number of tourist arrivals per capita from Turkey to North Cyprus(83:1-95:4).
p2: Seasonally adjusted number of tourist arrivals per capita from UK to North Cyprus.
p3: Seasonally adjusted number of tourist arrivals per capita from Germany to North Cyprus.
p4: Seasonally adjusted number of tourist arrivals per capita from USA to North Cyprus.
p5: Seasonally adjusted number of tourist arrivals per capita from Australia to North Cyprus.
p6: Seasonally adjusted number of tourist arrivals per capita from Turkey to North Cyprus (76:1-95:4).

s1: Surface travel cost from Denmark to Austria.
s10: Surface travel cost from the UK to Malta.
s11: Surface travel cost from Turkey to North Cyprus.
s12: Surface travel cost from the UK to North Cyprus.
s13: Surface travel cost from Germany to North Cyprus.
s14: Surface travel cost from Germany to Turkey.
s15: Surface travel cost from Germany to the UK.
s16: Surface travel cost from Austria to Turkey.
s17: Surface travel cost from Austria to the UK.
s18: Surface travel cost from France to Turkey.
s19: Surface travel cost from France to the UK.
s2: Surface travel cost from France to Austria.
s20: Surface travel cost from the UK to Turkey.
s21: Surface travel cost from the UK to the IOM.
s22: Surface travel cost from Italy to Turkey.
s23: Surface travel cost from Denmark to Turkey.
s24: Surface travel cost from Switzerland to Turkey.
s25: Surface travel cost from Greece to Turkey.
s26: Surface travel cost from Belgium to Turkey.
s27: Surface travel cost from the Netherlands to Turkey.
s28: Surface travel cost from Finland to the UK.
s29: Surface travel cost from Spain to the UK.
s3: Surface travel cost from the UK to Austria.
s4: Surface travel cost from the Netherlands to Austria.
s5: Surface travel cost from Turkey to Austria.
s6: Surface travel cost from Austria to Malta.
s7: Surface travel cost from Denmark to Malta.
s8: Surface travel cost from Germany to Malta.
s9: Surface travel cost from Italy to Malta.

t1: Number of tourist arrivals per capita from Germany to Turkey.
t10: Number of tourist arrivals per capita from Switzerland to Turkey.
t11: Number of tourist arrivals per capita from Greece to Turkey.
t12: Number of tourist arrivals per capita from Belgium to Turkey.
t13: Number of tourist arrivals per capita from the Netherlands to Turkey.
t2: Number of tourist arrivals per capita from Austria to Turkey.
t3: Number of tourist arrivals per capita from France to Turkey.
t4: Number of tourist arrivals per capita from the UK to Turkey.
t5: Number of tourist arrivals per capita from Italy to Turkey.
t6: Number of tourist arrivals per capita from the USA to Turkey.
t7: Number of tourist arrivals per capita from North Cyprus to Turkey.
t8: Number of tourist arrivals per capita from Israel to Turkey.
t9: Number of tourist arrivals per capita from Denmark to Turkey.
trend: The trend variable.
u1: Number of tourist arrivals per capita from the USA to the UK.
u2: Number of tourist arrivals per capita from Germany to the UK.
u3: Number of tourist arrivals per capita from Austria to the UK.
u4: Number of tourist arrivals per capita from France to the UK.
u5: Number of tourist arrivals per capita from Japan to the UK.
u6: Number of tourist arrivals per capita from Finland to the UK.
u7: Number of tourist arrivals per capita from Spain to the UK.
u8: Number of tourist arrivals per capita from the IOM to the UK.
w1: Seasonally adjusted number of tourist arrivals per capita from Austria to Malta.
w2: Seasonally adjusted number of tourist arrivals per capita from Denmark to Malta.
w3: Seasonally adjusted number of tourist arrivals per capita from Germany to Malta.
w4: Seasonally adjusted number of tourist arrivals per capita from Italy to Malta.
w5: Seasonally adjusted number of tourist arrivals per capita from Libya to Malta.
w6: Seasonally adjusted number of tourist arrivals per capita from the UK to Malta.
w7: Seasonally adjusted number of tourist arrivals per capita from the USA to Malta.
x1: Seasonally adjusted number of tourist arrivals per capita from Germany to Turkey.
x10: Seasonally adjusted number of tourist arrivals per capita from Switzerland to Turkey.
x11: Seasonally adjusted number of tourist arrivals per capita from Greece to Turkey.
x12: Seasonally adjusted number of tourist arrivals per capita from Belgium to Turkey.
x13: Seasonally adjusted number of tourist arrivals per capita from the Netherlands to Turkey.
x2: Seasonally adjusted number of tourist arrivals per capita from Austria to Turkey.
x3: Seasonally adjusted number of tourist arrivals per capita from France to Turkey.
x4: Seasonally adjusted number of tourist arrivals per capita from the UK to Turkey.
x5: Seasonally adjusted number of tourist arrivals per capita from Italy to Turkey.
x6: Seasonally adjusted number of tourist arrivals per capita from the USA to Turkey.
x7: Seasonally adjusted number of tourist arrivals per capita from North Cyprus to Turkey.
x8: Seasonally adjusted number of tourist arrivals per capita from Israel to Turkey.
x9: Seasonally adjusted number of tourist arrivals per capita from Denmark to Turkey.
z1: Seasonally adjusted number of tourist arrivals per capita from Denmark to Austria.
z2: Seasonally adjusted number of tourist arrivals per capita from France to Austria.
z3: Seasonally adjusted number of tourist arrivals per capita from the UK to Austria.
z4: Seasonally adjusted number of tourist arrivals per capita from Canada to Austria.
z5: Seasonally adjusted number of tourist arrivals per capita from the Netherlands to Austria.
z6: Seasonally adjusted number of tourist arrivals per capita from the USA to Austria.
z7: Seasonally adjusted number of tourist arrivals per capita from the Turkey to Austria.
ANNEX-1

1. REGRESSION RESULTS

You will find the OLS test results first and then econometrically corrected (OLS results without autocorrelation, multicollinearity etc.) results are following thereafter. For each model we use diagnostic tests and most of the equations satisfies the diagnostic tests. The sequence is North Cyprus (6 equations), Malta (7 equations), The Isle of Man (2 equations), Austria (7 equations), United Kingdom (8 equations) and Turkey (13 equations) inbound equations. There are 43 equations in total estimated with Ordinary Least Squares (OLS).

1.1 NORTH CYPRUS INBOUND

1. TURKEY TO NORTH CYPRUS (1983-1995)

LS // Dependent Variable is N1
Date: 01/14/98 Time: 10:38
Sample(adjusted): 1984:1 1995:4
Included observations: 48 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-3.030464</td>
<td>6.994808</td>
<td>-0.433245</td>
<td>0.6675</td>
</tr>
<tr>
<td>IN12</td>
<td>0.857909</td>
<td>1.196401</td>
<td>0.717075</td>
<td>0.4781</td>
</tr>
<tr>
<td>CL15</td>
<td>0.084839</td>
<td>0.094735</td>
<td>0.895537</td>
<td>0.3766</td>
</tr>
<tr>
<td>EX15</td>
<td>-0.300849</td>
<td>1.574800</td>
<td>-0.191040</td>
<td>0.8496</td>
</tr>
<tr>
<td>FF20</td>
<td>31.06562</td>
<td>12.03937</td>
<td>2.580336</td>
<td>0.0142</td>
</tr>
<tr>
<td>S11</td>
<td>-0.685628</td>
<td>0.308079</td>
<td>-2.225493</td>
<td>0.0326</td>
</tr>
<tr>
<td>D2</td>
<td>0.120016</td>
<td>0.100833</td>
<td>1.190251</td>
<td>0.2420</td>
</tr>
<tr>
<td>D3</td>
<td>-0.342048</td>
<td>0.214220</td>
<td>-1.596715</td>
<td>0.1193</td>
</tr>
<tr>
<td>DM86</td>
<td>-0.447046</td>
<td>0.141522</td>
<td>-3.158845</td>
<td>0.0033</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.333362</td>
<td>0.130345</td>
<td>-2.557543</td>
<td>0.0150</td>
</tr>
<tr>
<td>TREND</td>
<td>0.082810</td>
<td>0.034982</td>
<td>2.367185</td>
<td>0.0236</td>
</tr>
<tr>
<td>N1(-4)</td>
<td>0.154147</td>
<td>0.132500</td>
<td>1.163370</td>
<td>0.2525</td>
</tr>
</tbody>
</table>

R-squared 0.808240  Mean dependent var -1.542312
Adjusted R-squared 0.742493  S.D. dependent var 0.418230
S.E. of regression 0.212231  Akaike info criterion -2.874345
Sum squared resid 1.576472  Schwarz criterion -2.367561
Log likelihood 13.87522  F-statistic 12.29328
Durbin-Watson stat 1.650394  Prob(F-statistic) 0.000000

2. UK TO NORTH CYPRUS

LS // Dependent Variable is N2
Date: 01/13/98 Time: 12:15
Sample(adjusted): 1984:1 1995:4
Included observations: 48 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
<tr>
<td>C</td>
<td>-8.501020</td>
<td>3.205100</td>
<td>-2.652342</td>
<td>0.0117</td>
</tr>
<tr>
<td>IN21</td>
<td>1.182497</td>
<td>0.963342</td>
<td>1.227494</td>
<td>0.2274</td>
</tr>
<tr>
<td>CL16</td>
<td>-0.050054</td>
<td>0.087765</td>
<td>-0.570317</td>
<td>0.5719</td>
</tr>
<tr>
<td>EX16</td>
<td>-0.200215</td>
<td>0.047876</td>
<td>-4.181971</td>
<td>0.0002</td>
</tr>
<tr>
<td>S12</td>
<td>0.328593</td>
<td>0.665100</td>
<td>0.494051</td>
<td>0.6242</td>
</tr>
<tr>
<td>D2</td>
<td>0.709629</td>
<td>0.150839</td>
<td>4.704536</td>
<td>0.0000</td>
</tr>
<tr>
<td>D3</td>
<td>-1.710129</td>
<td>0.340998</td>
<td>-5.015074</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
3. GERMANY TO NORTH CYPRUS

LS // Dependent Variable is N3
Date: 01/13/98 Time: 12:20
Sample(adjusted): 1984:1 1995:4
Included observations: 48 after adjusting endpoints

<table>
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<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-9.478472</td>
<td>2.007128</td>
<td>-4.722405</td>
<td>0.0000</td>
</tr>
<tr>
<td>IN4</td>
<td>1.313561</td>
<td>0.345655</td>
<td>3.800214</td>
<td>0.0005</td>
</tr>
<tr>
<td>CL17</td>
<td>0.099151</td>
<td>0.121442</td>
<td>0.816444</td>
<td>0.4195</td>
</tr>
<tr>
<td>EX17</td>
<td>-0.111792</td>
<td>0.051956</td>
<td>-2.151669</td>
<td>0.0380</td>
</tr>
<tr>
<td>S13</td>
<td>-1.797620</td>
<td>0.596330</td>
<td>-3.014470</td>
<td>0.0046</td>
</tr>
<tr>
<td>D2</td>
<td>0.627327</td>
<td>0.185948</td>
<td>3.373672</td>
<td>0.0018</td>
</tr>
<tr>
<td>D3</td>
<td>-1.322778</td>
<td>0.377151</td>
<td>-3.411731</td>
<td>0.0016</td>
</tr>
<tr>
<td>D4</td>
<td>1.736721</td>
<td>0.568332</td>
<td>3.058222</td>
<td>0.0041</td>
</tr>
<tr>
<td>DM89</td>
<td>-0.045327</td>
<td>0.174114</td>
<td>-0.260330</td>
<td>0.7961</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.536647</td>
<td>0.168664</td>
<td>-3.77983</td>
<td>0.0030</td>
</tr>
<tr>
<td>N3(-4)</td>
<td>0.299485</td>
<td>0.131505</td>
<td>2.277368</td>
<td>0.0286</td>
</tr>
</tbody>
</table>

R-squared 0.936187 Mean dependent var -3.176265
Adjusted R-squared 0.918940 S.D. dependent var 0.739479
S.E. of regression 0.124476 Akaike info criterion -2.918130
Sum squared resid 1.640068 Schwarz criterion -2.489313
Log likelihood 12.92607 F-statistic 54.28147
Durbin-Watson stat 1.772386 Prob(F-statistic) 0.000000

4. USA TO NORTH CYPRUS

LS // Dependent Variable is N4
Date: 01/14/98 Time: 10:39
Sample(adjusted): 1984:1 1995:4
Included observations: 48 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-20.48601</td>
<td>13.22037</td>
<td>-1.549580</td>
<td>0.1298</td>
</tr>
<tr>
<td>IN20</td>
<td>3.638948</td>
<td>2.986536</td>
<td>1.226914</td>
<td>0.2276</td>
</tr>
<tr>
<td>CL18</td>
<td>0.272364</td>
<td>0.149125</td>
<td>1.826413</td>
<td>0.0759</td>
</tr>
<tr>
<td>EX26</td>
<td>0.334457</td>
<td>0.269216</td>
<td>1.242338</td>
<td>0.2219</td>
</tr>
<tr>
<td>D2</td>
<td>0.399613</td>
<td>0.193481</td>
<td>2.065387</td>
<td>0.0459</td>
</tr>
<tr>
<td>D3</td>
<td>-0.630288</td>
<td>0.410891</td>
<td>-1.533955</td>
<td>0.1335</td>
</tr>
<tr>
<td>D4</td>
<td>0.734040</td>
<td>0.637856</td>
<td>1.150793</td>
<td>0.2572</td>
</tr>
<tr>
<td>DM90</td>
<td>-0.483436</td>
<td>0.221958</td>
<td>-2.178050</td>
<td>0.0359</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.926999</td>
<td>0.206734</td>
<td>-4.484009</td>
<td>0.0001</td>
</tr>
<tr>
<td>TREND</td>
<td>0.020629</td>
<td>0.032723</td>
<td>0.630490</td>
<td>0.5323</td>
</tr>
<tr>
<td>N4(-4)</td>
<td>0.256880</td>
<td>0.125787</td>
<td>2.042193</td>
<td>0.0483</td>
</tr>
</tbody>
</table>

R-squared 0.904026 Mean dependent var -3.512029
Adjusted R-squared 0.878087 S.D. dependent var 0.819959
S.E. of regression 0.124794 Akaike info criterion -2.903402
Sum squared resid 1.772386 Schwarz criterion -1.874585
Log likelihood -1.827402 F-statistic 34.85219
Durbin-Watson stat 1.772386 Prob(F-statistic) 0.000000
5. AUSTRALIA TO NORTH CYPRUS

LS // Dependent Variable is N5
Date: 01/14/98 Time: 10:42
Sample(adjusted): 1984:1 1995:4
Included observations: 48 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-8.666869</td>
<td>4.863591</td>
<td>-1.781990</td>
<td>0.0830</td>
</tr>
<tr>
<td>IN13</td>
<td>0.325121</td>
<td>1.136875</td>
<td>0.285978</td>
<td>0.7765</td>
</tr>
<tr>
<td>CL19</td>
<td>-0.190673</td>
<td>0.299421</td>
<td>-0.336225</td>
<td>0.7386</td>
</tr>
<tr>
<td>EX19</td>
<td>-0.192009</td>
<td>0.511140</td>
<td>-0.375647</td>
<td>0.7093</td>
</tr>
<tr>
<td>D2</td>
<td>0.616255</td>
<td>0.300123</td>
<td>2.053344</td>
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<tr>
<td>D3</td>
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<td>0.653575</td>
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<tr>
<td>D4</td>
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<td>1.756369</td>
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<td>DM90</td>
<td>-0.293139</td>
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<td>-0.724738</td>
<td>0.4732</td>
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<tr>
<td>DM91</td>
<td>-1.597991</td>
<td>0.378332</td>
<td>-4.223779</td>
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<tr>
<td>TREND</td>
<td>-0.021114</td>
<td>0.055870</td>
<td>-0.377915</td>
<td>0.7077</td>
</tr>
<tr>
<td>N5(-4)</td>
<td>-0.037416</td>
<td>0.136718</td>
<td>-0.273670</td>
<td>0.7859</td>
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</table>

R-squared 0.493510
Mean dependent var -6.577081
Adjusted R-squared 0.356621
S.D. dependent var 0.769410
Akaike info criterion -0.767233
Schwarz criterion -0.338416
F-statistic 3.605176
Durbin-Watson stat 1.864985
Prob(F-statistic) 0.002038

6. TURKEY TO NORTH CYPRUS (1976-1995)

LS // Dependent Variable is N6
Date: 01/14/98 Time: 10:43
Sample(adjusted): 1978:1 1995:4
Included observations: 72 after adjusting endpoints

<table>
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<th>Prob.</th>
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<tbody>
<tr>
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<tr>
<td>IN12</td>
<td>0.356948</td>
<td>0.540763</td>
<td>0.660083</td>
<td>0.5118</td>
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<tr>
<td>CL20</td>
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<td>0.044423</td>
<td>0.251381</td>
<td>0.8024</td>
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<td>EX15</td>
<td>-0.367726</td>
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<td>-0.549077</td>
<td>0.5850</td>
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<tr>
<td>FF20</td>
<td>4.321459</td>
<td>4.012995</td>
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<td>S11</td>
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<td>0.124545</td>
<td>-3.087261</td>
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<tr>
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<td>-2.575941</td>
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<td>D4</td>
<td>0.361215</td>
<td>0.204507</td>
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<td>DM79</td>
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<td>0.199477</td>
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<td>0.0053</td>
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<td>N6(-4)</td>
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<td>0.114859</td>
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R-squared 0.900060 Mean dependent var -6.577081
Adjusted R-squared 0.356621 S.D. dependent var 0.485223
Akaike info criterion -0.767233
Schwarz criterion -0.338416
F-statistic 44.27948
Durbin-Watson stat 1.506430 Prob(F-statistic) 0.000000

1. TURKEY TO NORTH CYPRUS:

LS // Dependent Variable is N1
Date: 01/13/98 Time: 20:46
Sample(adjusted): 1983:1 1995:4
Included observations: 52 after adjusting endpoints

<table>
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<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
<tr>
<td>C</td>
<td>-4.465256</td>
<td>0.812950</td>
<td>-5.492660</td>
<td>0.0000</td>
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<tr>
<td>IN12</td>
<td>0.562396</td>
<td>0.243735</td>
<td>2.307404</td>
<td>0.0258</td>
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<tr>
<td>S11</td>
<td>-0.645796</td>
<td>0.218826</td>
<td>-2.951185</td>
<td>0.0051</td>
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<tr>
<td>D2</td>
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<td>2.352338</td>
<td>0.0232</td>
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<td>D3</td>
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<td>0.154306</td>
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<td>0.0002</td>
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<tr>
<td>D4</td>
<td>0.762953</td>
<td>0.220089</td>
<td>3.466571</td>
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<tr>
<td>DM86</td>
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<td>0.0001</td>
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<tr>
<td>DM91</td>
<td>-0.340123</td>
<td>0.119549</td>
<td>-2.845055</td>
<td>0.0067</td>
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R-squared 0.751083  Mean dependent var -1.558268
Adjusted R-squared 0.711483  S.D. dependent var 0.420067
S.E. of regression 0.225634  Akaike info criterion -2.837947
Sum squared resid 7.978430  Schwarz criterion -2.536856
Log likelihood 7.978430  F-statistic 18.96658
Durbin-Watson stat 1.602146  Prob(F-statistic) 0.000000

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 0.564168  Probability 0.690019

White Heteroskedasticity Test:
F-statistic 1.201129  Probability 0.319876

Estimation Command:
LS N1 C IN12 S11 D2 D3 D4 DM86 DM91

Estimation Equation:
N1 = C(1) + C(2)*IN12 + C(3)*S11 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*DM86 + C(8)*DM91

Substituted Coefficients:
N1 = -4.465256 + 0.56239598*IN12 - 0.64579577*S11 + 0.20878698*D2 - 0.63844416*D3 + 0.76295261*D4 - 0.53241847*DM86 - 0.34012342*DM91
Actual: N1  Forecast: N1F  
Sample: 1976:1 1995:4  
Include observations: 52

Root Mean Squared Error 0.207553 
Mean Absolute Error 0.162362 
Mean Absolute Percentage Error 10.48074 
Theil Inequality Coefficient 0.064612
  Bias Proportion 0.000000 
  Variance Proportion 0.071438 
  Covariance Proportion 0.928562

2. UK TO NORTH CYPRUS:  
LS // Dependent Variable is N2  
Date: 01/13/98 Time: 21:35  
Sample(adjusted): 1984:2 1995:4  
Included observations: 47 after adjusting endpoints  
Convergence achieved after 9 iterations 

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
<tr>
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<tr>
<td>IN21</td>
<td>0.958851</td>
<td>0.514872</td>
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<td>0.0699</td>
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<tr>
<td>D2</td>
<td>0.503897</td>
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<tr>
<td>D3</td>
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<tr>
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<tr>
<td>N2(-4)</td>
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<tr>
<td>AR(1)</td>
<td>0.709826</td>
<td>0.113299</td>
<td>6.265093</td>
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</table>

R-squared 0.900907  Mean dependent var -3.137245  
Adjusted R-squared 0.886043  S.D. dependent var 0.695732  
S.E. of regression 0.234862  Akaike info criterion -2.760914  
Sum squared resid 2.206398  Schwarz criterion -2.485360  
Log likelihood 5.191371  F-statistic 60.61036  
Durbin-Watson stat 2.177866  Prob(F-statistic) 0.000000

Inverted AR Roots .71

Breusch-Godfrey Serial Correlation LM Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Probability</th>
<th>Obs*R-squared</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.388869</td>
<td>0.815178</td>
<td>1.946650</td>
<td>0.745571</td>
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</tbody>
</table>
White Heteroskedasticity Test:

F-statistic 1.167198 Probability 0.343533
Obs*R-squared 8.140873 Probability 0.320336

Estimation Command:
LS N2 C IN21 D2 D3 D4 N2(-4) AR(1)

Estimation Equation:

\[ N2 = C(1) + C(2) \cdot IN21 + C(3) \cdot D2 + C(4) \cdot D3 + C(5) \cdot D4 + C(6) \cdot N2(-4) + [AR(1) = C(7)] \]

Substituted Coefficients:

\[ N2 = -5.6699703 + 0.9588506 \cdot IN21 + 0.5038967 \cdot D2 - 1.1841404 \cdot D3 + 1.5249054 \cdot D4 + 0.43920733 \cdot N2(-4) + [AR(1) = 0.70982644] \]

Residual Actual Fitted
Actual: N2 Forecast: N2F
Sample: 1984:2 1995:4
Include observations: 47

Root Mean Squared Error 0.371681
Mean Absolute Error 0.314719
Mean Absolute Percentage Error 10.85944
Theil Inequality Coefficient 0.058524
Bias Proportion 0.023666
Variance Proportion 0.049651
Covariance Proportion 0.926683

3. GERMANY TO NORTH CYPRUS:
LS // Dependent Variable is N3
Date: 01/13/98 Time: 21:52
Sample(adjusted): 1984:1 1995:4
Included observations: 48 after adjusting endpoints

<table>
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<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-10.72855</td>
<td>2.002226</td>
<td>-5.358312</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
IN4  1.475400  0.345337  4.272354  0.0001
S13 -1.416235  0.558460  -2.535966  0.0154
D2  0.775839  0.175671  4.416433  0.0001
D3 -1.677262  0.349813  -4.794734  0.0000
D4  2.271370  0.478130  4.750524  0.0000
DM91 -0.677026  0.152286  -4.445747  0.0001
DM92 -0.371639  0.167809  -2.214659  0.0329
TREND  0.015827  0.005864  2.698873  0.0103
N3(-4)  0.219782  0.125489  1.751408  0.0879

R-squared  0.908250  Mean dependent var  -3.512029
Adjusted R-squared  0.886520  S.D. dependent var  0.819959
S.E. of regression  0.276218  Akaike info criterion  -2.390075
Sum squared resid  2.899271  Schwarz criterion  -2.000242
Log likelihood -0.747244  F-statistic  41.79650
Durbin-Watson stat  1.433088  Prob(F-statistic)  0.000000

Breusch-Godfrey Serial Correlation LM Test:
F-statistic  0.733403  Probability  0.575565
Obs*R-squared  3.812608  Probability  0.431960

White Heteroskedasticity Test:
F-statistic  1.068990  Probability  0.415731
Obs*R-squared  13.92679  Probability  0.379020

Estimation Command:
LS N3 C IN4  S13 D2  D3  D4  DM91  DM92  TREND  N3(-4)

Estimation Equation:
N3 = C(1) + C(2)*IN4 + C(3)*S13 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*DM91 + C(8)*DM92 + C(9)*TREND + C(10)*N3(-4)

Substituted Coefficients:
N3 = -10.728552 + 1.475400*IN4 + 1.4162348*S13 + 0.77583901*D2 - 1.6772621*D3 + 2.2713701*D4 - 0.67702649*DM91 - 0.37163864*DM92 + 0.015826964*TREND + 0.21978154*N3(-4)
Sample: 1984:1 1995:4
Include observations: 48

Root Mean Squared Error 0.246826
Mean Absolute Error 0.194256
Mean Absolute Percentage Error 5.600115
Theil Inequality Coefficient 0.034290
  Bias Proportion 0.000000
  Variance Proportion 0.040460
  Covariance Proportion 0.959540

4. USA TO NORTH CYPRUS:
LS // Dependent Variable is N4
Date: 01/14/98 Time: 18:28
Sample(adjusted): 1984:1 1995:4
Included observations: 48 after adjusting endpoints

<table>
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<th>Prob.</th>
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<tbody>
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<td>4.214027</td>
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<tr>
<td>EX26</td>
<td>0.137884</td>
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<tr>
<td>D2</td>
<td>0.544570</td>
<td>0.164226</td>
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<tr>
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<td>DM91</td>
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</tbody>
</table>

R-squared 0.700453  Mean dependent var -7.162583
Adjusted R-squared 0.639007  S.D. dependent var 0.544262
S.E. of regression 0.327007  Akaike info criterion 11.39955
Sum squared resid 4.170422  Schwarz criterion -1.717334
Log likelihood -9.472637  F-statistic
Durbin-Watson stat 1.915943  Prob(F-statistic) 0.000000

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 1.553240  Probability 0.208441
Obs*R-squared 7.236122  Probability 0.123924

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 1.553240  Probability 0.208441
Obs*R-squared 7.236122  Probability 0.123924

White Heteroskedasticity Test:
F-statistic 0.892327  Probability 0.556294
Obs*R-squared 10.28359  Probability 0.505073

Estimation Command:
LS N4 C IN20 EX26 D2 D3 D4 DM90 DM91 N4(-4)

Estimation Equation:
N4 = C(1) + C(2)*IN20 + C(3)*EX26 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*DM90 + C(8)*DM91 +
C(9)*N4(-4)

Substituted Coefficients:
N4 = -23.371056 + 4.2140273 *IN20 + 0.13788446*EX26 + 0.54456954*D2 - 1.0620531*D3 + 1.5241517*D4 -
0.37710552*DM90 - 0.97523977*DM91 + 0.24889494*N4(-4)

5. AUSTRALIA TO NORTH CYPRUS:
LS // Dependent Variable is N5
Date: 01/14/98 Time: 21:20
Sample(adjusted): 1983:2 1995:4
Included observations: 51 after adjusting endpoints
Convergence achieved after 7 iterations

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<th>Prob.</th>
<th>R-squared</th>
<th>Adjusted R-squared</th>
<th>S.E. of regression</th>
<th>S.E. of regression</th>
<th>Durbin-Watson stat</th>
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<tbody>
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<td>-38.10398</td>
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<td>0.460467</td>
<td>0.400519</td>
<td>0.590812</td>
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<td>D2</td>
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<td>1.353694</td>
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<tr>
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<td>-3.095940</td>
<td>0.0034</td>
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<td>0.534892</td>
<td>0.376061</td>
<td>-1.151543</td>
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<tr>
<td>D4</td>
<td>1.353694</td>
<td>0.534892</td>
<td>2.530780</td>
<td>0.0149</td>
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<td>0.254826</td>
<td>0.534892</td>
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<td>0.254826</td>
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<tr>
<td>DM91</td>
<td>-1.551543</td>
<td>0.376061</td>
<td>-4.125774</td>
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<tr>
<td>AR(1)</td>
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<td>0.146431</td>
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<td>0.254826</td>
<td>0.254826</td>
<td>0.146431</td>
<td>0.146431</td>
<td>0.254826</td>
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</tbody>
</table>

R-squared | Adjusted R-squared | S.E. of regression | S.E. of regression | Durbin-Watson stat |
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>0.460467</td>
<td>0.400519</td>
<td>0.590812</td>
<td>15.70765</td>
<td>-42.33508</td>
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</tbody>
</table>

Mean dependent var | S.D. dependent var | Akaike info criterion | Schwarz criterion |
<table>
<thead>
<tr>
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<tbody>
<tr>
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<td>-0.942384</td>
<td>-0.715110</td>
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</table>

Log likelihood | Durbin-Watson stat |
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</thead>
<tbody>
<tr>
<td>-42.33508</td>
<td>1.956330</td>
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</tbody>
</table>

Prob(F-statistic) | Inverted AR Roots |
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<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000027</td>
<td>0.25</td>
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</tbody>
</table>
Breusch-Godfrey Serial Correlation LM Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>0.866606</th>
<th>Probability</th>
<th>0.492112</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obs*R-squared</td>
<td>3.975757</td>
<td>Probability</td>
<td>0.409297</td>
</tr>
</tbody>
</table>

Breusch-Godfrey Serial Correlation LM Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>0.866606</th>
<th>Probability</th>
<th>0.492112</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obs*R-squared</td>
<td>3.975757</td>
<td>Probability</td>
<td>0.409297</td>
</tr>
</tbody>
</table>

White Heteroskedasticity Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>2.116751</th>
<th>Probability</th>
<th>0.093927</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obs*R-squared</td>
<td>7.928050</td>
<td>Probability</td>
<td>0.094250</td>
</tr>
</tbody>
</table>

Estimation Command:

\[ \text{LS N5 C D2 D3 D4 DM91 AR(1)} \]

Estimation Equation:

\[ N5 = C(1) + C(2)*D2 + C(3)*D3 + C(4)*D4 + C(5)*DM91 + [AR(1)=C(6)] \]

Substituted Coefficients:

\[ N5 = -6.8357342 + 0.49775194*D2 - 1.1973907*D3 + 1.3536937*D4 - 1.5515434*DM91 + [AR(1)=0.25482625] \]

Actual: N5    Forecast: N5F
Sample: 1983:2 1995:4
Include observations: 51

- Root Mean Squared Error: 0.571302
- Mean Absolute Error: 0.452028
- Mean Absolute Percentage Error: 6.765489
- Theil Inequality Coefficient: 0.042988
- Bias Proportion: 0.000004
- Variance Proportion: 0.200710
- Covariance Proportion: 0.799286
6. TURKEY TO NORTH CYPRUS:

**Dependent Variable is N6**

Date: 01/14/98  Time: 21:31
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-3.238879</td>
<td>0.492746</td>
<td>-6.573118</td>
<td>0.0000</td>
</tr>
<tr>
<td>IN12</td>
<td>0.672682</td>
<td>0.114197</td>
<td>5.890535</td>
<td>0.0000</td>
</tr>
<tr>
<td>S11</td>
<td>-0.457810</td>
<td>0.109259</td>
<td>-4.33735</td>
<td>0.0000</td>
</tr>
<tr>
<td>D2</td>
<td>0.131855</td>
<td>0.059259</td>
<td>2.225068</td>
<td>0.0294</td>
</tr>
<tr>
<td>D3</td>
<td>-0.393153</td>
<td>0.114439</td>
<td>-3.435495</td>
<td>0.0010</td>
</tr>
<tr>
<td>D4</td>
<td>0.415705</td>
<td>0.153307</td>
<td>2.711588</td>
<td>0.0085</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.279227</td>
<td>0.098855</td>
<td>-2.824615</td>
<td>0.0062</td>
</tr>
<tr>
<td>TREND</td>
<td>0.031040</td>
<td>0.007812</td>
<td>3.973232</td>
<td>0.0002</td>
</tr>
<tr>
<td>N6(-4)</td>
<td>0.368185</td>
<td>0.091971</td>
<td>4.003259</td>
<td>0.0002</td>
</tr>
</tbody>
</table>

R-squared 0.884971  Mean dependent var -0.447998
Adjusted R-squared 0.871236  S.D. dependent var 0.475560
S.E. of regression 0.170649  Akaike info criterion -3.425493
Sum squared resid 1.951109  Schwarz criterion -3.149485
Log likelihood 31.32942  F-statistic 64.43242
Durbin-Watson stat 1.445658  Prob(F-statistic) 0.000000

Breusch-Godfrey Serial Correlation LM Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Obs*R-squared</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.204673</td>
<td>1.861840</td>
<td>0.078540</td>
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</tbody>
</table>

White Heteroskedasticity Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Obs*R-squared</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.332119</td>
<td>9.332119</td>
<td>0.053313</td>
</tr>
</tbody>
</table>

Estimation Command:

**LS N6 C IN12 S11 D2 D3 D4 DM91 TREND N6(-4)**

**Estimation Equation:**

\[ N6 = C(1) + C(2)*IN12 + C(3)*S11 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*DM91 + C(8)*TREND + C(9)*N6(-4) \]
Substituted Coefficients:

\[ N_6 = -3.2388787 + 0.67268192*IN_{12} - 0.45780982*S_{11} + 0.13185539*D_{2} - 0.39315348*D_{3} + 0.41570506*D_{4} - 0.27922658*DM_{91} + 0.031040214*TREND + 0.36818517*N_{6(-4)} \]

Actual: \( N_6 \)  
Forecast: \( N_{6F} \)  
Sample: 1977:1 1995:4  
Include observations: 76  
Root Mean Squared Error 0.159656  
Mean Absolute Error 0.127786  
Mean Absolute Percentage Error 97.62235  
Theil Inequality Coefficient 0.125024  
Bias Proportion 0.000012  
Variance Proportion 0.047293  
Covariance Proportion 0.952695
1.2 MALTA INBOUND

1. AUSTRIA TO MALTA

LS // Dependent Variable is M1
Date: 01/12/98 Time: 17:12
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-39.50921</td>
<td>10.62445</td>
<td>-3.718708</td>
<td>0.0004</td>
</tr>
<tr>
<td>IN14</td>
<td>7.250067</td>
<td>2.017353</td>
<td>3.593851</td>
<td>0.0006</td>
</tr>
<tr>
<td>CL8</td>
<td>-0.674540</td>
<td>1.385837</td>
<td>-0.486738</td>
<td>0.6281</td>
</tr>
<tr>
<td>EX9</td>
<td>4.650966</td>
<td>1.703072</td>
<td>2.730928</td>
<td>0.0082</td>
</tr>
<tr>
<td>FF8</td>
<td>-7.477592</td>
<td>4.840798</td>
<td>-1.544702</td>
<td>0.1274</td>
</tr>
<tr>
<td>S6</td>
<td>0.902266</td>
<td>0.549068</td>
<td>1.643268</td>
<td>0.1053</td>
</tr>
<tr>
<td>D2</td>
<td>0.586535</td>
<td>0.168798</td>
<td>3.474779</td>
<td>0.0009</td>
</tr>
<tr>
<td>D3</td>
<td>-0.972957</td>
<td>0.335948</td>
<td>-2.748870</td>
<td>0.0078</td>
</tr>
<tr>
<td>D4</td>
<td>0.526714</td>
<td>0.053668</td>
<td>0.951319</td>
<td>0.3451</td>
</tr>
<tr>
<td>DM87</td>
<td>-0.367663</td>
<td>0.174873</td>
<td>-2.102456</td>
<td>0.0395</td>
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<tr>
<td>DM92</td>
<td>-0.022724</td>
<td>0.177008</td>
<td>-0.128376</td>
<td>0.8983</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.017501</td>
<td>0.010417</td>
<td>-1.680044</td>
<td>0.0979</td>
</tr>
<tr>
<td>M1(-4)</td>
<td>0.108835</td>
<td>0.121639</td>
<td>0.894743</td>
<td>0.3743</td>
</tr>
</tbody>
</table>

R-squared: 0.900839
Adjusted R-squared: 0.881951
S.E. of regression: 0.300390
Durbin-Watson stat: 1.811920

Mean dependent var: -1.687804
S.D. dependent var: 0.874287
Akaike info criterion: -2.250838
Schwarz criterion: -1.852160
F-statistic: 47.69398
Prob(F-statistic): 0.000000

2. DENMARK TO MALTA

LS // Dependent Variable is M2
Date: 01/14/98 Time: 10:26
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-0.432666</td>
<td>3.904963</td>
<td>-0.110799</td>
<td>0.9121</td>
</tr>
<tr>
<td>IN2</td>
<td>0.759419</td>
<td>0.705026</td>
<td>1.077149</td>
<td>0.2855</td>
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<tr>
<td>CL9</td>
<td>0.006828</td>
<td>0.950973</td>
<td>0.007180</td>
<td>0.9943</td>
</tr>
<tr>
<td>EX9</td>
<td>0.923913</td>
<td>0.815404</td>
<td>1.133074</td>
<td>0.2615</td>
</tr>
<tr>
<td>FF9</td>
<td>-8.021732</td>
<td>3.223129</td>
<td>-2.488803</td>
<td>0.0155</td>
</tr>
<tr>
<td>S7</td>
<td>0.972672</td>
<td>0.191738</td>
<td>5.072911</td>
<td>0.0000</td>
</tr>
<tr>
<td>D2</td>
<td>0.199746</td>
<td>0.086773</td>
<td>2.301935</td>
<td>0.0247</td>
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<tr>
<td>D3</td>
<td>-0.515575</td>
<td>0.137055</td>
<td>-3.282767</td>
<td>0.0017</td>
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<tr>
<td>D4</td>
<td>0.461293</td>
<td>0.210698</td>
<td>2.189355</td>
<td>0.0323</td>
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</table>
### 3. GERMANY TO MALTA

**LS // Dependent Variable is M3**

Date: 01/12/98  Time: 17:23  
Sample(adjusted): 1977:1 1995:4  
Included observations: 76 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-6.239968</td>
<td>2.390617</td>
<td>-2.610191</td>
<td>0.0113</td>
</tr>
<tr>
<td>IN4</td>
<td>0.894851</td>
<td>0.539739</td>
<td>1.657932</td>
<td>0.1023</td>
</tr>
<tr>
<td>CL10</td>
<td>-1.647191</td>
<td>0.622824</td>
<td>-2.644714</td>
<td>0.0103</td>
</tr>
<tr>
<td>EX10</td>
<td>-0.182088</td>
<td>0.558630</td>
<td>-0.325954</td>
<td>0.7455</td>
</tr>
<tr>
<td>FF10</td>
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<td>1.484974</td>
<td>-1.002318</td>
<td>0.3200</td>
</tr>
<tr>
<td>S8</td>
<td>-0.070197</td>
<td>0.255901</td>
<td>-0.274311</td>
<td>0.7847</td>
</tr>
<tr>
<td>D2</td>
<td>0.193800</td>
<td>0.071955</td>
<td>2.693362</td>
<td>0.0091</td>
</tr>
<tr>
<td>D3</td>
<td>-0.440218</td>
<td>0.137173</td>
<td>-3.209213</td>
<td>0.0021</td>
</tr>
<tr>
<td>D4</td>
<td>0.490408</td>
<td>0.071955</td>
<td>2.836086</td>
<td>0.0061</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.171424</td>
<td>0.102782</td>
<td>-1.667843</td>
<td>0.1003</td>
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<tr>
<td>DM95</td>
<td>-0.099946</td>
<td>0.104754</td>
<td>-0.954101</td>
<td>0.3437</td>
</tr>
<tr>
<td>TREND</td>
<td>0.018962</td>
<td>0.004285</td>
<td>4.425206</td>
<td>0.0000</td>
</tr>
<tr>
<td>M3(-4)</td>
<td>0.461333</td>
<td>0.110684</td>
<td>4.168029</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

- R-squared: 0.964738  
- Mean dependent var: -1.534386

### 4. ITALY TO MALTA

**LS // Dependent Variable is M4**

Date: 01/14/98  Time: 10:28  
Sample(adjusted): 1977:1 1995:4  
Included observations: 76 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>3.907074</td>
<td>3.676553</td>
<td>1.062700</td>
<td>0.2920</td>
</tr>
<tr>
<td>IN18</td>
<td>-0.020021</td>
<td>0.404254</td>
<td>-0.049525</td>
<td>0.9607</td>
</tr>
<tr>
<td>CL11</td>
<td>1.188321</td>
<td>0.243141</td>
<td>4.887380</td>
<td>0.0000</td>
</tr>
<tr>
<td>EX11</td>
<td>0.176595</td>
<td>0.401406</td>
<td>0.439941</td>
<td>0.6615</td>
</tr>
<tr>
<td>FF11</td>
<td>-4.368773</td>
<td>2.515886</td>
<td>-1.736475</td>
<td>0.0874</td>
</tr>
<tr>
<td>S9</td>
<td>-0.295424</td>
<td>0.175147</td>
<td>-1.686724</td>
<td>0.0966</td>
</tr>
<tr>
<td>D2</td>
<td>0.739322</td>
<td>0.119334</td>
<td>6.195394</td>
<td>0.0000</td>
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<tr>
<td>D3</td>
<td>-2.259450</td>
<td>0.340736</td>
<td>-6.631095</td>
<td>0.0000</td>
</tr>
<tr>
<td>D4</td>
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<td>0.400502</td>
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<tr>
<td>DM79</td>
<td>-0.114042</td>
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<td>0.2142</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.012030</td>
<td>0.090324</td>
<td>-0.133191</td>
<td>0.8945</td>
</tr>
<tr>
<td>TREND</td>
<td>0.037012</td>
<td>0.006453</td>
<td>5.735515</td>
<td>0.0000</td>
</tr>
<tr>
<td>M4(-4)</td>
<td>0.106643</td>
<td>0.128388</td>
<td>0.830636</td>
<td>0.4093</td>
</tr>
</tbody>
</table>

- R-squared: 0.969786  
- Mean dependent var: -1.820328
### 5. LIBYA TO MALTA

**LS // Dependent Variable is M5**  
**Date: 01/14/98**  
**Time: 10:31**  
**Sample(adjusted): 1977:2 1995:4**  
**Included observations: 75 after adjusting endpoints**  
**Convergence achieved after 12 iterations**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>7.070378</td>
<td>4.458155</td>
<td>1.585942</td>
<td>0.1178</td>
</tr>
<tr>
<td>IN7</td>
<td>-0.096074</td>
<td>0.347543</td>
<td>-0.276438</td>
<td>0.7831</td>
</tr>
<tr>
<td>CL12</td>
<td>-1.737642</td>
<td>0.726364</td>
<td>-2.392247</td>
<td>0.0197</td>
</tr>
<tr>
<td>EX12</td>
<td>0.451856</td>
<td>0.643287</td>
<td>0.702417</td>
<td>0.4850</td>
</tr>
<tr>
<td>D2</td>
<td>-0.088151</td>
<td>0.090067</td>
<td>-0.978728</td>
<td>0.3315</td>
</tr>
<tr>
<td>D3</td>
<td>-0.149485</td>
<td>0.174536</td>
<td>-0.856470</td>
<td>0.3950</td>
</tr>
<tr>
<td>D4</td>
<td>0.232604</td>
<td>0.241569</td>
<td>0.962887</td>
<td>0.3393</td>
</tr>
<tr>
<td>DM80</td>
<td>-0.160278</td>
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<td>0.5442</td>
</tr>
<tr>
<td>DM86</td>
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<td>0.261154</td>
<td>-1.192735</td>
<td>0.2374</td>
</tr>
<tr>
<td>TREND</td>
<td>0.017804</td>
<td>0.007333</td>
<td>2.428123</td>
<td>0.0180</td>
</tr>
<tr>
<td>M5(-4)</td>
<td>0.450259</td>
<td>0.119169</td>
<td>3.778336</td>
<td>0.0004</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.415827</td>
<td>0.112478</td>
<td>3.696962</td>
<td>0.0005</td>
</tr>
</tbody>
</table>

**R-squared**  
0.658753  
**Adj. R-squared**  
0.658753

<table>
<thead>
<tr>
<th>Mean dependent var</th>
<th>0.561101</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.D. dependent var</td>
<td>0.522358</td>
</tr>
<tr>
<td>Akaike info criterion</td>
<td>-2.067376</td>
</tr>
<tr>
<td>Schwarz criterion</td>
<td>-1.696578</td>
</tr>
</tbody>
</table>

**Log likelihood**  
-16.89380

**Durbin-Watson stat**  
1.952658

**Prob(F-statistic)**  
0.000000

**Inverted AR Roots**  
0.42

### 6. UK TO MALTA

**LS // Dependent Variable is M6**  
**Date: 01/14/98**  
**Time: 10:32**  
**Sample(adjusted): 1977:1 1995:4**  
**Included observations: 76 after adjusting endpoints**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-5.299078</td>
<td>1.892821</td>
<td>-2.799566</td>
<td>0.0068</td>
</tr>
<tr>
<td>IN21</td>
<td>1.520752</td>
<td>0.564911</td>
<td>2.692022</td>
<td>0.0091</td>
</tr>
<tr>
<td>CL13</td>
<td>0.316360</td>
<td>0.604614</td>
<td>0.523243</td>
<td>0.6026</td>
</tr>
<tr>
<td>EX13</td>
<td>1.182980</td>
<td>0.824923</td>
<td>1.434050</td>
<td>0.1565</td>
</tr>
<tr>
<td>FF13</td>
<td>0.201427</td>
<td>1.213222</td>
<td>0.594868</td>
<td>0.9247</td>
</tr>
<tr>
<td>S10</td>
<td>-0.392879</td>
<td>0.378618</td>
<td>-1.037667</td>
<td>0.3034</td>
</tr>
<tr>
<td>D2</td>
<td>0.557804</td>
<td>0.097021</td>
<td>5.749307</td>
<td>0.0000</td>
</tr>
<tr>
<td>D3</td>
<td>-1.386793</td>
<td>0.212548</td>
<td>-6.524621</td>
<td>0.0000</td>
</tr>
<tr>
<td>D4</td>
<td>1.704269</td>
<td>0.272355</td>
<td>6.257536</td>
<td>0.0000</td>
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<tr>
<td>DM78</td>
<td>-0.165651</td>
<td>0.118672</td>
<td>-1.395871</td>
<td>0.1677</td>
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<tr>
<td>DM82</td>
<td>-0.139789</td>
<td>0.112841</td>
<td>-1.238822</td>
<td>0.2200</td>
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<tr>
<td>TREND</td>
<td>0.005315</td>
<td>0.003499</td>
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<td>0.1337</td>
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<tr>
<td>M6(-4)</td>
<td>0.224778</td>
<td>0.100906</td>
<td>2.227600</td>
<td>0.0295</td>
</tr>
</tbody>
</table>

**R-squared**  
0.880139  
**Adjusted R-squared**  
0.880139

<table>
<thead>
<tr>
<th>Mean dependent var</th>
<th>0.495484</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.D. dependent var</td>
<td>0.503531</td>
</tr>
<tr>
<td>Akaike info criterion</td>
<td>-3.164785</td>
</tr>
<tr>
<td>Schwarz criterion</td>
<td>-2.766107</td>
</tr>
</tbody>
</table>

**Log likelihood**  
25.42250

**Durbin-Watson stat**  
11.05609

**Prob(F-statistic)**  
0.000000
## 7. USA TO MALTA

**Equation:**

\[ \text{Dependent Variable is M7} \]

**Date:** 01/14/98  Time: 10:34

**Sample(adjusted):** 1977:1 1995:4

**Included observations:** 76 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-12.03982</td>
<td>3.502097</td>
<td>-3.437890</td>
<td>0.0010</td>
</tr>
<tr>
<td>IN20</td>
<td>2.489506</td>
<td>0.743706</td>
<td>3.347433</td>
<td>0.0014</td>
</tr>
<tr>
<td>CL14</td>
<td>-1.443185</td>
<td>0.612143</td>
<td>-2.357593</td>
<td>0.0214</td>
</tr>
<tr>
<td>FF14</td>
<td>9.507264</td>
<td>2.081576</td>
<td>4.567340</td>
<td>0.0000</td>
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<tr>
<td>D2</td>
<td>0.226816</td>
<td>0.076873</td>
<td>2.950536</td>
<td>0.0044</td>
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<td>-0.489684</td>
<td>0.153986</td>
<td>-3.180061</td>
<td>0.0023</td>
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<tr>
<td>D4</td>
<td>0.603819</td>
<td>0.198997</td>
<td>3.034307</td>
<td>0.0035</td>
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<tr>
<td>DM79</td>
<td>-0.083926</td>
<td>0.124644</td>
<td>-0.673327</td>
<td>0.5031</td>
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<tr>
<td>DM91</td>
<td>-0.097590</td>
<td>0.101183</td>
<td>-0.964491</td>
<td>0.3384</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.012342</td>
<td>0.003297</td>
<td>-3.743036</td>
<td>0.0004</td>
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<tr>
<td>M7(-4)</td>
<td>0.647643</td>
<td>0.090964</td>
<td>7.119770</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

**R-squared:** 0.841088

**Adjusted R-squared:** 0.816640

**S.E. of regression:** 0.171973

**Akaike info criterion:** -3.387710

**Schwarz criterion:** -3.050367

**F-statistic:** 0.000000

**Durbin-Watson stat:** 1.548948

---

## 1. AUSTRIA TO MALTA:

**Equation:**

\[ \text{Dependent Variable is M1} \]

**Date:** 01/12/98  Time: 18:38

**Sample(adjusted):** 1977:1 1995:4

**Included observations:** 76 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-35.65973</td>
<td>6.284508</td>
<td>-5.674228</td>
<td>0.0000</td>
</tr>
<tr>
<td>IN14</td>
<td>6.893674</td>
<td>1.203109</td>
<td>5.729882</td>
<td>0.0000</td>
</tr>
<tr>
<td>EX8</td>
<td>4.510262</td>
<td>0.826178</td>
<td>5.459192</td>
<td>0.0000</td>
</tr>
<tr>
<td>FF8</td>
<td>-7.321217</td>
<td>2.686034</td>
<td>-2.725661</td>
<td>0.0082</td>
</tr>
<tr>
<td>D2</td>
<td>0.360451</td>
<td>0.076590</td>
<td>4.706251</td>
<td>0.0000</td>
</tr>
<tr>
<td>D3</td>
<td>-0.542404</td>
<td>0.089705</td>
<td>-6.046510</td>
<td>0.0000</td>
</tr>
<tr>
<td>DM87</td>
<td>-0.364370</td>
<td>0.160885</td>
<td>-2.264786</td>
<td>0.0268</td>
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<tr>
<td>TREND</td>
<td>-0.023654</td>
<td>0.006039</td>
<td>-3.916856</td>
<td>0.0002</td>
</tr>
<tr>
<td>M1(-4)</td>
<td>0.251963</td>
<td>0.095424</td>
<td>2.640464</td>
<td>0.0103</td>
</tr>
</tbody>
</table>

**R-squared:** 0.891914

**Adjusted R-squared:** 0.879009

**S.E. of regression:** 0.874287

**Akaike info criterion:** -2.269926

**Schwarz criterion:** -1.993918

**F-statistic:** 3.105996

**Durbin-Watson stat:** 1.802077

---

**Breusch-Godfrey Serial Correlation LM Test:**

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>0.021344</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>0.013882</td>
</tr>
</tbody>
</table>
White Heteroskedasticity Test:

- F-statistic: 1.969545, Probability: 0.035829
- Obs*R-squared: 23.65937, Probability: 0.050351

Estimation Command:

```
LS M1 IN14 EX8 FF8 D2 D3 DM87 TREND M1(-4)
```

Estimation Equation:

\[
M1 = C(1) + C(2)*IN14 + C(3)*EX8 + C(4)*FF8 + C(5)*D2 + C(6)*D3 + C(7)*DM87 + C(8)*TREND + C(9)*M1(-4)
\]

Substituted Coefficients:

\[
M1 = -35.659731 + 6.8936739*IN14 + 4.5102619*EX8 - 7.321217*FF8 + 0.36045135*D2 - 0.54240359*D3 - 0.36437034*DM87 - 0.023653778*TREND + 0.25196312*M1(-4)
\]

Actual: M1  
Forecast: M1F  
Sample: 1977:1 1995:4  
Include observations: 76

- Root Mean Squared Error: 0.279235
- Mean Absolute Error: 0.219583
- Mean Absolute Percentage Error: 19.46162
- Theil Inequality Coefficient: 0.074037
  - Bias Proportion: 0.000026
  - Variance Proportion: 0.043863
  - Covariance Proportion: 0.956111

2. DENMARK TO MALTA:

```
LS // Dependent Variable is M2  
Date: 01/12/98 Time: 19:32  
Included observations: 79 after adjusting endpoints  
Convergence achieved after 6 iterations
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1.261275</td>
<td>0.741484</td>
<td>1.701015</td>
<td>0.0932</td>
</tr>
<tr>
<td>FF9</td>
<td>-5.953345</td>
<td>2.259547</td>
<td>-2.634751</td>
<td>0.0103</td>
</tr>
<tr>
<td>D2</td>
<td>0.262953</td>
<td>0.058565</td>
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<td>0.0000</td>
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<td>D3</td>
<td>-0.710544</td>
<td>0.111243</td>
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<td>0.0000</td>
</tr>
<tr>
<td>D4</td>
<td>0.644126</td>
<td>0.151882</td>
<td>4.240978</td>
<td>0.0001</td>
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<tr>
<td>AR(1)</td>
<td>0.821171</td>
<td>0.066855</td>
<td>12.28280</td>
<td>0.0000</td>
</tr>
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</table>

- R-squared: 0.846787, Mean dependent var: -0.525488
- Adjusted R-squared: 0.836293, S.D. dependent var: 0.666926
- S.E. of regression: 0.269843, Akaike info criterion: -2.546920
- Sum squared resid: 0.315510, Schwarz criterion: -2.366962
- Log likelihood: -5.492793, F-statistic: 80.69222
Durbin-Watson stat 1.798462  Prob(F-statistic) 0.000000

Inverted AR Roots .82

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 2.230795  Probability 0.074552
Obs*R-squared 9.046488  Probability 0.059948

White Heteroskedasticity Test:
F-statistic 7.619640  Probability 0.000008
Obs*R-squared 27.09097  Probability 0.000055

Estimation Command:
LS M2 C FF9 D2 D3 D4  AR(1)

Estimation Equation:
M2 = C(1) + C(2)*FF9 + C(3)*D2 + C(4)*D3 + C(5)*D4 + [AR(1)=C(6)]

Substituted Coefficients:
M2 = 1.2612751 - 5.9533452*FF9 + 0.26295275*D2 - 0.7105437*D3 + 0.64412637*D4 + [AR(1)=0.82117092]
Actual: M2  Forecast: M2F
Include observations: 79

Root Mean Squared Error 0.436994
Mean Absolute Error 0.345371
Mean Absolute Percentage Error 180.4411
Theil Inequality Coefficient 0.285740
Bias Proportion 0.000009
Variance Proportion 0.269944
Covariance Proportion 0.730047

3. GERMANY TO MALTA:
LS // Dependent Variable is M3
Date: 01/13/98  Time: 17:57
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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</thead>
<tbody>
<tr>
<td>C</td>
<td>-6.699117</td>
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<td>-3.338309</td>
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</tr>
<tr>
<td>IN4</td>
<td>1.076691</td>
<td>0.328492</td>
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<td>0.0017</td>
</tr>
<tr>
<td>CL10</td>
<td>-1.649072</td>
<td>0.368735</td>
<td>-4.472240</td>
<td>0.0000</td>
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<tr>
<td>FF10</td>
<td>-2.237266</td>
<td>1.190414</td>
<td>-1.879401</td>
<td>0.0646</td>
</tr>
<tr>
<td>D2</td>
<td>0.186877</td>
<td>0.069779</td>
<td>2.678133</td>
<td>0.0093</td>
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<tr>
<td>D3</td>
<td>-0.438115</td>
<td>0.135165</td>
<td>-3.241336</td>
<td>0.0019</td>
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<tr>
<td>D4</td>
<td>0.477632</td>
<td>0.167569</td>
<td>2.850362</td>
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<tr>
<td>DM91</td>
<td>-0.183844</td>
<td>0.093391</td>
<td>-1.968536</td>
<td>0.0532</td>
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<tr>
<td>TREND</td>
<td>0.018225</td>
<td>0.003258</td>
<td>5.594107</td>
<td>0.0000</td>
</tr>
<tr>
<td>M3(-4)</td>
<td>0.472187</td>
<td>0.104868</td>
<td>4.502665</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared 0.964083  Mean dependent var -1.534386
Adjusted R-squared 0.959185 S.D. dependent var 0.807310
S.E. of regression 0.163098 Akaike info criterion -3.504726
Sum squared resid 1.755667 Schwarz criterion -3.198051
Log likelihood 35.34028 F-statistic 196.8410
Durbin-Watson stat 1.843039 Prob(F-statistic) 0.000000

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 1.742521 Probability 0.152023
Obs*R-squared 7.680523 Probability 0.104007

White Heteroskedasticity Test:
F-statistic 1.183415 Probability 0.310873
Obs*R-squared 16.23294 Probability 0.299357

Estimation Command:
LS M3 C IN4 CL10 FF10 D2 D3 D4 DM91 TREND M3(-4)

Estimation Equation:
M3 = C(1) + C(2)*IN4 + C(3)*CL10 + C(4)*FF10 + C(5)*D2 + C(6)*D3 + C(7)*D4 + C(8)*DM91 + C(9)*TREND + C(10)*M3(-4)

Substituted Coefficients:
M3 = -6.6991168 + 1.0766909*IN4 - 1.6490717*CL10 - 2.2372655*FF10 + 0.1868766*D2 - 0.43811546*D3 + 0.4776322*D4 - 0.18384387*DM91 + 0.018225098*TREND + 0.47218717*M3(-4)

Actual: M3  Forecast: M3F
Sample: 1977:1 1995:4
Include observations: 76

Root Mean Squared Error 0.162021
Mean Absolute Error 0.131226
Mean Absolute Percentage Error 11.30702
Theil Inequality Coefficient 0.046908
Bias Proportion 0.000157
Variance Proportion 0.019796
Covariance Proportion 0.980048
4. ITALY TO MALTA:
LS // Dependent Variable is M4
Date: 01/13/98 Time: 18:13
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-3.154992</td>
<td>0.789882</td>
<td>-3.994255</td>
<td>0.0002</td>
</tr>
<tr>
<td>IN18</td>
<td>0.195321</td>
<td>0.120112</td>
<td>1.626159</td>
<td>0.1086</td>
</tr>
<tr>
<td>S9</td>
<td>-0.274543</td>
<td>0.158281</td>
<td>-1.734522</td>
<td>0.0874</td>
</tr>
<tr>
<td>D2</td>
<td>0.499320</td>
<td>0.105744</td>
<td>4.721988</td>
<td>0.0000</td>
</tr>
<tr>
<td>D3</td>
<td>-1.508790</td>
<td>0.290202</td>
<td>-5.199097</td>
<td>0.0000</td>
</tr>
<tr>
<td>D4</td>
<td>1.742856</td>
<td>0.344966</td>
<td>5.052259</td>
<td>0.0000</td>
</tr>
<tr>
<td>DM86</td>
<td>-0.298945</td>
<td>0.092368</td>
<td>-3.236459</td>
<td>0.0019</td>
</tr>
<tr>
<td>TREND</td>
<td>0.010852</td>
<td>0.002046</td>
<td>5.304751</td>
<td>0.0000</td>
</tr>
<tr>
<td>M4(-4)</td>
<td>0.412770</td>
<td>0.106033</td>
<td>3.892857</td>
<td>0.0002</td>
</tr>
</tbody>
</table>

R-squared 0.961791 Mean dependent var -1.820328
Adjusted R-squared 0.957229 S.D. dependent var 0.794458
S.E. of regression 0.164304 Akaike info criterion -3.501278
Sum squared resid 1.808710 Schwarz criterion -3.225270
Log likelihood 34.20922 F-statistic 210.8144
Durbin-Watson stat 1.912672 Prob(F-statistic) 0.000000

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 1.956530 Probability 0.112067
Obs*R-squared 8.397820 Probability 0.078046

White Heteroskedasticity Test:
F-statistic 2.114227 Probability 0.028284
Obs*R-squared 21.81916 Probability 0.039597

Estimation Command:
LS M4 C IN18  S9 D2 D3 D4 DM86 TREND M4(-4)

Estimation Equation:
\[ M4 = C(1) + C(2) \cdot IN18 + C(3) \cdot S9 + C(4) \cdot D2 + C(5) \cdot D3 + C(6) \cdot D4 + C(7) \cdot DM86 + C(8) \cdot TREND + C(9) \cdot M4(-4) \]

Substituted Coefficients:

\[ M4 = -3.154992 + 0.19532076 \cdot IN18 - 0.27454264 \cdot S9 + 0.49932023 \cdot D2 - 1.5087904 \cdot D3 + 1.7428565 \cdot D4 - 0.29894479 \cdot DM86 + 0.010851922 \cdot TREND + 0.4127704 \cdot M4(-4) \]

---

5. LIBYA TO MALTA:

LS // Dependent Variable is M5

Date: 01/13/98 Time: 18:47
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints
Convergence achieved after 8 iterations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>6.913701</td>
<td>2.284557</td>
<td>3.026277</td>
<td>0.0035</td>
</tr>
<tr>
<td>CL12</td>
<td>-1.892360</td>
<td>0.637171</td>
<td>-2.969943</td>
<td>0.0041</td>
</tr>
<tr>
<td>D2</td>
<td>-0.163785</td>
<td>0.050945</td>
<td>-3.214930</td>
<td>0.0020</td>
</tr>
<tr>
<td>TREND</td>
<td>0.019069</td>
<td>0.005897</td>
<td>3.233568</td>
<td>0.0019</td>
</tr>
<tr>
<td>M5(-4)</td>
<td>0.404928</td>
<td>0.102830</td>
<td>3.937844</td>
<td>0.0002</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.396649</td>
<td>0.105455</td>
<td>3.761307</td>
<td>0.0004</td>
</tr>
</tbody>
</table>

R-squared 0.635615
Adjusted R-squared 0.610176
S.E. of regression 0.326139

Mean dependent var 0.561101
S.D. dependent var 0.522358
Akaike info criterion -2.164245
Sum squared resid 7.339297    Schwarz criterion -1.978846
Log likelihood -19.26120    F-statistic 24.16583
Durbin-Watson stat 1.877252  Prob(F-statistic) 0.000000

Inverted AR Roots .40

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 1.884348    Probability 0.123768
Obs*R-squared 7.793281 Probability 0.099451

White Heteroskedasticity Test:
F-statistic 3.656962    Probability 0.001399
Obs*R-squared 23.03460 Probability 0.003320

Estimation Command:
LS M5 C CL12 D2 TREND M5(-4) AR(1)

Estimation Equation:
M5 = C(1) + C(2)*CL12 + C(3)*D2 + C(4)*TREND + C(5)*M5(-4) + [AR(1)=C(6)]

Substituted Coefficients:
M5 = 6.9137015 - 1.8923602*CL12 - 0.16378505*D2 + 0.019069095 *TREND + 0.4049282l*M5(-4) + [AR(1)=0.39664866]

Actual: M5  Forecast: M5F
Sample: 1977:2 1995:4
Include observations: 75

Root Mean Squared Error 0.347447
Mean Absolute Error 0.241585
Mean Absolute Percentage Error 306.2585
Theil Inequality Coefficient 0.242847
  Bias Proportion 0.000418
  Variance Proportion 0.182256
  Covariance Proportion 0.817326

6. UK TO MALTA:
LS // Dependent Variable is M6
Date: 01/13/98 Time: 18:58
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints
Convergence achieved after 6 iterations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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</thead>
<tbody>
<tr>
<td>C</td>
<td>-4.444937</td>
<td>0.868957</td>
<td>-5.115256</td>
<td>0.0000</td>
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<tr>
<td>IN21</td>
<td>1.233077</td>
<td>0.223337</td>
<td>5.516221</td>
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<tr>
<td>EX13</td>
<td>1.462627</td>
<td>0.663567</td>
<td>2.204189</td>
<td>0.0311</td>
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<tr>
<td>S10</td>
<td>-0.600575</td>
<td>0.309267</td>
<td>-1.941929</td>
<td>0.0565</td>
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<tr>
<td>D2</td>
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<td>0.087813</td>
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<td>0.0000</td>
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<tr>
<td>D3</td>
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<td>D4</td>
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<td>0.252835</td>
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<td>0.0000</td>
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</table>
TREND  0.004736  0.003342  1.416974  0.1613
M6(-4)  0.182240  0.096798  1.882683  0.0642
AR(1)   0.200040  0.127118  1.573649  0.1204

R-squared  0.873280  Mean dependent var  0.510925
Adjusted R-squared  0.855734  S.D. dependent var  0.488473
S.E of regression  0.185533  Akaike info criterion  -3.245478
Sum squared resid  2.237465  Schwarz criterion  -2.936479
Log likelihood  25.28503  F-statistic  49.77144
Durbin-Watson stat  1.964795  Prob(F-statistic)  0.000000

Inverted AR Roots  .20

Breusch-Godfrey Serial Correlation LM Test:
F-statistic  3.113578  Probability  0.021351
Obs*R-squared  12.71638  Probability  0.012748

White Heteroskedasticity Test:
F-statistic  2.808799  Probability  0.003318
Obs*R-squared  28.08384  Probability  0.008809

Estimation Command:
LS M6 C IN21 EX13 S10 D2 D3 D4  TREND M6(-4) AR(1)

Estimation Equation:
M6 = C(1) + C(2)*IN21 + C(3)*EX13 + C(4)*S10 + C(5)*D2 + C(6)*D3 + C(7)*D4 + C(8)*TREND + C(9)*M6(-4) + [AR(1)=C(10)]

Substituted Coefficients:
M6 = -4.4449373 + 1.2330773*IN21 + 1.4626267*EX13 - 0.60057475*S10 + 0.56583008*D2 - 1.4197792*D3 + 1.737461*D4 + 0.0047362318*TREND + 0.18224034*M6(-4) + [AR(1)=0.20003965]

Actual: M6  Forecast: M6F
Sample: 1977:2 1995:4
Include observations: 75

Root Mean Squared Error  0.175817
Mean Absolute Error: 0.125839  
Mean Absolute Percentage Error: 120.5535  
Theil Inequality Coefficient: 0.127164  
Bias Proportion: 0.000044  
Variance Proportion: 0.047202  
Covariance Proportion: 0.952754  

7. USA TO MALTA:  
LS // Dependent Variable is M7  
Date: 01/13/98 Time: 20:19  
Sample(adjusted): 1977:2 1995:4  
Included observations: 75 after adjusting endpoints  
Convergence achieved after 10 iterations

<table>
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<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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</thead>
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<td>4.199904</td>
<td>-3.430652</td>
<td>0.0011</td>
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<tr>
<td>IN20</td>
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<td>2.878257</td>
<td>0.0054</td>
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<td>D2</td>
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<td>D3</td>
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<tr>
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<td>DM79</td>
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<td>-1.939392</td>
<td>0.0568</td>
</tr>
<tr>
<td>DM86</td>
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<td>-1.651026</td>
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<tr>
<td>TREND</td>
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<td>0.003621</td>
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<tr>
<td>Adjusted R-squared</td>
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<td>S.E. of regression</td>
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<td></td>
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</tr>
<tr>
<td>Sum squared resid</td>
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Inverted AR Roots .52

LS // Dependent Variable is M7  
Date: 01/13/98 Time: 20:19  
Sample(adjusted): 1977:2 1995:4  
Included observations: 75 after adjusting endpoints  
Convergence achieved after 10 iterations

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Prob.</th>
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<td>-14.40841</td>
<td>4.199904</td>
<td>-3.430652</td>
<td>0.0011</td>
</tr>
<tr>
<td>IN20</td>
<td>2.692717</td>
<td>0.935537</td>
<td>2.878257</td>
<td>0.0054</td>
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<tr>
<td>D2</td>
<td>0.327597</td>
<td>0.063601</td>
<td>5.150812</td>
<td>0.0000</td>
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<td>D3</td>
<td>-0.740611</td>
<td>0.137357</td>
<td>-5.391855</td>
<td>0.0000</td>
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<tr>
<td>D4</td>
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<td>0.113109</td>
<td>-1.939392</td>
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<td>DM86</td>
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<td>-1.651026</td>
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<td>TREND</td>
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<td>M7(-4)</td>
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<td>0.093330</td>
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<tr>
<td>AR(1)</td>
<td>0.520466</td>
<td>0.098532</td>
<td>5.282219</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared       | 0.887384 |
Adjusted R-squared| 0.871791 |
S.E. of regression | 0.143602 |
Sum squared resid | 1.340391 |
Log likelihood   | 44.49937 |
Durbin-Watson stat | 2.028273 |

Inverted AR Roots | .52 |

Breusch-Godfrey Serial Correlation LM Test:

| F-statistic | 0.459799 |
| Obs*R-squared | 2.195121 |
| Probability  | 0.764899 |
| Probability  | 0.699923 |

White Heteroskedasticity Test:

| F-statistic | 0.866344 |
| Obs*R-squared | 9.854351 |
| Probability  | 0.576704 |
| Probability  | 0.543534 |

Estimation Command:

```
LS M7 C IN20 D2 D3 D4 DM79 DM86 TREND M7(-4) AR(1)
```

Estimation Equation:

\[
M7 = C(1) + C(2) \times IN20 + C(3) \times D2 + C(4) \times D3 + C(5) \times D4 + C(6) \times DM79 + C(7) \times DM86 + C(8) \times TREND + C(9) \times M7(-4) + [AR(1)=C(10)]
\]

Substituted Coefficients:

\[
M7 = -14.408407 + 2.6927175 \times IN20 + 0.32759735 \times D2 - 0.74061148 \times D3 + 0.89975767 \times D4 - 0.21936244 \times DM79 - 0.17445497 \times DM86 - 0.0072606693 \times TREND + 0.45883728 \times M7(-4) + [AR(1)=0.52046591]
\]

![Graphical representation of residuals and fitted values](image)

Actual: M7  Forecast: M7F  
Sample: 1977:2 1995:4  
Include observations: 75

Root Mean Squared Error | 0.160071 |
Mean Absolute Error      | 0.119454 |
Mean Absolute Percentage Error | 2.477202 |
Theil Inequality Coefficient | 0.016681 |
Bias Proportion    | 0.000096 |
Variance Proportion | 0.146933 |
Covariance Proportion | 0.852071 |
1. UK TO IOM
LS // Dependent Variable is II
Date: 01/14/98 Time: 10:54
Sample(adjusted): 1986:1 1995:4
 Included observations: 40 after adjusting endpoints

<table>
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<tr>
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<td>EX15</td>
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<tr>
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R-squared 0.908274 Mean dependent var -0.811335
Adjusted R-squared 0.867508 S.D. dependent var 1.182129
S.E. of regression 0.430289 Akaike info criterion -1.429638
Sum squared resid 4.999017 Schwarz criterion -0.880752
Durbin-Watson stat 2.651983 Prob(F-statistic) 0.000000

2. EIRE TO IOM
LS // Dependent Variable is II
Date: 01/14/98 Time: 10:55
Sample(adjusted): 1986:1 1995:4
 Included observations: 35
 Excluded observations: 5 after adjusting endpoints

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R-squared 0.936947 Mean dependent var -0.811335
Adjusted R-squared 0.867508 S.D. dependent var 1.182129
S.E. of regression 0.483145 Akaike info criterion -1.429638
Sum squared resid 5.368867 Schwarz criterion -0.880752
Durbin-Watson stat 2.480962 Prob(F-statistic) 0.000000
Date: 01/15/98  Time: 14:21
Sample(adjusted): 1986:1 1995:4
Included observations: 40 after adjusting endpoints

<table>
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<tr>
<th>Variable</th>
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<th>Prob.</th>
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R-squared 0.895459  Mean dependent var -0.811335
Adjusted R-squared 0.880085  S.D. dependent var 1.82129
S.E. of regression 0.409375  Akaike info criterion -1.648856
Sum squared resid 5.697478  Schwarz criterion -1.395524
Log likelihood -17.78042  F-statistic 58.24602
Durbin-Watson stat 2.060376  Prob(F-statistic) 0.000000

Breusch-Godfrey Serial Correlation LM Test:

F-statistic 1.723235  Probability 0.170901
Obs*R-squared 7.473451  Probability 0.112886

White Heteroskedasticity Test:

F-statistic 4.520203  Probability 0.001902
Obs*R-squared 18.04436  Probability 0.006122

Estimation Command:

LS II C D2 D3 D4 DM88 II(-4)

Estimation Equation:

II = C(1) + C(2)*D2 + C(3)*D3 + C(4)*D4 + C(5)*DM88 + C(6)*II(-4)

Substituted Coefficients:

II = -1.3231675 + 1.4345087*D2 - 3.1472372*D3 + 3.4590906*D4 - 1.1231724*DM88 + 0.30120477*II(-4)

Actual: II  Forecast: II F

![Graph of data analysis results]
Sample: 1986:1 1995:4
Include observations: 40

Root Mean Squared Error 0.364189
Mean Absolute Error 0.233401
Mean Absolute Percentage Error 141.5828
Theil Inequality Coefficient 0.130940

Bias Proportion 0.000072
Variance Proportion 0.040969
Covariance Proportion 0.958959

2. EIRE TO IOM:

LS // Dependent Variable is I2
Date: 01/15/98 Time: 13:57
Included observations: 29
Excluded observations: 8 after adjusting endpoints
Convergence achieved after 6 iterations

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<tr>
<th>Variable</th>
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<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
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<td>0.2872</td>
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</table>

R-squared 0.951163
Adjusted R-squared 0.937844
S.E. of regression 0.991663
Sum squared resid 3.064346
Log likelihood -8.561021

Durbin-Watson stat 1.718573

Inverted AR Roots 0.58, -0.29+0.50i, -0.29-0.50i

Breusch-Godfrey Serial Correlation LM Test:

<table>
<thead>
<tr>
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<th>Probability</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>4.471209</td>
<td>0.345975</td>
</tr>
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</table>
White Heteroskedasticity Test:

F-statistic | 1.203633 | Probability | 0.341312
Obs*R-squared | 7.166983 | Probability | 0.305681

Estimation Command:

LS I2 C D2 D3 D4 DM91 I2(-4) AR(3)

Estimation Equation:

I2 = C(1) + C(2)*D2 + C(3)*D3 + C(4)*D4 + C(5)*DM91 + C(6)*I2(-4) + [AR(3)=C(7)]

Substituted Coefficients:

I2 = 3.8816864 + 1.4260207*D2 - 3.8376063*D3 + 4.0735168*D4 - 0.37200194*DM91 + 0.3383971*I2(-4) + [AR(3)=0.19485409]

---

1.4 AUSTRIA INBOUND

1. DENMARK TO AUSTRIA

LS // Dependent Variable is A1
Date: 01/11/98 Time: 17:57
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

<table>
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<th>t-Statistic</th>
<th>Prob.</th>
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<td>1.751622</td>
<td>-0.803726</td>
<td>0.4246</td>
</tr>
<tr>
<td>IN2</td>
<td>0.242285</td>
<td>0.242950</td>
<td>0.997262</td>
<td>0.3225</td>
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<tr>
<td>CL1</td>
<td>-0.334648</td>
<td>0.281845</td>
<td>-1.187348</td>
<td>0.2395</td>
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<tr>
<td>EX1</td>
<td>0.215096</td>
<td>0.387315</td>
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<td>0.5806</td>
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<tr>
<td>FF1</td>
<td>0.499701</td>
<td>0.590138</td>
<td>0.846752</td>
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<td>S1</td>
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<tr>
<td>D2</td>
<td>-0.105305</td>
<td>0.044668</td>
<td>-2.357508</td>
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<tr>
<td>D3</td>
<td>0.045114</td>
<td>0.059486</td>
<td>0.758395</td>
<td>0.4510</td>
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<tr>
<td>D4</td>
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<td>0.108996</td>
<td>-2.248401</td>
<td>0.0281</td>
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<tr>
<td>DM79</td>
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<td>-1.42960</td>
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<td>DM91</td>
<td>0.023406</td>
<td>0.055431</td>
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<td>0.002863</td>
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<td>A1(-4)</td>
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R-squared 0.983582  Mean dependent var 1.937285
Adjusted R-squared 0.980455  S.D. dependent var 0.708584
S.E. of regression 0.099062  Akaike info criterion -4.469519
Sum squared resid 75.00240  Schwarz criterion -4.070841
Log likelihood 2.156786  F-statistic 314.5301
Durbin-Watson stat 0.000000

2. FRANCE TO AUSTRIA:

LS // Dependent Variable is A2
Date: 01/11/98  Time: 18:10
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

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<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
<tr>
<td>C</td>
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<tr>
<td>IN3</td>
<td>1.797980</td>
<td>0.454420</td>
<td>3.956651</td>
<td>0.0002</td>
</tr>
<tr>
<td>CL2</td>
<td>-1.781155</td>
<td>0.498309</td>
<td>-3.57440</td>
<td>0.0007</td>
</tr>
<tr>
<td>EX2</td>
<td>-1.508194</td>
<td>0.673697</td>
<td>-2.238682</td>
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</tr>
<tr>
<td>FF2</td>
<td>-0.731395</td>
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<td>S2</td>
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<td>0.184368</td>
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<td>D2</td>
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<td>D3</td>
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<td>-4.812040</td>
<td>0.0000</td>
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<td>D4</td>
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<td>0.4578</td>
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<td>0.501818</td>
<td>0.102919</td>
<td>4.875830</td>
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</table>

R-squared 0.980455  Mean dependent var 1.937285
Adjusted R-squared 0.980455  S.D. dependent var 0.708584
S.E. of regression 0.099062  Akaike info criterion -4.469519
Sum squared resid 75.00240  Schwarz criterion -4.070841
Log likelihood 2.156786  F-statistic 314.5301
Durbin-Watson stat 0.000000

3. UK TO AUSTRIA:

LS // Dependent Variable is A3
Date: 01/11/98  Time: 18:17
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

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<th>Variable</th>
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<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
<tr>
<td>C</td>
<td>-1.687097</td>
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<td>0.3577</td>
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R-squared 0.980455  Mean dependent var 1.937285
Adjusted R-squared 0.980455  S.D. dependent var 0.708584
S.E. of regression 0.099062  Akaike info criterion -4.469519
Sum squared resid 75.00240  Schwarz criterion -4.070841
Log likelihood 2.156786  F-statistic 314.5301
Durbin-Watson stat 0.000000
4. CANADA TO AUSTRIA:

LS // Dependent Variable is $A_4$

Date: 01/11/98 Time: 20:22
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

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<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tr>
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<td>1.223400</td>
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<td>0.0000</td>
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<tr>
<td>$IN_{15}$</td>
<td>1.097388</td>
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<tr>
<td>$CL_{4}$</td>
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<td>-2.709323</td>
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<tr>
<td>$EX_{4}$</td>
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<td>$FF_{4}$</td>
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<td>0.2082</td>
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<td>D2</td>
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<tr>
<td>D3</td>
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<tr>
<td>D4</td>
<td>0.814734</td>
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<tr>
<td>$DM_{79}$</td>
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<td>0.097946</td>
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<td>$DM_{91}$</td>
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<td>$A_{4(-4)}$</td>
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</table>

R-squared: 0.976776
Adjusted R-squared: 0.972353
S.D. dependent var: 0.901715
Akaike info criterion: -4.397523
Schwarz criterion: -3.998845
F-statistic: 220.8130
Prob(F-statistic): 0.000000

5. NETHERLANDS TO AUSTRIA:

LS // Dependent Variable is $A_5$

Date: 01/11/98 Time: 20:38
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

<table>
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<td>$IN_{9}$</td>
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<td>$CL_{5}$</td>
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<td>0.6585</td>
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<td>$EX_{5}$</td>
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<td>$FF_{5}$</td>
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<td>S4</td>
<td>-0.102035</td>
<td>0.067409</td>
<td>-1.513659</td>
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R-squared: 0.947995
Adjusted R-squared: 0.939057
S.D. dependent var: -0.506361
Akaike info criterion: -3.856619
Schwarz criterion: -3.488609
F-statistic: 106.0599
Prob(F-statistic): 0.000000
### 6. USA TO AUSTRIA:

**LS // Dependent Variable is A**

- **Date:** 01/11/98  Time: 21:32
- **Sample(adjusted):** 1977:1 1995:4
- **Included observations:** 76 after adjusting endpoints

<table>
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<th>Prob.</th>
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<td>C</td>
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<td>0.1420</td>
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<tr>
<td>CL6</td>
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<td>1.206007</td>
<td>0.673275</td>
<td>0.5032</td>
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<tr>
<td>EX6</td>
<td>0.396673</td>
<td>0.429931</td>
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<tr>
<td>D2</td>
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<td>0.0001</td>
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<tr>
<td>D4</td>
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<td>0.402787</td>
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<tr>
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<td>A6(-4)</td>
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<td>2.564712</td>
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</table>

**R-squared** 0.988492  **Mean dependent var** 2.825736
- **Adjusted R-squared** 0.986300  **S.D. dependent var** 0.690558
- **S.E. of regression** 0.080827  **Akaike info criterion** -4.876394
- **Sum squared resid** 0.411574  **Schwarz criterion** -4.477116
- **Log likelihood** 90.46363  **F-statistic** 450.9679
- **Durbin-Watson stat** 2.547827  **Prob(F-statistic)** 0.000000

### 7. TURKEY TO AUSTRIA:

**LS // Dependent Variable is A**

- **Date:** 01/14/98  Time: 10:21
- **Sample(adjusted):** 1977:1 1995:4
- **Included observations:** 76 after adjusting endpoints

<table>
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<th>Prob.</th>
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<tbody>
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<td>0.609596</td>
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<td>IN12</td>
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<td>0.384203</td>
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<td>0.0504</td>
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<td>EX7</td>
<td>0.273576</td>
<td>0.270708</td>
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<tr>
<td>FF7</td>
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<td>-3.616364</td>
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**R-squared** 0.917627  **Mean dependent var** -0.619434
- **Adjusted R-squared** 0.901937  **S.D. dependent var** 0.592479
- **S.E. of regression** 0.185535  **Akaike info criterion** -3.214520
- **Sum squared resid** 2.168657  **Schwarz criterion** -2.815842
- **Log likelihood** 27.31244  **F-statistic** 58.48549
- **Durbin-Watson stat** 1.225432  **Prob(F-statistic)** 0.000000
1. DENMARK TO AUSTRIA:

LS: Dependent Variable is A1

Date: 01/11/98 Time: 19:23


Included observations: 76 after adjusting endpoints

<table>
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<th>Prob.</th>
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<tbody>
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<td>0.1100</td>
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<td>D2</td>
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<td>-2.542652</td>
<td>0.0132</td>
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<td>D4</td>
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<td>0.0377</td>
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<td>0.061819</td>
<td>13.55607</td>
<td>0.0000</td>
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</table>

R-squared 0.982576 Mean dependent var 1.937285
Adjusted R-squared 0.981061 S.D. dependent var 0.708584
S.E. of regression 0.097516 Akaike info criterion -4.567901
Sum squared resid 0.656142 Schwarz criterion -4.353228
Log likelihood 72.74090 F-statistic 648.4998
Durbin-Watson stat 2.093829 Prob(F-statistic) 0.000000

Breusch-Godfrey Serial Correlation LM Test:

<table>
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<tr>
<th>F-statistic</th>
<th>Obs*R-squared</th>
<th>Probability</th>
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<tbody>
<tr>
<td>1.402152</td>
<td>6.036858</td>
<td>0.243154</td>
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</table>

White Heteroskedasticity Test:

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<tr>
<th>F-statistic</th>
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<th>Probability</th>
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</thead>
<tbody>
<tr>
<td>1.351063</td>
<td>14.32240</td>
<td>0.218283</td>
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</tbody>
</table>

Estimation Command:

LS A1 C IN2 CL1 D2 D4 TREND A1(-4)

Estimation Equation:

A1 = C(1) + C(2)*IN2 + C(3)*CL1 + C(4)*D2 + C(5)*D4 + C(6)*TREND + C(7)*A1(-4)

Substituted Coefficients:

A1 = -1.6729491 + 0.33263867*IN2 - 0.33331421*CL1 - 0.095789887*D2 - 0.21765488*D4 - 0.0034708669*TREND + 0.83802846*A1(-4)
Actual: A1  Forecast: A1F  
Sample: 1977:1 1995:4  
Include observations: 76  

Root Mean Squared Error  0.133447  
Mean Absolute Error  0.106238  
Mean Absolute Percentage Error  5.989570  
Theil Inequality Coefficient  0.032412  
Bias Proportion  0.000158  
Variance Proportion  0.022555  
Covariance Proportion  0.977286  

2. FRANCE TO AUSTRIA:  

LS // Dependent Variable is A2  
Date: 01/11/98  Time: 19:34  
Sample(adjusted): 1977:1 1995:4  
Included observations: 76 after adjusting endpoints  

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
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<tbody>
<tr>
<td>C</td>
<td>-11.65522</td>
<td>2.964923</td>
<td>-3.931036</td>
<td>0.0002</td>
</tr>
<tr>
<td>IN3</td>
<td>1.550279</td>
<td>0.390996</td>
<td>3.964946</td>
<td>0.0002</td>
</tr>
<tr>
<td>CL2</td>
<td>-1.835692</td>
<td>0.433844</td>
<td>-4.231229</td>
<td>0.0001</td>
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<tr>
<td>EX2</td>
<td>-1.659150</td>
<td>0.530730</td>
<td>-3.126166</td>
<td>0.0026</td>
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<tr>
<td>D2</td>
<td>0.306381</td>
<td>0.085740</td>
<td>3.573365</td>
<td>0.0007</td>
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<td>D3</td>
<td>-1.195078</td>
<td>0.254735</td>
<td>-4.691459</td>
<td>0.0000</td>
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<tr>
<td>D4</td>
<td>0.843622</td>
<td>0.207410</td>
<td>4.067421</td>
<td>0.0001</td>
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<tr>
<td>A2(-4)</td>
<td>0.523387</td>
<td>0.100676</td>
<td>5.198734</td>
<td>0.0000</td>
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<tr>
<td>R-squared</td>
<td>0.975405</td>
<td>Mean dependent var 0.662342</td>
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<tr>
<td>Adjusted R-squared</td>
<td>0.972873</td>
<td>S.D. dependent var 0.878488</td>
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<tr>
<td>S.E. of regression</td>
<td>0.144690</td>
<td>Akaike info criterion -3.767028</td>
<td></td>
<td></td>
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<tr>
<td>Sum squared resid</td>
<td>1.423585</td>
<td>Schwarz criterion -3.521688</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>43.30775</td>
<td>F-statistic 385.2524</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durbin-Watson stat</td>
<td>1.804170</td>
<td>Prob(F-statistic) 0.000000</td>
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<td></td>
</tr>
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</table>

Breusch-Godfrey Serial Correlation LM Test:  

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>2.169540</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>9.074806</td>
</tr>
</tbody>
</table>
White Heteroskedasticity Test:

F-statistic : 3.231927
Obs*R-squared : 27.14072
Probability : 0.001497

Estimation Command:

LS A2 C IN3 CL2 EX2 D2 D3 D4 A2(-4)

Estimation Equation:

A2 = C(1) + C(2)*IN3 + C(3)*CL2 + C(4)*EX2 + C(5)*D2 + C(6)*D3 + C(7)*D4 + C(8)*A2(-4)

Substituted Coefficients:

A2 = -11.65522 + 1.5502793*IN3 - 1.8356917*CL2 - 1.6591502*EX2 + 0.30638074*D2 - 1.1950784*D3 + 0.84362202*D4 + 0.52338735*A2(-4)

Actual: A2  Forecast: A2F
Sample: 1977:1 1995:4
Include observations: 76

Root Mean Squared Error: 0.154472
Mean Absolute Error: 0.114535
Mean Absolute Percentage Error: 44.63780
Theil Inequality Coefficient:
  Bias Proportion: 0.001425
  Variance Proportion: 0.019879
  Covariance Proportion: 0.978696

3. UK TO AUSTRIA:

LS // Dependent Variable is A3
Date: 01/11/98  Time: 22:41
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints
Convergence achieved after 6 iterations
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-0.504847</td>
<td>0.469074</td>
<td>-1.076262</td>
<td>0.2856</td>
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<tr>
<td>IN21</td>
<td>0.193576</td>
<td>0.125702</td>
<td>1.539966</td>
<td>0.1282</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.152150</td>
<td>0.066860</td>
<td>-2.275644</td>
<td>0.0260</td>
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<tr>
<td>TREND</td>
<td>-0.003572</td>
<td>0.001100</td>
<td>-3.246529</td>
<td>0.0018</td>
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<tr>
<td>A3(-4)</td>
<td>0.963967</td>
<td>0.022383</td>
<td>43.06689</td>
<td>0.0000</td>
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<tr>
<td>AR(2)</td>
<td>0.385306</td>
<td>0.106787</td>
<td>3.608187</td>
<td>0.0006</td>
</tr>
</tbody>
</table>

R-squared                     0.968183  Mean dependent var 0.919209
Adjusted R-squared            0.965843  S.D. dependent var 0.615923
S.E. of regression            0.113832  Akaike info criterion -4.268464
Sum squared resid             0.881121  Schwarz criterion -4.081648
Log likelihood                58.93171  F-statistic 413.8441
Durbin-Watson stat            1.613501  Prob(F-statistic) 0.000000

Inverted AR Roots            .62     -.62

Breusch-Godfrey Serial Correlation LM Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Obs*R-squared</th>
<th>Probability</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.468095</td>
<td>9.889437</td>
<td>0.053540</td>
<td>0.042332</td>
</tr>
</tbody>
</table>

White Heteroskedasticity Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Obs*R-squared</th>
<th>Probability</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.815230</td>
<td>11.94676</td>
<td>0.098937</td>
<td>0.102323</td>
</tr>
</tbody>
</table>

Estimation Command:

LS A3 C IN21 DM91 TREND A3(-4) AR(2)

Estimation Equation:

A3 = C(1) + C(2)*IN21 + C(3)*DM91 + C(4)*TREND + C(5)*A3(-4) + [AR(2)=C(6)]

Substituted Coefficients:

A3 = -0.5048469 + 0.19357613*IN21 - 0.15214999*DM91 -0.0035718027*TREND + 0.96396658*A3(-4) + [AR(2)=0.38530607]

Actual: A3  Forecast: A3F
Sample: 1977:3 1995:4
Include observations: 74

Root Mean Squared Error 0.243911
Mean Absolute Error 0.185217
Mean Absolute Percentage Error 175.8161
Theil Inequality Coefficient 0.114119
   Bias Proportion 0.002039
   Variance Proportion 0.238604
   Covariance Proportion 0.759357

4. CANADA TO AUSTRIA:
   LS // Dependent Variable is A4
Date: 01/11/98 Time: 20:25
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints
Convergence achieved after 6 iterations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-6.088356</td>
<td>2.247720</td>
<td>-2.708681</td>
<td>0.0086</td>
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<tr>
<td>IN15</td>
<td>1.235342</td>
<td>0.495490</td>
<td>2.493170</td>
<td>0.0152</td>
</tr>
<tr>
<td>CL4</td>
<td>-0.384408</td>
<td>0.381448</td>
<td>-1.007759</td>
<td>0.3173</td>
</tr>
<tr>
<td>D2</td>
<td>0.430078</td>
<td>0.091723</td>
<td>4.68897</td>
<td>0.0000</td>
</tr>
<tr>
<td>D3</td>
<td>-1.154558</td>
<td>0.240937</td>
<td>-4.791946</td>
<td>0.0000</td>
</tr>
<tr>
<td>D4</td>
<td>1.196756</td>
<td>0.253952</td>
<td>4.712537</td>
<td>0.0000</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.176424</td>
<td>0.101983</td>
<td>-1.729942</td>
<td>0.0883</td>
</tr>
<tr>
<td>A4(-4)</td>
<td>0.394610</td>
<td>0.120176</td>
<td>3.283592</td>
<td>0.0016</td>
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<tr>
<td>AR(1)</td>
<td>0.705344</td>
<td>0.094850</td>
<td>7.436424</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared 0.952847
Adjusted R-squared 0.947131
S.E. of regression 0.126132
Akaike info criterion 0.395083
Schwarz criterion 0.264504
F-statistic 166.7117
Prob(F-statistic) 0.000000

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 1.396234
Obs*R-squared 6.197687
Probability 0.245727
Probability 0.184863

White Heteroskedasticity Test:
F-statistic 1.430897
Obs*R-squared 13.70434
Probability 0.187338
Probability 0.186910

Estimation Equation:
LS A4 C IN15 CL4 D2 D3 D4 DM91 A4(-4) AR(1)
A4 = C(1) + C(2)*IN15 + C(3)*CL4 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*DM91 + C(8)*A4(-4) + [AR(1)=C(9)]

Substituted Coefficients:
A4 = -6.0883563 + 1.2353417*IN15 - 0.38440787*CL4 + 0.43007841*D2 - 1.1545583*D3 + 1.1967565*D4 + 0.1764243*DM91 + 0.3946104*A4(-4) + [AR(1)=0.7053444]

Estimation Command:
LS A4 C IN15 CL4 D2 D3 D4 DM91 A4(-4) AR(1)

Estimation Equation:
A4 = C(1) + C(2)*IN15 + C(3)*CL4 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*DM91 + C(8)*A4(-4) + [AR(1)=C(9)]

Substituted Coefficients:
A4 = -6.0883563 + 1.2353417*IN15 - 0.38440787*CL4 + 0.43007841*D2 - 1.1545583*D3 + 1.1967565*D4 + 0.1764243*DM91 + 0.3946104*A4(-4) + [AR(1)=0.7053444]

Actual: A4  Forecast: A4F
Sample: 1977:2 1995:4
Include observations: 75

Root Mean Squared Error 0.199100
Mean Absolute Error 0.155768
Mean Absolute Percentage Error 72.86518
Theil Inequality Coefficient 0.135784
  Bias Proportion 0.007928
  Variance Proportion 0.029282
  Covariance Proportion 0.962791

5. NETHERLANDS TO AUSTRIA:
LS // Dependent Variable is A5
Date: 01/11/98 Time: 20:48
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints
Convergence achieved after 7 iterations

<table>
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<tr>
<th>Variable</th>
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<th>t-Statistic</th>
<th>Prob.</th>
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</thead>
<tbody>
<tr>
<td>C</td>
<td>2.525864</td>
<td>1.298188</td>
<td>1.945684</td>
<td>0.0561</td>
</tr>
<tr>
<td>IN9</td>
<td>0.062118</td>
<td>0.033333</td>
<td>1.863571</td>
<td>0.0670</td>
</tr>
<tr>
<td>EX5</td>
<td>1.108553</td>
<td>0.701274</td>
<td>1.580770</td>
<td>0.1189</td>
</tr>
<tr>
<td>D2</td>
<td>-0.245039</td>
<td>0.060631</td>
<td>-4.041505</td>
<td>0.0001</td>
</tr>
<tr>
<td>D3</td>
<td>0.271350</td>
<td>0.068605</td>
<td>3.955246</td>
<td>0.0002</td>
</tr>
<tr>
<td>D4</td>
<td>-0.529553</td>
<td>0.133347</td>
<td>-3.971249</td>
<td>0.0002</td>
</tr>
<tr>
<td>DM82</td>
<td>-0.078632</td>
<td>0.039200</td>
<td>-2.005897</td>
<td>0.0491</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.003847</td>
<td>0.001166</td>
<td>-3.300194</td>
<td>0.0016</td>
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<td>A5(-4)</td>
<td>0.827339</td>
<td>0.053416</td>
<td>15.48850</td>
<td>0.0000</td>
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</table>

38
AR(2)  -0.199622  0.127306  -1.568044  0.1218

R-squared 0.988441  Mean dependent var 2.832079
Adjusted R-squared 0.986816  S.D. dependent var 0.698798
S.E. of regression 0.080238  Akaike info criterion -4.920440
Sum squared resid 0.412036  Schwarz criterion -4.609080
R-squared 0.988441  Mean dependent var 2.832079
Adjusted R-squared 0.986816  S.D. dependent var 0.698798
S.E. of regression 0.080238  Akaike info criterion -4.920440
Sum squared resid 0.412036  Schwarz criterion -4.609080

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 2.993279  Probability 0.025521
Obs*R-squared 12.31030  Probability 0.015187

White Heteroskedasticity Test:
F-statistic 1.631613  Probability 0.106443
Obs*R-squared 17.98069  Probability 0.116278

Estimation Command:
LS A5 C IN9 EX5 D2 D3 D4 DM82 TREND A5(-4) AR(2)

Estimation Equation:
A5 = C(1) + C(2)*IN9 + C(3)*EX5 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*DM82 + C(8)*TREND + C(9)*A5(-4) + [AR(2)=-0.19962186]

Substituted Coefficients:
A5 = 2.5258638 + 0.06211775*IN9 + 1.1085526*EX5 - 0.24503908*D2 + 0.27135045*D3 - 0.52955328*D4 - 0.078632116*DM82 - 0.0038468462*TREND + 0.82733878*A5(-4) + [AR(2)=-0.19962186]
Bias Proportion 0.000049
Variance Proportion 0.047313
Covariance Proportion 0.952638

6. USA TO AUSTRIA:
LS // Dependent Variable is A6
Date: 01/11/98 Time: 21:52
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints
Convergence achieved after 12 iterations

<table>
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<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
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<td>C</td>
<td>0.367487</td>
<td>0.480275</td>
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<td>0.4469</td>
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<td>FF6</td>
<td>-6.934382</td>
<td>2.942768</td>
<td>-2.356414</td>
<td>0.0214</td>
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<tr>
<td>D2</td>
<td>0.620373</td>
<td>0.118512</td>
<td>5.234690</td>
<td>0.0000</td>
</tr>
<tr>
<td>D3</td>
<td>-1.545601</td>
<td>0.290567</td>
<td>-5.319260</td>
<td>0.0000</td>
</tr>
<tr>
<td>D4</td>
<td>1.759729</td>
<td>0.336132</td>
<td>5.235235</td>
<td>0.0000</td>
</tr>
<tr>
<td>DM86</td>
<td>-0.283888</td>
<td>0.124740</td>
<td>-2.275843</td>
<td>0.0261</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.383356</td>
<td>0.128700</td>
<td>-2.978681</td>
<td>0.0040</td>
</tr>
<tr>
<td>A6(-4)</td>
<td>0.318646</td>
<td>0.121452</td>
<td>2.623629</td>
<td>0.0108</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.464583</td>
<td>0.111178</td>
<td>4.178733</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

R-squared 0.926436
Adjusted R-squared 0.917519
S.E. of regression 0.168926
Sum squared resid 1.883385
Log likelihood 31.74527

$R^2 = 0.926436$
$\text{Adjusted } R^2 = 0.917519$
$\text{S.E. of regression} = 0.168926$
$\text{Sum squared resid} = 1.883385$
$\text{Log likelihood} = 31.74527$

Breusch-Godfrey Serial Correlation LM Test:

F-statistic 1.256234
Prob(F-statistic) 0.296817

White Heteroskedasticity Test:

F-statistic 2.409280
Prob(F-statistic) 0.019980

Estimation Command:

LS A6 C FF6 D2 D3 D4 DM86 DM91 A6(-4) AR(1)

Estimation Equation:

$A6 = C(1) + C(2)\cdot FF6 + C(3)\cdot D2 + C(4)\cdot D3 + C(5)\cdot D4 + C(6)\cdot DM86 + C(7)\cdot DM91 + C(8)\cdot A6(-4) + [AR(1)=C(9)]$

Substituted Coefficients:

$A6 = 0.36748708 - 6.9343816\cdot FF6 + 0.62037322\cdot D2 - 1.545601\cdot D3 + 1.7597293\cdot D4 - 0.28388829\cdot DM86 - 0.38335571\cdot DM91 + 0.31864617\cdot A6(-4) + [AR(1)=0.4645834]$
Actual: A6  Forecast: A6F
Sample: 1977:2 1995:4
Include observations: 75

Root Mean Squared Error  0.186422
Mean Absolute Error  0.151645
Mean Absolute Percentage Error  64.36046
Theil Inequality Coefficient  0.112025
  Bias Proportion  0.000243
  Variance Proportion  0.037870
  Covariance Proportion  0.961886

7. TURKEY TO AUSTRIA:
LS // Dependent Variable is A7
Date: 01/11/98  Time: 22:26
Included observations: 79 after adjusting endpoints
Convergence achieved after 5 iterations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-3.347899</td>
<td>0.496491</td>
<td>-6.743126</td>
<td>0.0000</td>
</tr>
<tr>
<td>IN12</td>
<td>0.498871</td>
<td>0.164533</td>
<td>3.032039</td>
<td>0.0034</td>
</tr>
<tr>
<td>DM79</td>
<td>-0.301906</td>
<td>0.170810</td>
<td>-1.767501</td>
<td>0.0814</td>
</tr>
<tr>
<td>D3</td>
<td>-0.365714</td>
<td>0.049180</td>
<td>-7.436287</td>
<td>0.0000</td>
</tr>
<tr>
<td>D4</td>
<td>0.376631</td>
<td>0.085826</td>
<td>4.388337</td>
<td>0.0000</td>
</tr>
<tr>
<td>TREND</td>
<td>0.040261</td>
<td>0.016523</td>
<td>2.436717</td>
<td>0.0173</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.533150</td>
<td>0.100123</td>
<td>5.524686</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared  0.724372  Mean dependent var  -2.156301
Adjusted R-squared  0.701403  S.D. dependent var  0.383082
S.E. of regression  0.209332  Akaike info criterion  -3.043239
Sum squared resid  3.155017  Schwarz criterion  -2.833288
Log likelihood  15.11179  F-statistic  31.53698
Durbin-Watson stat  1.706170  Prob(F-statistic)  0.000000

Inverted AR Roots  .55

Breusch-Godfrey Serial Correlation LM Test:
F-statistic  7.110539  Probability  0.000076
Obs*R-squared  23.29822  Probability  0.000110

White Heteroskedasticity Test:
F-statistic  1.624767  Probability  0.142485
Obs*R-squared  10.90761  Probability  0.142700

Estimation Command:

LS A7 C IN12 DM79 D3 D4 TREND  AR(1)

Estimation Equation:
A7 = C(1) + C(2)*IN12 + C(3)*DM79 + C(4)*D3 + C(5)*D4 + C(6)*TREND + [AR(1)=C(7)]

Substituted Coefficients:

A7 = -3.34878993 + 0.49887062*IN12 - 0.30190596*DM79 - 0.3657142*D3 + 0.3766313*D4 + 0.040261466*TREND + [AR(1)=0.55315026]

Actual: A7  Forecast: A7F
Include observations: 79

Root Mean Squared Error 0.237977
Mean Absolute Error 0.180743
Mean Absolute Percentage Error 9.387518
Theil Inequality Coefficient 0.054505
  Bias Proportion 0.000021
  Variance Proportion 0.151943
  Covariance Proportion 0.848036

1.5 UK INBOUNDS

1. USA TO UK
LS // Dependent Variable is U1
Date: 01/14/98  Time: 10:46
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

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Adjusted R-squared 0.902767  S.D. dependent var 0.400685
S.E. of regression 0.124942  Akaike info criterion -4.015868
Sum squared resid 3.647857  Schwarz criterion 64.30394
Log likelihood 56.76364  F-statistic 0.000000
Durbin-Watson stat 1.138051  Prob(F-statistic) 2.608758

2. GERMANY TO UK
LS // Dependent Variable is U2
Date: 01/14/98  Time: 10:47
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

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**AUSTRIA TO UK**

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**FRANCE TO UK**

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5. JAPAN TO UK

LS // Dependent Variable is U5
Date: 01/13/98  Time: 12:46
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

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6. FINLAND TO UK

LS // Dependent Variable is U6
Date: 01/14/98  Time: 10:51
Sample(adjusted): 1978:1 1995:4
Included observations: 72 after adjusting endpoints

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R-squared: 0.514852
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Mean dependent var: 1.372654
S.D. dependent var: 0.796059
7. SPAIN TO UK

LS // Dependent Variable is U7
Date: 01/14/98 Time: 10:51
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

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Akaike info criterion 2.328275
Schwarz criterion 0.352413
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Prob(F-statistic) 0.5295

8. IOM TO UK

LS // Dependent Variable is U8
Date: 01/14/98 Time: 10:52
Sample(adjusted): 1986:1 1995:4
Included observations: 40 after adjusting endpoints

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<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
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<tbody>
<tr>
<td>C</td>
<td>2.319766</td>
<td>1.884006</td>
<td>1.231294</td>
<td>0.2285</td>
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<tr>
<td>IN22</td>
<td>1.245410</td>
<td>0.951407</td>
<td>1.309019</td>
<td>0.2012</td>
</tr>
<tr>
<td>CL41</td>
<td>1.896728</td>
<td>2.352466</td>
<td>0.806272</td>
<td>0.4269</td>
</tr>
<tr>
<td>EX15</td>
<td>0.036372</td>
<td>0.120236</td>
<td>0.302503</td>
<td>0.7645</td>
</tr>
<tr>
<td>FF41</td>
<td>-2.932494</td>
<td>6.309156</td>
<td>-0.464800</td>
<td>0.6457</td>
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<tr>
<td>D2</td>
<td>0.413991</td>
<td>0.117331</td>
<td>3.528399</td>
<td>0.0015</td>
</tr>
<tr>
<td>D3</td>
<td>-0.726699</td>
<td>0.203936</td>
<td>-3.563368</td>
<td>0.0013</td>
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<tr>
<td>D4</td>
<td>0.952802</td>
<td>0.275210</td>
<td>3.462093</td>
<td>0.0017</td>
</tr>
<tr>
<td>DM89</td>
<td>-0.001419</td>
<td>0.105407</td>
<td>-0.013459</td>
<td>0.9894</td>
</tr>
<tr>
<td>DM90</td>
<td>-0.155959</td>
<td>0.093874</td>
<td>-1.661370</td>
<td>0.1078</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.009092</td>
<td>0.017535</td>
<td>-0.518476</td>
<td>0.6082</td>
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<tr>
<td>U8(-4)</td>
<td>0.059254</td>
<td>0.239829</td>
<td>0.247069</td>
<td>0.8067</td>
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R-squared 0.743770
Adjusted R-squared 0.643108
S.E. of regression 0.132886
S.D. dependent var 0.132886
Akaike info criterion 0.743770
Schwarz criterion 0.643108
F-statistic 0.222439
Prob(F-statistic) 0.132886
1. USA TO UK:
LS // Dependent Variable is U1
Date: 01/14/98 Time: 21:47
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints
Convergence achieved after 12 iterations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
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<tbody>
<tr>
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<td>1.422391</td>
<td>-2.315705</td>
<td>0.0237</td>
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<tr>
<td>IN20</td>
<td>0.868404</td>
<td>0.325946</td>
<td>2.664255</td>
<td>0.0097</td>
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<tr>
<td>EX34</td>
<td>0.474028</td>
<td>0.133797</td>
<td>3.542877</td>
<td>0.0007</td>
</tr>
<tr>
<td>D2</td>
<td>0.351867</td>
<td>0.075348</td>
<td>4.669917</td>
<td>0.0000</td>
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<tr>
<td>D3</td>
<td>-0.908255</td>
<td>0.185489</td>
<td>-4.896548</td>
<td>0.0000</td>
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<tr>
<td>D4</td>
<td>1.081034</td>
<td>0.225078</td>
<td>4.802941</td>
<td>0.0000</td>
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<tr>
<td>DM86</td>
<td>-0.143138</td>
<td>0.078065</td>
<td>-1.833567</td>
<td>0.0713</td>
</tr>
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<td>DM91</td>
<td>-0.289354</td>
<td>0.078168</td>
<td>-3.701695</td>
<td>0.0004</td>
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<tr>
<td>U1(-4)</td>
<td>0.373944</td>
<td>0.116019</td>
<td>3.223117</td>
<td>0.0020</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.380018</td>
<td>0.115986</td>
<td>3.276403</td>
<td>0.0017</td>
</tr>
</tbody>
</table>

| R-squared | 0.930951 | Mean dependent var | 0.857615 |
| Adjusted R-squared | 0.921391 | S.D. dependent var | 0.392577 |
| S.E. of regression | 0.110068 | Akaike info criterion | -4.289742 |
| Durbin-Watson stat | 1.943135 | Schwarz criterion | 0.000000 |

Inverted AR Roots

Breusch-Godfrey Serial Correlation LM Test:

| F-statistic | 0.547206 | Probability | 0.701715 |
| Obs*R-squared | 2.597954 | Probability | 0.627186 |

White Heteroskedasticity Test:

| F-statistic | 1.733325 | Probability | 0.086304 |
| Obs*R-squared | 17.42479 | Probability | 0.095923 |

Estimation Command:

LS U1 IN20 EX34 D2 D3 D4 DM86 DM91 U1(-4) AR(1)

Estimation Equation:

\[ U1 = C(1) + C(2)*IN20 + C(3)*EX34 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*DM86 + C(8)*DM91 + C(9)*U1(-4) + \text{[AR}(1)\text{]=C}(10) \]

Substituted Coefficients:

\[ U1 = -3.2938371 + 0.86840409*IN20 + 0.47402751*EX34 + 0.35186733*D2 - 0.90825542*D3 + 1.0810339*D4 - 0.14313804*DM86 - 0.28935416*DM91 + 0.3739438*U1(-4) + [\text{AR}(1)]=0.3800181 \]
Actual: U1  Forecast: U1F
Sample: 1977:2 1995:4
Include observations: 75

Root Mean Squared Error 0.115795
Mean Absolute Error 0.092272
Mean Absolute Percentage Error 24.84842
Theil Inequality Coefficient 0.061828
Bias Proportion 0.000160
Variance Proportion 0.046174
Covariance Proportion 0.953666

2. GERMANY TO UK:
LS // Dependent Variable is U2
Date: 01/14/98 Time: 22:07
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints
Convergence achieved after 5 iterations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
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<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-0.540883</td>
<td>0.183681</td>
<td>-2.944692</td>
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<tr>
<td>IN4</td>
<td>0.269478</td>
<td>0.048941</td>
<td>5.506243</td>
<td>0.0000</td>
</tr>
<tr>
<td>S15</td>
<td>-0.269821</td>
<td>0.059298</td>
<td>-4.550285</td>
<td>0.0000</td>
</tr>
<tr>
<td>D2</td>
<td>0.341023</td>
<td>0.053588</td>
<td>6.363827</td>
<td>0.0000</td>
</tr>
<tr>
<td>D3</td>
<td>-0.827634</td>
<td>0.115924</td>
<td>-7.139426</td>
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<tr>
<td>D4</td>
<td>0.920815</td>
<td>0.137242</td>
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<tr>
<td>DM83</td>
<td>-0.069972</td>
<td>0.039020</td>
<td>-1.793215</td>
<td>0.0775</td>
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<tr>
<td>U2(-4)</td>
<td>0.336815</td>
<td>0.084170</td>
<td>4.001608</td>
<td>0.0002</td>
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<tr>
<td>AR(1)</td>
<td>-0.269732</td>
<td>0.119099</td>
<td>-2.264766</td>
<td>0.0268</td>
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</table>

R-squared 0.936169  Mean dependent var 1.861659
Adjusted R-squared 0.928432  S.D. dependent var 0.321444
S.E. of regression 0.085993  Akaike info criterion -4.794802
Sum squared resid 0.488062  Schwarz criterion -4.516703
Log likelihood 82.38469  F-statistic 120.9972
Durbin-Watson stat 2.025046  Prob(F-statistic) 0.000000

Inverted AR Roots -.27
Breusch-Godfrey Serial Correlation LM Test:

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Probability</th>
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<tbody>
<tr>
<td>F-statistic</td>
<td>1.087230</td>
<td>0.410431</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>42.45746</td>
<td>0.212634</td>
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White Heteroskedasticity Test:

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Probability</th>
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<tbody>
<tr>
<td>F-statistic</td>
<td>0.566213</td>
<td>0.835231</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>6.095990</td>
<td>0.807135</td>
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</table>

Estimation Command:

```
LS U2 C IN4 S15 D2 D3 D4 DM83 U2(-4) AR(1)
```

Estimation Equation:

\[
U2 = C(1) + C(2)*IN4 + C(3)*S15 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*DM83 + C(8)*U2(-4) + [AR(1)=C(9)]
\]

Substituted Coefficients:

\[
U2 = -0.54088264 + 0.26947833*IN4 - 0.26982109*S 15 + 0.34102258*D2 - 0.82763369*D3 + 0.92081493*D4 - 0.069971965*DM83 + 0.33681474*U2(-4) + [AR(1)=-0.26973227]
\]

Actual: U2  Forecast: U2F
Sample: 1977:2 1995:4
Include observations: 75

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
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<td>Mean Absolute Error</td>
<td>0.067410</td>
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<td>Mean Absolute Percentage Error</td>
<td>3.650120</td>
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<tr>
<td>Theil Inequality Coefficient</td>
<td>0.023057</td>
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<tr>
<td>Bias Proportion</td>
<td>0.000321</td>
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<tr>
<td>Variance Proportion</td>
<td>0.015349</td>
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<tr>
<td>Covariance Proportion</td>
<td>0.984330</td>
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3. AUSTRIA TO UK:

LS // Dependent Variable is U3
Date: 01/15/98  Time: 10:15
Sample(adjusted): 1978:1 1995:4
Included observations: 72 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
</table>

48
C  -7.001235  3.299227  -2.122083  0.0377
IN14  1.143757  0.489417  2.336979  0.0226
CL36  -1.024560  0.533649  -1.919914  0.0593
D2   -0.976316  0.077946   3.752102  0.0377
D3   -0.976316  0.203659  -4.793875  0.0000
D4   0.983477  0.250284  -3.929438  0.0002
TREND  0.010856  0.002519  4.310245  0.0001
U3(-4)  0.269964  0.120231  2.245383  0.0282

R-squared  0.906099  Mean dependent var  1.360196
Adjusted R-squared  0.895829  S.D. dependent var  0.544864
S.E. of regression  0.175858  Akaike info criterion  -3.371723
Sum squared resid  1.979256  Schwarz criterion  -3.118760
Log likelihood  27.21845  F-statistic  88.22459
Durbin-Watson stat  2.145304  Prob(F-statistic)  0.000000

Breusch-Godfrey Serial Correlation LM Test:
F-statistic  0.342394  Probability  0.848265
Obs*R-squared  1.606813  Probability  0.807567

White Heteroskedasticity Test:
F-statistic  0.839070  Probability  0.602463
Obs*R-squared  9.599099  Probability  0.566767

Estimation Command:
LS U3 C IN14 CL36 D2 D3 D4 TREND U3(-4)

Estimation Equation:
U3 = C(1) + C(2)*IN14 + C(3)*CL36 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*TREND + C(8)*U3(-4)

Substituted Coefficients:
U3 = -7.0012354 + 1.1437572*IN14 + 0.29246206*D2 - 0.97631605*D3 + 0.98347694*D4 + 0.010856328*TREND + 0.26996441*U3(-4)

Actual: U3  Forecast: U3F
Include observations: 72

Root Mean Squared Error 0.169396
Mean Absolute Error 0.134374
Mean Absolute Percentage Error 12.50374
Theil Inequality Coefficient 0.058019
  Bias Proportion 0.000128
  Variance Proportion 0.025756
  Covariance Proportion 0.974116

4. FRANCE TO UK:
LS // Dependent Variable is U4
Date: 01/15/98 Time: 11:25
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints
Convergence achieved after 5 iterations

Variable Coefficient Std. Error t-Statistic Prob.
C 0.231445 0.273423 0.846473 0.4003
IN 3 0.106585 0.066111 1.612209 0.1117
D2 0.237007 0.072652 3.262248 0.0018
D3 -0.465489 0.137824 -3.377406 0.0012
D4 0.432039 0.155807 2.772914 0.0072
TREND 0.004877 0.001328 3.672694 0.0005
DM79 -0.095383 0.072079 -1.323307 0.1903
U4(-4) 0.543065 0.105445 5.150218 0.0000
AR(1) -0.164659 0.126851 -1.298052 0.1988

R-squared 0.894549 Mean dependent var 2.100126
Adjusted R-squared 0.881767 S.D. dependent var 0.403143
S.E. of regression 0.138621 Akaie info criterion -3.839857
Sum squared resid 1.268241 Schwarz criterion -3.561759
Log likelihood 46.57425 F-statistic 69.98534
Durbin-Watson stat 1.990611 Prob(F-statistic) 0.000000

Inverted AR Roots -.16

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 1.244095 Probability 0.301662
Obs*R-squared 5.572540 Probability 0.233426

White Heteroskedasticity Test:
F-statistic 0.869267  Probability 0.565861
Obs*R-squared 8.968581 Probability 0.535088

Estimation Command:

LS U4 C IN3 D2 D3 D4 TREND DM79 U4(-4) AR(1)

Estimation Equation:

U4 = C(1) + C(2)*IN3 + C(3)*D2 + C(4)*D3 + C(5)*D4 + C(6)*TREND + C(7)*DM79 + C(8)*U4(-4) + [AR(1)=C(9)]

Substituted Coefficients:

U4 = 0.23144508 + 0.10658467*IN3 + 0.23700737*D2 - 0.4654892*D3 + 0.43203894*D4 + 0.004877279*TREND - 0.095383107*DM79 + 0.54306539*U4(-4) + [AR(1)=-0.1646592]

Residual  Actual  Fitted
Actual: U4  Forecast: U4F
Sample: 1977:2 1995:4
Include observations: 75

Root Mean Squared Error 0.149615
Mean Absolute Error 0.121554
Mean Absolute Percentage Error 6.079436
Theil Inequality Coefficient 0.035015
Bias Proportion 0.000353
Variance Proportion 0.047687
Covariance Proportion 0.951960

5. JAPAN TO UK:
LS // Dependent Variable is U5
Date: 01/15/98 Time: 12:24
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints
Convergence achieved after 13 iterations

<table>
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<tr>
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<th>Prob.</th>
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<tbody>
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<td>0.684574</td>
<td>-4.544693</td>
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</tr>
<tr>
<td>IN19</td>
<td>0.612199</td>
<td>0.133241</td>
<td>4.594662</td>
<td>0.0000</td>
</tr>
<tr>
<td>D2</td>
<td>-0.090520</td>
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<td>-2.870718</td>
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<tr>
<td>D3</td>
<td>-0.062357</td>
<td>0.029138</td>
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<tr>
<td>DM91</td>
<td>-0.458471</td>
<td>0.127215</td>
<td>-3.603922</td>
<td>0.0006</td>
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<tr>
<td>U5(-4)</td>
<td>0.474437</td>
<td>0.104774</td>
<td>4.529366</td>
<td>0.0000</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.535757</td>
<td>0.103767</td>
<td>5.163068</td>
<td>0.0000</td>
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</table>

R-squared 0.931450 Mean dependent var -0.576426
Adjusted R-squared 0.925538 S.D. dependent var 0.596628
S.E. of regression 0.145806 Akaike info criterion -3.541708
Sum squared resid 1.802389 Schwarz criterion -3.325409
Log likelihood 33.39347 F-statistic 154.3002
Durbin-Watson stat 1.891086 Prob(F-statistic) 0.000000
Breusch-Godfrey Serial Correlation LM Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Obs*R-squared</th>
<th>Probability</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.258320</td>
<td>1.191638</td>
<td>0.903532</td>
<td>0.879474</td>
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</tbody>
</table>

White Heteroskedasticity Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Obs*R-squared</th>
<th>Probability</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.888864</td>
<td>13.97245</td>
<td>0.076524</td>
<td>0.082486</td>
</tr>
</tbody>
</table>

Estimation Command:

LS U5 C IN19 D2 D3 DM91 U5(-4) AR(1)

Estimation Equation:

U5 = C(1) + C(2)*IN19 + C(3)*D2 + C(4)*D3 + C(5)*DM91 + C(6)*U5(-4) + [AR(1)=C(7)]

Substituted Coefficients:

U5 = -3.1111773 + 0.61219933*IN19 - 0.090519873*D2 - 0.062357375*D3 - 0.45847116*DM91 + 0.47443668*U5(-4) + [AR(1)=0.53575696]

Actual: U5  Forecast: U5F  
Sample: 1977:2 1995:4  
Include observations: 75

Root Mean Squared Error  0.205839
Mean Absolute Error  0.156721
Mean Absolute Percentage Error  351.9474
Theil Inequality Coefficient  0.127646
Bias Proportion  0.000741
Variance Proportion  0.098583
Covariance Proportion  0.900676
6. FINLAND TO UK:
LS // Dependent Variable is U6
Date: 01/15/98 Time: 12:51
Sample(adjusted): 1978:1 1995:4
Included observations: 72 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-3.162470</td>
<td>0.828172</td>
<td>-3.818615</td>
<td>0.0003</td>
</tr>
<tr>
<td>IN16</td>
<td>0.983351</td>
<td>0.240502</td>
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<tr>
<td>FF39</td>
<td>-1.803357</td>
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<tr>
<td>D2</td>
<td>0.456188</td>
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<td>0.0001</td>
</tr>
<tr>
<td>D3</td>
<td>-1.034245</td>
<td>0.216550</td>
<td>-4.776005</td>
<td>0.0000</td>
</tr>
<tr>
<td>D4</td>
<td>1.156893</td>
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<td>0.0001</td>
</tr>
<tr>
<td>TREND</td>
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<td>U6(-4)</td>
<td>0.171021</td>
<td>0.119478</td>
<td>1.431403</td>
<td>0.0157</td>
</tr>
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</table>

R-squared 0.781709
Adjusted R-squared 0.757833
S.E. of regression 0.253361
Sum squared resid 0.370736
Log likelihood 3.814948
Durbin-Watson stat 2.641440

F-statistic 1.938202
Prob(F-statistic) 0.000000

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 0.645251
Obs*R-squared 2.969469
Probability 0.562948

White Heteroskedasticity Test:
F-statistic 1.573142
Obs*R-squared 16.117114
Probability 0.136837

Estimation Command:
LS U6 C IN16 FF39 D2 D3 D4 TREND U6(-4)

Estimation Equation:
U6 = C(1) + C(2)*IN16 + C(3)*FF39 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*TREND + C(8)*U6(-4)

Substituted Coefficients:
U_6 = -3.16247 + 0.98335135*IN16 - 1.803357*FF39 + 0.45618757*D2 - 1.0342455*D3 + 1.1568933*D4 + 0.0044195495*TREND + 0.17102116*U_6(-4)

Actual: U_6  Forecast: U_6F
Sample: 1978:1 1995:4
Include observations: 72

Root Mean Squared Error 0.243623
Mean Absolute Error 0.184708
Mean Absolute Percentage Error 18.94493
Theil Inequality Coefficient 0.083756
Bias Proportion 0.000001
Variance Proportion 0.068747
Covariance Proportion 0.931252

7.SPAIN TO UK:
LS // Dependent Variable is U7
Date: 01/15/98 Time: 13:01
Sample: 1976:1 1995:4
Included observations: 80

Variable Coefficient Std. Error t-Statistic Prob.
C -1.443152 0.269816 -5.348660 0.0000
IN10 0.470315 0.063294 7.430679 0.0000
S29 -0.171806 0.119618 -1.436284 0.1552
D3 -0.684638 0.031361 -21.83067 0.0000
D4 0.824016 0.050508 16.31463 0.0000
DM78 -0.096949 0.065780 -1.473852 0.1448
TREND 0.014380 0.001260 11.40879 0.0000

R-squared 0.948835 Mean dependent var 0.945575
Adjusted R-squared 0.944629 S.D. dependent var 0.479376
S.E. of regression 0.112802 Akaike info criterion -4.280809
Sum squared resid 0.928874 Schwarz criterion -4.072382
Log likelihood 64.71729 F-statistic 225.6241
Durbin-Watson stat 1.972131 Prob(F-statistic) 0.000000

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 0.398752 Probability 0.808883
Obs*R-squared 1.807501 Probability 0.771110

White Heteroskedasticity Test:

F-statistic 0.813664 Probability 0.605323
Obs*R-squared 7.576507 Probability 0.577321

Actual: U7     Forecast: U7F
Sample: 1976:1 1995:4
Include observations: 80

Root Mean Squared Error 0.107754
Mean Absolute Error 0.079708
Mean Absolute Percentage Error 13.55963
Theil Inequality Coefficient 0.051018
  Bias Proportion 0.000000
  Variance Proportion 0.013129
  Covariance Proportion 0.986871

8. IOM TO UK :
LS // Dependent Variable is U8
Date: 01/15/98 Time: 13:17
Sample(adjusted): 1985:2 1995:4
Included observations: 43 after adjusting endpoints
Convergence achieved after 6 iterations

<table>
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<td>0.133388</td>
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<td>DM90</td>
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R-squared 0.748114 Mean dependent var 6.241755
Adjusted R-squared 0.706133 S.D. dependent var 0.223136
S.E. of regression 0.120961 Akaike info criterion -4.076678
Sum squared resid 0.526734 Schwarz criterion -3.789971
Log likelihood 33.63422 F-statistic 17.82027
Durbin-Watson stat 1.925373 Prob(F-statistic) 0.000000

Inverted AR Roots .24
Breusch-Godfrey Serial Correlation LM Test:

F-statistic: 0.842064
Obs*R-squared: 4.095056

White Heteroskedasticity Test:

F-statistic: 0.621925
Obs*R-squared: 4.03823

Estimation Command:

LS U8 C IN22 D2 D3 D4 DM90 AR(1)

Estimation Equation:

U8 = C(1) + C(2)*IN22 + C(3)*D2 + C(4)*D3 + C(5)*D4 + C(6)*DM90 + [AR(1)=C(7)]

Substituted Coefficients:

U8 = 4.0476923 + 0.57963186*IN22 + 0.44788973*D2 - 0.7818757*D3 + 1.0427627*D4 - 0.13613418*DM90 + [AR(1)=0.24225098]

Actual: U8  Forecast: U8F
Sample: 1985:2 1995:4
Include observations: 43

Root Mean Squared Error: 0.114215
Mean Absolute Error: 0.092980
Mean Absolute Percentage Error: 1.488248
Theil Inequality Coefficient: 0.009144
Bias Proportion: 0.000032
Variance Proportion: 0.091993
Covariance Proportion: 0.907975
### 1.6 TURKEY INBOUND

1. GERMANY TO TURKEY

**LS // Dependent Variable is T1**

Date: 01/11/98 Time: 18:28

Sample(adjusted): 1977:1 1995:4

Included observations: 76 after adjusting endpoints

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<th>Prob.</th>
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R-squared: 0.961943  Mean dependent var: 0.265579
Adjusted R-squared: 0.954694  S.D. dependent var: 1.006988
S.E. of regression: 0.214339  Akaike info criterion: -2.925891
Sum squared resid: 2.894283  Schwarz criterion: -2.327213
Log likelihood: 16.34452  F-statistic: 132.7021
Durbin-Watson stat: 1.820108  Prob(F-statistic): 0.000000

2. AUSTRIA TO TURKEY

**LS // Dependent Variable is T2**

Date: 01/14/98 Time: 13:39

Sample(adjusted): 1977:1 1995:4

Included observations: 76 after adjusting endpoints

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R-squared: 0.904293
Mean dependent var: -0.581202

4. UK TO TURKEY

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<th>Coefficient</th>
<th>Std. Error</th>
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R-squared: 0.956661
Mean dependent var: -0.522286
### 5. Italy to Turkey

**LS** // Dependent Variable is T5  
Date: 01/14/98 Time: 13:50  
Sample (adjusted): 1977:2 1995:4  
Included observations: 75 after adjusting endpoints

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R-squared 0.949614  Mean dependent var -1.199923
Adjusted R-squared 0.939862  S.D. dependent var 0.839609
S.E. of regression 0.205898  Akaike info criterion -3.004438
Sum squared resid 3.648594  Schwarz criterion -2.602740
Log likelihood 19.922724  F-statistic 97.37533
Durbin-Watson stat 0.596400  Prob(F-statistic) 0.000000

### 6. USA to Turkey

**LS** // Dependent Variable is T6  
Date: 01/14/98 Time: 13:46  
Sample (adjusted): 1977:3 1995:4  
Included observations: 74 after adjusting endpoints

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R-squared 0.855865  Mean dependent var -1.927209
Adjusted R-squared 0.830929  S.D. dependent var 0.694112
S.E. of regression 0.285944  Akaike info criterion -2.356526
Sum squared resid 2.069359  Schwarz criterion -1.982894
Log likelihood 12.87995  F-statistic 33.46826
Durbin-Watson stat 1.596400  Prob(F-statistic) 0.000000

### 7. N. Cyprus to Turkey


### 8. ISRAEL TO TURKEY

- **LS // Dependent Variable is T8**
- **Date:** 01/14/98  Time: 13:54
- **Sample(adjusted):** 1987:1 1995:4
- **Included observations:** 36 after adjusting endpoints

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<td>-2.703555</td>
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<tr>
<td>IN17</td>
<td>-1.120534</td>
<td>2.726170</td>
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<tr>
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<td>2.448088</td>
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<tr>
<td>EX28</td>
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<tr>
<td>FF28</td>
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<tr>
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<td>0.336194</td>
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<tr>
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<tr>
<td>D4</td>
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<tr>
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<td>-0.197332</td>
<td>0.252652</td>
<td>-0.781042</td>
<td>0.4424</td>
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- R-squared: 0.835127
- Adjusted R-squared: 0.832098
- S.E. of regression: 1.492664
- S.D. dependent var: 0.068224
- Akaikie info criterion: 29.89292
- Schwarz criterion: 29.89292
- F-statistic: 29.89292
- Prob(F-statistic): 0.000000

### 9. DENMARK TO TURKEY

- **LS // Dependent Variable is T9**
- **Date:** 01/14/98  Time: 13:56
- **Sample(adjusted):** 1977:1 1995:4
- **Included observations:** 76 after adjusting endpoints

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<tr>
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<td>EX15</td>
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<td>0.084990</td>
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</table>

- R-squared: 0.957267
- Adjusted R-squared: 0.934883
- S.E. of regression: 0.096922
- Sum squared resid: 4.154987
- Log likelihood: -12.21384
- Durbin-Watson stat: 1.371813
- Mean dependent var: 0.900800
- S.D. dependent var: 0.132098
- Akaike info criterion: 0.197270
- Schwarz criterion: 0.379817
- F-statistic: 0.427658
- Prob(F-statistic): 0.000000
### 10. SWITZERLAND TO TURKEY

LS // Dependent Variable is T10  
Date: 01/11/98 Time: 18:26  
Sample(adjusted): 1977:1 1995:4  
Included observations: 76 after adjusting endpoints

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<th>Variable</th>
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<th>Prob.</th>
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<tbody>
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<td>C</td>
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<td>CL30</td>
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<td>FF30</td>
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| R-squared | 0.882804 | Mean dependent var | 0.278565 |
| Adjusted R-squared | 0.860481 | S.D. dependent var | 0.825413 |
| S.E. of regression | 0.308310 | Akaike info criterion | -2.198789 |
| Sum squared resid | 5.988486 | Schwarz criterion | -1.800111 |
| Log likelihood | -11.25533 | F-statistic | 39.54675 |
| Durbin-Watson stat | 1.337778 | Prob(F-statistic) | 0.000000 |

### 11. GREECE TO TURKEY

LS // Dependent Variable is T11  
Date: 01/14/98 Time: 13:58  
Sample(adjusted): 1977:1 1995:4  
Included observations: 76 after adjusting endpoints

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<th>t-Statistic</th>
<th>Prob.</th>
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<p>| R-squared | 0.898486 | Mean dependent var | 0.278565 |
| Adjusted R-squared | 0.860481 | S.D. dependent var | 0.825413 |
| S.E. of regression | 0.308310 | Akaike info criterion | -2.198789 |
| Sum squared resid | 5.988486 | Schwarz criterion | -1.800111 |
| Log likelihood | -11.25533 | F-statistic | 39.54675 |
| Durbin-Watson stat | 1.337778 | Prob(F-statistic) | 0.000000 |</p>
<table>
<thead>
<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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R-squared 0.938794  Mean dependent var -0.564963
Adjusted R-squared 0.927136  S.D. dependent var 1.053291
S.E. of regression 0.284318  Akaike info criterion -2.360816
Sum squared resid 5.128313  Schwarz criterion -1.962138
Log likelihood -5.128313  F-statistic 80.52642
Durbin-Watson stat 1.753263  Prob(F-statistic) 0.000000
T13(-4) 0.533606 0.097321 5.482924 0.0000

R-squared 0.955260 Mean dependent var -0.300935
Adjusted R-squared 0.946738 S.D. dependent var 1.102953
S.E. of regression 0.254546 Akaike info criterion -2.582038
Sum squared resid 4.082014 Schwarz criterion -2.183360
Log likelihood 3.278102 F-statistic 112.0937
Durbin-Watson stat 1.948214 Prob(F-statistic) 0.000000

1. Germany to Turkey

LS // Dependent Variable is T1
Date: 12/13/97 Time: 18:55
Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints

<table>
<thead>
<tr>
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<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
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</table>

R-squared 0.954464 Mean dependent var 0.265579
Adjusted R-squared 0.949027 S.D. dependent var 1.006988
S.E. of regression 0.227349 Akaike info criterion -2.851732
Sum squared resid 3.463082 Schwarz criterion -2.575724
Log likelihood 9.526504 F-statistic 175.5463
Durbin-Watson stat 1.475719 Prob(F-statistic) 0.000000

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 2.412631 Probability 0.058196
Obs*R-squared 10.09545 Probability 0.038850

White Heteroskedasticity Test:
F-statistic 2.310487 Probability 0.016241
Obs*R-squared 23.22562 Probability 0.025870

Ramsey RESET Test:
F-statistic 0.916647 Probability 0.341851
Log likelihood ratio 1.048270 Probability 0.305906

Estimation Command:
LS T1 C IN4 S14 DM91 D2 D3 D4 TREND T1(-4)

Estimation Equation:
\[ T_1 = C(1) + C(2)*IN4 + C(3)*S14 + C(4)*DM91 + C(5)*D2 + C(6)*D3 + C(7)*D4 + C(8)*TREND + C(9)*T1(-4) \]

Substituted Coefficients:

\[ T_1 = -3.5476914 + 0.66442625*IN4 - 0.99891839*S14 - 0.48251439*DM91 + 0.70079897*D2 - 1.5730396*D3 + 1.9250776*D4 + 0.0086786781*TREND + 0.51370278*T1(-4) \]

Actual: T1  Forecast: T1F
Sample: 1977:1 1995:4
Include observations: 76

<p>| | | |</p>
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<td>Mean Absolute Error</td>
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<td>Mean Absolute Percentage Error</td>
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<td>Theil Inequality Coefficient</td>
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<td>Bias Proportion</td>
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<tr>
<td>Variance Proportion</td>
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<td>Covariance Proportion</td>
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2. Austria to Turkey
LS // Dependent Variable is T2
Date: 12/14/97 Time: 10:04
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints
Convergence achieved after 8 iterations

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<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
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R-squared 0.915940 Mean dependent var 0.821237
Adjusted R-squared 0.904300 S.D. dependent var 0.894293
S.E. of regression 0.276653 Akaike info criterion -2.446418
Sum squared resid 4.974890 Schwarz criterion -2.137420
Log likelihood -4.679705 F-statistic 78.69478
Durbin-Watson stat 2.077251 Prob(F-statistic) 0.000000

Inverted AR Roots .36
Omitted Variables: EX22 CL22 FF22

Estimation Equation:

\[ T2 = C(1) + C(2) \times IN14 + C(3) \times S16 + C(4) \times D2 + C(5) \times D3 + C(6) \times D4 + C(7) \times DM91 + C(8) \times DM94 + C(9) \times T2(-4) + [AR(1) = C(10)] \]

Substituted Coefficients:

\[ T2 = -4.2538513 + 0.91158787 \times IN14 - 1.2982694 \times S16 + 0.77006525 \times D2 - 1.7593477 \times D3 + 2.1275936 \times D4 - 0.67908007 \times DM91 - 0.552284 \times DM94 + 0.41798933 \times T2(-4) + [AR(1) = 0.35832907] \]

Actual: T2  Forecast: T2F
Sample: 1977:2 1995:4
Include observations: 75

Root Mean Squared Error 0.304159
Mean Absolute Error 0.239046
Mean Absolute Percentage Error 313.9619
Theil Inequality Coefficient 0.127898
  Bias Proportion 0.000002
  Variance Proportion 0.034855
  Covariance Proportion 0.965143
3. France to Turkey:

**LS // Dependent Variable is T3**

Date: 12/14/97  Time: 11:13  
Sample(adjusted): 1977:1 1995:4  
Included observations: 76 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
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<td>0.866503</td>
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<tr>
<td>S18</td>
<td>-1.442570</td>
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<tr>
<td>D2</td>
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<td>D3</td>
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<td>0.361894</td>
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<tr>
<td>D4</td>
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<tr>
<td>DM91</td>
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<tr>
<td>T3(-4)</td>
<td>0.375898</td>
<td>0.095015</td>
<td>3.956180</td>
<td>0.0002</td>
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R-squared 0.906846  Mean dependent var -0.576193  
Adjusted R-squared 0.897256  S.D. dependent var 0.860929  
S.E. of regression 0.275959  Akaike info criterion -2.475702  
Sum squared resid 5.178441  Schwarz criterion -2.230362  
Log likelihood -5.762637  F-statistic 94.56719  
Durbin-Watson stat 1.497764  Prob(F-statistic) 0.000000

Breusch-Godfrey Serial Correlation LM Test:

| F-statistic | 1.250899 | Probability | 0.298575 |
| Obs*R-squared | 5.510918 | Probability | 0.238771 |

White Heteroskedasticity Test:

| F-statistic | 1.485017 | Probability | 0.165302 |
| Obs*R-squared | 14.13413 | Probability | 0.166961 |

Ramsey RESET Test:

| F-statistic | 0.098881 | Probability | 0.754154 |
| Log likelihood ratio | 0.112081 | Probability | 0.737788 |
Estimation Command:
```
LS T3 C IN3 S18 D2 D3 D4 DM91 T3(-4)
```

Estimation Equation:
```
T3 = C(1) + C(2)*IN3 + C(3)*S18 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*DM91 + C(8)*T3(-4)
```

Substituted Coefficients:
```
T3 = -4.1850738 + 0.73695518*IN3 - 1.4425699*S18 + 0.89825823*D2 - 2.0403691*D3 + 2.384746*D4 - 0.96970791*DM91 + 0.37589795*T3(-4)
```

Actual: T3  Forecast: T3F
Sample: 1977:1 1995:4
Include observations: 76

Root Mean Squared Error 0.277665
Mean Absolute Error 0.232911
Mean Absolute Percentage Error 70.19032
Theil Inequality Coefficient 0.138031
Bias Proportion 0.000075
Variance Proportion 0.047191
Covariance Proportion 0.952733

4. UK to Turkey:

```
LS // Dependent Variable is T4
Date: 12/17/97 Time: 17:15
Sample: 1976:1 1995:4
Included observations: 80
```

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<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
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<td>IN21</td>
<td>1.426352</td>
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R-squared 0.049037  Mean dependent var -0.545090
Adjusted R-squared 0.036845  S.D. dependent var 1.036636
S.E. of regression 1.017360  Akaike info criterion 0.059104
Sum squared resid 80.73162  Schwarz criterion 0.118654
Log likelihood -113.8792  F-statistic 4.022099
Durbin-Watson stat 1.222863  Prob(F-statistic) 0.048376

```
LS // Dependent Variable is T4
Date: 12/14/97 Time: 21:51
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints
```

67
Convergence achieved after 5 iterations

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<th>Variable</th>
<th>Coefficient</th>
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<th>t-Statistic</th>
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<tr>
<td>T4(-4)</td>
<td>0.761672</td>
<td>0.070296</td>
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<td>TREND</td>
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<td>AR(1)</td>
<td>0.491734</td>
<td>0.101687</td>
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</table>

R-squared: 0.962064  Mean dependent var: -0.513925
Adjusted R-squared: 0.958101  S.D. dependent var: 1.059868
S.E. of regression: 0.216948  Akaike info criterion: -2.955659
Sum squared resid: 3.153447  Schwarz criterion: -2.708460
Log likelihood: 12.41681  F-statistic: 242.7337
Durbin-Watson stat: 1.969418  Prob(F-statistic): 0.000000

Inverted AR Roots

Breusch-Godfrey Serial Correlation LM Test:
- F-statistic: 0.332059  Probability: 0.855394
- Obs*R-squared: 1.548585  Probability: 0.818002

White Heteroskedasticity Test:
- F-statistic: 1.060484  Probability: 0.401357
- Obs*R-squared: 8.542662  Probability: 0.382331

Ramsey RESET Test:
- F-statistic: 6.901131  Probability: 0.010700
- Log likelihood ratio: 7.458706  Probability: 0.006313

Estimation Command:
LS T4 C D2 D3 D4 DM91 T4(-4) TREND AR(1)

Estimation Equation:
\[ T_4 = C(1) + C(2) \cdot D_2 + C(3) \cdot D_3 + C(4) \cdot D_4 + C(5) \cdot D_{M91} + C(6) \cdot T_4(-4) + C(7) \cdot \text{TREND} + [\text{AR}(1) = C(8)] \]

Substituted Coefficients:

\[ T_4 = -0.85562189 + 0.45311176 \cdot D_2 - 1.0194755 \cdot D_3 + 1.2921392 \cdot D_4 - 0.6821718 \cdot D_{M91} + 0.76167249 \cdot T_4(-4) + 0.01149794 \cdot \text{TREND} + [\text{AR}(1) = 0.4917336] \]

Actual: T4  Forecast: T4F
Include observations: 75

Root Mean Squared Error 0.308064
Mean Absolute Error 0.241199
Mean Absolute Percentage Error 147.5479
Theil Inequality Coefficient 0.133610
Bias Proportion 0.005216
Variance Proportion 0.029989
Covariance Proportion 0.964796

5. Italy to Turkey:

LS // Dependent Variable is T5
Date: 12/14/97  Time: 15:49
Included observations: 79 after adjusting endpoints
Convergence achieved after 7 iterations

<table>
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<tr>
<th>Variable</th>
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<th>Std. Error</th>
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<th>Prob.</th>
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<tr>
<td>DM82</td>
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<td>DM91</td>
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R-squared 0.953473  Mean dependent var -1.208671
Adjusted R-squared 0.946631  S.D. dependent var 0.833942
S.E. of regression 0.192656  Akaike info criterion -3.165159
Sum squared resid 2.523907  Schwarz criterion -2.835236
Log likelihood 23.92764  F-statistic 139.3511
Durbin-Watson stat 2.113687  Prob(F-statistic) 0.000000

Inverted AR Roots .33

LS // Dependent Variable is T5
### Sample Output

#### Date: 12/14/97  Time: 16:13

**Sample(adjusted): 1976:2 1995:4**

Included observations: 79 after adjusting endpoints

Convergence achieved after 8 iterations

<table>
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<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
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<tbody>
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<tr>
<td>EX25</td>
<td>0.244958</td>
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<tr>
<td>TREND</td>
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<td>2.478620</td>
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R-squared 0.953245  Mean dependent var -1.208671

Adjusted R-squared 0.946369  S.D. dependent var 0.833942

S.E. of regression 0.193128  Akaike info criterion -3.160267

Sum squared resid 2.536283  Schwarz criterion -2.830344

Log likelihood 23.73441  F-statistic 138.6379

Durbin-Watson stat 2.096527  Prob(F-statistic) 0.000000

Inverted AR Roots .29

---

### Second Sample Output

#### Date: 12/14/97  Time: 16:08

**Sample(adjusted): 1976:2 1995:4**

Included observations: 79 after adjusting endpoints

Convergence achieved after 8 iterations

<table>
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<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
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<td>EX25</td>
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<td>-0.403968</td>
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<td>AR(1)</td>
<td>0.275363</td>
<td>0.117955</td>
<td>2.334478</td>
<td>0.0225</td>
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R-squared 0.953091  Mean dependent var -1.208671

Adjusted R-squared 0.946193  S.D. dependent var 0.833942

S.E. of regression 0.193444  Akaike info criterion -3.156993

Sum squared resid 2.544600  Schwarz criterion -2.827070

Log likelihood 23.60509  F-statistic 138.1625

Durbin-Watson stat 2.096527  Prob(F-statistic) 0.000000

Inverted AR Roots .29

---

### Final Sample Output

#### Date: 12/14/97  Time: 16:24

Sample: 1976:1 1995:4

Included observations: 80

<table>
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<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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</table>

R-squared 0.953091  Mean dependent var -1.208671

Adjusted R-squared 0.946193  S.D. dependent var 0.833942

S.E. of regression 0.193444  Akaike info criterion -3.156993

Sum squared resid 2.544600  Schwarz criterion -2.827070

Log likelihood 23.60509  F-statistic 138.1625

Durbin-Watson stat 2.096527  Prob(F-statistic) 0.000000

Inverted AR Roots .28

---

**LS // Dependent Variable is T5**

---

**LS // Dependent Variable is T5**
C  -7.519716  0.750935  -10.01381  0.0000
IN18  1.072574  0.141900  7.558649  0.0000
EX25  0.251890  0.098953  2.545545  0.0131
S22  -0.531182  0.175765  -3.022112  0.0035
DM82  -0.307966  0.110110  -2.796901  0.0067
DM91  -0.810139  0.114055  -7.103056  0.0000
D2  1.031828  0.063402  16.27434  0.0000
D3  -3.005897  0.109769  -27.38395  0.0000
D4  3.493584  0.155350  22.48844  0.0000
TREND  0.032433  0.009418  3.443598  0.0010

R-squared  0.949056  Mean dependent var  -1.220562
Adjusted R-squared  0.942507  S.D. dependent var  0.835445
S.E. of regression  0.200321  Akaike info criterion  -3.099198
Sum squared resid  2.809001  Schwarz criterion  -2.801444
Log likelihood  20.45283  Prob(F-statistic)  0.000000

Breusch-Godfrey Serial Correlation LM Test:
F-statistic  1.965254  Probability  0.110061
Obs*R-squared  8.514389  Probability  0.074452

White Heteroskedasticity Test:
F-statistic  1.339906  Probability  0.213434
Obs*R-squared  16.70490  Probability  0.213148

Ramsey RESET Test:
F-statistic  0.204075  Probability  0.652868
Log likelihood ratio  0.236259  Probability  0.626921

Estimation Command:
LS T5 C IN18 EX25 S22 DM82 DM91 D2 D3 D4 TREND

Estimation Equation:
T5 = C(1) + C(2)*IN18 + C(3)*EX25 + C(4)*S22 + C(5)*DM82 + C(6)*DM91 + C(7)*D2 + C(8)*D3 + C(9)*D4 + C(10)*TREND

Substituted Coefficients:
T5  =  -7.5197164 + 1.072574*IN18 + 0.251890*EX25 + 0.5311815*S22 + 0.30796566*DM82 - 0.81013853*DM91 + 1.0318276*D2 - 3.005897*D3 + 3.493584*D4 + 0.03243266*TREND

Actual: T5  Forecast: T5F
Sample: 1976:1 1995:4
Include observations: 80

Root Mean Squared Error  0.187383
Mean Absolute Error  0.151662
Mean Absolute Percentage Error  46.03014
Theil Inequality Coefficient  0.063728
Bias Proportion 0.000000
Variance Proportion 0.013071
Covariance Proportion 0.986929

6. USA TO TURKEY:

LS // Dependent Variable is T6
Date: 12/14/97 Time: 16:54
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints
Convergence achieved after 10 iterations

<table>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
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<td>-3.667302</td>
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<td>D3</td>
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<td>-6.941599</td>
<td>0.0000</td>
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<tr>
<td>D4</td>
<td>2.646329</td>
<td>0.382180</td>
<td>6.924307</td>
<td>0.0000</td>
</tr>
<tr>
<td>DM86</td>
<td>-0.515081</td>
<td>0.142066</td>
<td>-3.625649</td>
<td>0.0006</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.875118</td>
<td>0.149626</td>
<td>-5.848695</td>
<td>0.0000</td>
</tr>
<tr>
<td>T6(-4)</td>
<td>0.311019</td>
<td>0.096129</td>
<td>3.235440</td>
<td>0.0019</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.511053</td>
<td>0.108969</td>
<td>4.689905</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared 0.928913  Mean dependent var -1.920935
Adjusted R-squared 0.920297  S.D. dependent var 0.691544
S.E. of regression 0.195235  Akaike info criterion -3.154932
Sum squared resid 2.515713  Schwarz criterion 2.876833
Log likelihood 20.88956  F-statistic 107.8052
Durbin-Watson stat 2.234945  Prob(F-statistic) 0.000000

Inverted AR Roots .51

Breusch-Godfrey Serial Correlation LM Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.096698</td>
<td>0.091925</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>Probability</td>
</tr>
<tr>
<td>8.936468</td>
<td>0.062707</td>
</tr>
</tbody>
</table>
White Heteroskedasticity Test:

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>5.379753</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>32.01732</td>
</tr>
</tbody>
</table>

Ramsey RESET Test:

<table>
<thead>
<tr>
<th>Test Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>5.069703</td>
</tr>
<tr>
<td>Log likelihood ratio</td>
<td>5.632743</td>
</tr>
</tbody>
</table>

Estimation Command:

```
LS T6 C IN20 D2 D3 D4 DM86 DM91 T6(-4) AR(1)
```

Estimation Equation:

\[
T_6 = C(1) + C(2)*IN20 + C(3)*D2 + C(4)*D3 + C(5)*D4 + C(6)*DM86 + C(7)*DM91 + C(8)*T6(-4) + [AR(1)=C(9)]
\]

Substituted Coefficients:

\[
T_6 = -9.766439 + 1.7753542*IN20 + 0.92634173*D2 - 1.985889*D3 + 2.6463295*D4 - 0.51508091*DM86 - 0.87511784*DM91 + 0.31101851*T6(-4) + [AR(1)=0.51105344]
\]

Actual: T6  Forecast: T6F
Sample: 1977:2 1995:4
Include observations: 75

Root Mean Squared Error 0.230503
Mean Absolute Error 0.174086
Mean Absolute Percentage Error 9.959574
Theil Inequality Coefficient 0.056744
Bias Proportion 0.000003
Variance Proportion 0.055034
Covariance Proportion 0.944963

---

7. NORTH CYPRUS TO TURKEY:
```
LS // Dependent Variable is T7
Date: 12/14/97 Time: 17:10
Sample(adjusted): 1986:1 1995:4
Included observations: 40 after adjusting endpoints
```

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-4.584612</td>
<td>0.229895</td>
<td>-19.94222</td>
<td>0.0000</td>
</tr>
<tr>
<td>IN23</td>
<td>0.418488</td>
<td>0.116867</td>
<td>3.580884</td>
<td>0.0012</td>
</tr>
<tr>
<td>EX15</td>
<td>0.377128</td>
<td>0.104343</td>
<td>3.614303</td>
<td>0.0011</td>
</tr>
<tr>
<td>FF27</td>
<td>-0.366003</td>
<td>0.149204</td>
<td>-2.453038</td>
<td>0.0200</td>
</tr>
<tr>
<td>D2</td>
<td>0.315558</td>
<td>0.054657</td>
<td>5.773460</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
### Regression Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Statistic</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>D3</td>
<td>-1.222394</td>
<td>0.111742</td>
<td>-10.9394</td>
<td>0.0000</td>
</tr>
<tr>
<td>D4</td>
<td>1.482942</td>
<td>0.182482</td>
<td>8.1265</td>
<td>0.0000</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.233332</td>
<td>0.069099</td>
<td>-3.3767</td>
<td>0.0020</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.032145</td>
<td>0.012276</td>
<td>-2.6185</td>
<td>0.0135</td>
</tr>
</tbody>
</table>

- **R-squared**: 0.933332
- **Adjusted R-squared**: 0.916127
- **S.D. dependent var**: 0.382280
- **S.E. of regression**: 0.110711
- **Akaike info criterion**: -4.206549
- **Schwarz criterion**: -3.826551
- **Log likelihood**: 36.37344
- **F-statistic**: 54.24874
- **Durbin-Watson stat**: 1.442006

### Diagnostic Tests

- **Breusch-Godfrey Serial Correlation LM Test**:
  - F-statistic: 0.782338
  - Probability: 0.546577

- **White Heteroskedasticity Test**:
  - F-statistic: 5.39830
  - Probability: 0.869094

- **Ramsey RESET Test**:
  - F-statistic: 0.020055
  - Log likelihood ratio: 0.026731

### Estimation Command

```
LS T7 C IN23 EX15 FF27 D2 D3 D4 DM91 TREND
```

### Estimation Equation

\[ T7 = C(1) + C(2)*IN23 + C(3)*EX15 + C(4)*FF27 + C(5)*D2 + C(6)*D3 + C(7)*D4 + C(8)*DM91 + C(9)*TREND \]

### Substituted Coefficients

\[ T7 = -4.584612 + 0.41848831*IN23 + 0.37712784*EX15 - 0.36600319*FF27 + 0.31555838*D2 - 1.2223941*D3 + 1.4829421*D4 - 0.2333315 \]

### Forecasting Results

- **Actual**: T7
- **Forecast**: T7F
- **Sample**: 1978:1 1995:4
- **Include observations**: 40

- **Root Mean Squared Error**: 0.097464
- **Mean Absolute Error**: 0.077358
- **Mean Absolute Percentage Error**: 3.118471
- **Theil Inequality Coefficient**: 0.019105
- **Bias Proportion**: 0.000000
- **Variance Proportion**: 0.017247
- **Covariance Proportion**: 0.982753
8. ISRAEL TO TURKEY:
LS // Dependent Variable is T
8
Date: 12/14/97  Time: 17:30
Sample(adjusted): 1987:1 1995:4
Included observations: 36 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-15.38763</td>
<td>6.387258</td>
<td>-2.409113</td>
<td>0.0228</td>
</tr>
<tr>
<td>CL28</td>
<td>-1.546757</td>
<td>0.859759</td>
<td>-1.799059</td>
<td>0.0828</td>
</tr>
<tr>
<td>FF28</td>
<td>-1.869939</td>
<td>0.640933</td>
<td>-2.917524</td>
<td>0.0069</td>
</tr>
<tr>
<td>D2</td>
<td>0.519481</td>
<td>0.298252</td>
<td>1.741753</td>
<td>0.0925</td>
</tr>
<tr>
<td>D3</td>
<td>-1.719230</td>
<td>0.730226</td>
<td>-2.354382</td>
<td>0.0258</td>
</tr>
<tr>
<td>D4</td>
<td>2.142083</td>
<td>0.930617</td>
<td>2.301788</td>
<td>0.0290</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.656889</td>
<td>0.256499</td>
<td>-2.560985</td>
<td>0.0161</td>
</tr>
<tr>
<td>T8(-4)</td>
<td>0.390179</td>
<td>0.187647</td>
<td>2.079321</td>
<td>0.0469</td>
</tr>
</tbody>
</table>

R-squared 0.896426  Mean dependent var 0.835127
Adjusted R-squared 0.870533  S.D. dependent var 1.320982
S.E. of regression 0.475309  Akaike info criterion -1.294449
Sum squared resid 6.325731  Schwarz criterion -0.942556
Log likelihood -19.78171  F-statistic 34.61990
Durbin-Watson stat 1.487285  Prob(F-statistic) 0.000000

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 0.687345  Probability 0.607765
Obs*R-squared 3.700185  Probability 0.448099

White Heteroskedasticity Test:
F-statistic 0.752046  Probability 0.671020
Obs*R-squared 8.325118  Probability 0.597113

Ramsey RESET Test:
F-statistic 0.001692  Probability 0.967488
Log likelihood ratio 0.002256  Probability 0.962113

Estimation Command:
LS T8 C CL28 FF28 D2 D3 D4 DM91 T8(-4)
Estimation Equation:

\[ T8 = C(1) + C(2)*CL28 + C(3)*FF28 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*DM91 + C(8)*T8(-4) \]

Substituted Coefficients:

\[ T8 = -15.387626 - 1.5467568*CL28 - 1.8699386*FF28 + 0.5194805*D2 - 1.7192299*D3 + 2.1420828*D4 - 0.65688908*DM91 + 0.39017897*T8(-4) \]

Actual: \( T8 \)  
Forecast: \( T8 \)

Sample: 1987:1 1995:4  
Include observations: 36

Root Mean Squared Error 0.413749  
Mean Absolute Error 0.335355  
Mean Absolute Percentage Error 571.3542  
Theil Inequality Coefficient 0.135105  
Bias Proportion 0.001618  
Variance Proportion 0.014260  
Covariance Proportion 0.984122

9. DENMARK TO TURKEY:

\( T9 \) // Dependent Variable is \( T9 \)

Date: 12/14/97  Time: 19:31  
Sample(adjusted): 1977:2 1995:4  
Included observations: 75 after adjusting endpoints  
Convergence achieved after 6 iterations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-4.586806</td>
<td>1.279459</td>
<td>-3.584957</td>
<td>0.0006</td>
</tr>
<tr>
<td>IN2</td>
<td>0.688842</td>
<td>0.281584</td>
<td>2.446316</td>
<td>0.0171</td>
</tr>
<tr>
<td>D2</td>
<td>0.905667</td>
<td>0.169375</td>
<td>5.347113</td>
<td>0.0000</td>
</tr>
<tr>
<td>D3</td>
<td>-2.157177</td>
<td>0.379063</td>
<td>-5.690806</td>
<td>0.0000</td>
</tr>
<tr>
<td>D4</td>
<td>2.590132</td>
<td>0.468213</td>
<td>5.531948</td>
<td>0.0000</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.379855</td>
<td>0.226393</td>
<td>-1.677856</td>
<td>0.0981</td>
</tr>
<tr>
<td>TREND</td>
<td>0.019673</td>
<td>0.004103</td>
<td>4.794777</td>
<td>0.0000</td>
</tr>
<tr>
<td>T9(-4)</td>
<td>0.414962</td>
<td>0.100242</td>
<td>4.139607</td>
<td>0.0001</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.333444</td>
<td>0.111905</td>
<td>2.979713</td>
<td>0.0040</td>
</tr>
</tbody>
</table>

R-squared 0.924489  Mean dependent var -0.337362  
Adjusted R-squared 0.915336  S.D. dependent var 1.162121  
S.E. of regression 0.338144  Akaike info criterion -2.056400  
Sum squared resid 7.546529  Schwarz criterion -1.778302  
Log likelihood -20.30537  F-statistic 101.0050  
Durbin-Watson stat 1.904538  Prob(F-statistic) 0.000000

Inverted AR Roots .33
Breusch-Godfrey Serial Correlation LM Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.960021</td>
<td>0.111731</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>0.077371</td>
</tr>
</tbody>
</table>

White Heteroskedasticity Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.062906</td>
<td>0.003101</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>0.006901</td>
</tr>
</tbody>
</table>

Ramsey RESET Test:

<table>
<thead>
<tr>
<th>F-statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.685613</td>
<td>0.034094</td>
</tr>
<tr>
<td>Log likelihood ratio</td>
<td>0.022322</td>
</tr>
</tbody>
</table>

Estimation Command:

```
LS T9 C IN2 D2 D3 D4 DM91 TREND T9(-4) AR(1)
```

Estimation Equation:

\[
T9 = C(1) + C(2)*IN2 + C(3)*D2 + C(4)*D3 + C(5)*D4 + C(6)*DM91 + C(7)*TREND + C(8)*T9(-4) + [AR(1)=C(9)]
\]

Substituted Coefficients:

\[
T9 = -4.5868062 + 0.68884238*IN2 + 0.90566728*D2 + 2.1571766*D3 + 2.5901325*D4 + 0.3798553*DM91 + 0.019673301*TREND + 0.41496153*T9(-4) + [AR(1)=0.33344434]
\]

Actual: T9  Forecast: T9F
Sample: 1977.2 1995.4
Include observations: 75

Root Mean Squared Error 0.338001
Mean Absolute Error 0.269624
Mean Absolute Percentage Error 72.56135
Theil Inequality Coefficient 0.143696
Bias Proportion 0.000000
Variance Proportion 0.026828
Covariance Proportion 0.973172
10. SWITZERLAND TO TURKEY:
LS // Dependent Variable is T10
Date: 12/14/97 Time: 21:20
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints
Convergence achieved after 7 iterations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-4.185165</td>
<td>1.552049</td>
<td>-2.696543</td>
<td>0.0090</td>
</tr>
<tr>
<td>INI1</td>
<td>1.031333</td>
<td>0.391782</td>
<td>2.632412</td>
<td>0.0107</td>
</tr>
<tr>
<td>EX30</td>
<td>0.541288</td>
<td>0.206674</td>
<td>2.619042</td>
<td>0.0110</td>
</tr>
<tr>
<td>S24</td>
<td>-0.851369</td>
<td>0.514018</td>
<td>-1.656303</td>
<td>0.1026</td>
</tr>
<tr>
<td>D2</td>
<td>0.848365</td>
<td>0.172283</td>
<td>-4.924260</td>
<td>0.0000</td>
</tr>
<tr>
<td>D3</td>
<td>-2.085445</td>
<td>0.319681</td>
<td>-6.523519</td>
<td>0.0000</td>
</tr>
<tr>
<td>D4</td>
<td>2.695237</td>
<td>0.443911</td>
<td>6.071566</td>
<td>0.0000</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.746132</td>
<td>0.175763</td>
<td>-4.245097</td>
<td>0.0001</td>
</tr>
<tr>
<td>TREND</td>
<td>0.057884</td>
<td>0.025026</td>
<td>2.312923</td>
<td>0.0240</td>
</tr>
<tr>
<td>T10(-4)</td>
<td>0.349878</td>
<td>0.091839</td>
<td>3.809674</td>
<td>0.0003</td>
</tr>
<tr>
<td>AR(2)</td>
<td>0.358370</td>
<td>0.104875</td>
<td>3.417119</td>
<td>0.0011</td>
</tr>
</tbody>
</table>

R-squared 0.896079 Mean dependent var 0.275761
Adjusted R-squared 0.879584 S.D. dependent var 0.830581
S.E. of regression 0.288220 Akaike info criterion -2.351694
Sum squared resid 5.233466 Schwarz criterion -2.009198
Log likelihood -6.988767 F-statistic 54.32313
Durbin-Watson stat 1.633643 Prob(F-statistic) 0.000000

Inverted AR Roots
<table>
<thead>
<tr>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.60</td>
</tr>
<tr>
<td>-0.60</td>
</tr>
</tbody>
</table>

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 5.072435 Probability 0.001397
Obs*R-squared 18.93613 Probability 0.000809

White Heteroskedasticity Test:
F-statistic 1.534772 Probability 0.127031
Obs*R-squared 19.75508 Probability 0.138054

Ramsey RESET Test:
F-statistic 0.144359 Probability 0.705284
Log likelihood ratio 0.172099 Probability 0.678253

Estimation Command:
LS T10 C INI11 EX30 S24 D2 D3 D4 DM91 TREND T10(-4) AR(2)

Estimation Equation:
T10 = C(1) + C(2)*INI11 + C(3)*EX30 + C(4)*S24 + C(5)*D2 + C(6)*D3 + C(7)*D4 + C(8)*DM91 + C(9)*TREND + C(10)*T10(-4) + [AR(2)=C(11)]

Substituted Coefficients:
T10 = -4.1851653 + 1.0313329*IN11 + 0.54128769*EX30 - 0.85136904*S24 + 0.84836462*D2 - 2.0854445*D3 + 2.6952375*D4 - 0.74613174*DM91 + 0.057883563*TREND + 0.34987818*T10(-4) + [AR(2)=0.35837048]

Actual: T10  Forecast: T10F
Sample: 1977:3 1995:4
Include observations: 74

Root Mean Squared Error 0.267589
Mean Absolute Error 0.213996
Mean Absolute Percentage Error 99.66265
Theil Inequality Coefficient 0.158113
Bias Proportion 0.000820
Variance Proportion 0.038857
Covariance Proportion 0.960323

11. GREECE TO TURKEY:
LS // Dependent Variable is T11
Date: 12/17/97 Time: 13:10
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints
Convergence achieved after 8 iterations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-4.082410</td>
<td>1.301581</td>
<td>-3.136502</td>
<td>0.0026</td>
</tr>
<tr>
<td>CL25</td>
<td>-0.551029</td>
<td>0.164684</td>
<td>-3.354984</td>
<td>0.0014</td>
</tr>
<tr>
<td>D2</td>
<td>0.279037</td>
<td>0.067321</td>
<td>4.144888</td>
<td>0.0001</td>
</tr>
<tr>
<td>D3</td>
<td>-0.788241</td>
<td>0.155360</td>
<td>-5.073643</td>
<td>0.0000</td>
</tr>
<tr>
<td>D4</td>
<td>1.109451</td>
<td>0.216868</td>
<td>5.115793</td>
<td>0.0000</td>
</tr>
<tr>
<td>DM87</td>
<td>-0.476508</td>
<td>0.170801</td>
<td>-2.789842</td>
<td>0.0069</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.432325</td>
<td>0.170219</td>
<td>-2.539817</td>
<td>0.0135</td>
</tr>
<tr>
<td>TREND</td>
<td>0.053992</td>
<td>0.014786</td>
<td>3.651487</td>
<td>0.0005</td>
</tr>
<tr>
<td>T11(-4)</td>
<td>0.313957</td>
<td>0.107225</td>
<td>2.928023</td>
<td>0.0047</td>
</tr>
<tr>
<td>AR(1)</td>
<td>0.652516</td>
<td>0.095570</td>
<td>6.827629</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
LS // Dependent Variable is T11
Date: 12/17/97 Time: 12:59
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints
Convergence achieved after 5 iterations

**Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.**
---|---|---|---|---
C | -1.584233 | 0.727644 | -2.177209 | 0.0330
CL31 | -0.451341 | 0.175832 | -2.566889 | 0.0125
D2 | 0.277223 | 0.071122 | 3.897839 | 0.0002
D3 | -0.805857 | 0.166297 | -4.845883 | 0.0000
D4 | 1.129981 | 0.231884 | 4.873035 | 0.0000
DM91 | -0.447425 | 0.181097 | -2.470633 | 0.0161
TREND | 0.027086 | 0.008939 | 3.029954 | 0.0035
T11(-4) | 0.295237 | 0.115898 | 2.547393 | 0.0132
AR(1) | 0.659567 | 0.095743 | 6.888961 | 0.0000

Breusch-Godfrey Serial Correlation LM Test:
- F-statistic: 2.218332
- Probability: 0.077215

White Heteroskedasticity Test:
- F-statistic: 1.016347
- Probability: 0.439922

Ramsey RESET Test:
- F-statistic: 6.633475
- Probability: 0.012291

Estimation Command:
```
LS T11 C CL25 D2 D3 D4 DM91 TREND T11(-4) SAR(1)
```
\[ T11 = C(1) + C(2)\times CL25 + C(3)\times D2 + C(4)\times D3 + C(5)\times D4 + C(6)\times DM91 + C(7)\times TREND + C(8)\times T11(-4) + [AR(1) = C(9)] \]

**Substituted Coefficients:**

\[ T11 = -3.8427226 - 0.51835277\times CL25 + 0.28761834\times D2 - 0.81339619\times D3 + 1.1442889\times D4 - 0.4161824\times DM91 + 0.05147709\times TREND + 0.29181726\times T11(-4) + [AR(1) = 0.62419424] \]

**Actual vs. Forecast:**

- **Actual:** T11
- **Forecast:** T11F

**Sample:** 1977:2-1995:4

**Include observations:** 75

**Root Mean Squared Error:** 0.292996
**Mean Absolute Error:** 0.225708
**Mean Absolute Percentage Error:** 31.49351
**Theil Inequality Coefficient:** 0.109529

**Belgium to Turkey:**

**Dependent Variable:** T12

**Date:** 12/17/97  Time: 14:53

**Sample (adjusted):** 1977:3-1995:4  
**Included observations:** 74 after adjusting endpoints

**Convergence achieved after 6 iterations**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-5.903157</td>
<td>1.193013</td>
<td>-4.948110</td>
<td>0.0000</td>
</tr>
<tr>
<td>IN1</td>
<td>0.919127</td>
<td>0.253943</td>
<td>3.619418</td>
<td>0.0006</td>
</tr>
<tr>
<td>S26</td>
<td>-0.454678</td>
<td>0.279421</td>
<td>-1.627216</td>
<td>0.1087</td>
</tr>
<tr>
<td>D2</td>
<td>1.105970</td>
<td>0.198315</td>
<td>5.576835</td>
<td>0.0000</td>
</tr>
<tr>
<td>D3</td>
<td>-2.810637</td>
<td>0.437198</td>
<td>-6.428748</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
D4  3.307439  0.536022  6.170344  0.0000
DM80 -0.337486  0.190308 -1.773369  0.0810
DM91 -0.579882  0.179247 -3.235103  0.0019
TREND  0.017762  0.003548  5.005603  0.0000
T12(-4)  0.207708  0.115865  1.792666  0.0778
AR(2)  0.288835  0.121680  2.373720  0.0207

R-squared  0.929995  Mean dependent var  -0.551893
Adjusted R-squared  0.918884  S.D. dependent var  1.061491
S.E. of regression  0.302323  Akaike info criterion  -2.256154
Sum squared resid  5.758138  Schwarz criterion  -1.913657
Log likelihood  -10.52377  F-statistic  83.69414
Durbin-Watson stat  1.694659  Prob(F-statistic)  0.000000

Inverted AR Roots  .54  -.54

Breusch-Godfrey Serial Correlation LM Test:
F-statistic  2.816068  Probability  0.033080
Obs*R-squared  11.86316  Probability  0.018398

White Heteroskedasticity Test:
F-statistic  1.851827  Probability  0.055225
Obs*R-squared  21.18922  Probability  0.069269

Ramsey RESET Test:
F-statistic  0.000724  Probability  0.978620
Log likelihood ratio  0.000864  Probability  0.976549

Estimation Command:
LS T12 C INI S26 D2 D3 D4 DM80 DM91 TREND T12(-4) SAR(2)

Estimation Equation:
T12 = C(1) + C(2)*INI + C(3)*S26 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*DM80 + C(8)*DM91 + C(9)*TREND + C(10)*T12(-4) + [AR(2)=C(11)]

Substituted Coefficients:
T12 = -5.9031575 + 0.591912731*INI - 0.4546782*S26 + 1.1059699*D2 - 2.8106369*D3 + 3.3074387*D4 - 0.33748616*DM80 - 0.5798822*DM91 + 0.0177665*TREND + 0.2077081*T12(-4) + [AR(2)=0.28883492]
Actual: T12  Forecast: T12F
Sample: 1977:3 1995:4
Include observations: 74

Root Mean Squared Error 0.290951
Mean Absolute Error 0.223668
Mean Absolute Percentage Error 53.05020
Theil Inequality Coefficient 0.124424
  Bias Proportion 0.000140
  Variance Proportion 0.024283
  Covariance Proportion 0.975577

### 13. NETHERLANDS TO TURKEY:

LS // Dependent Variable is T13
Date: 12/17/97  Time: 15:34
Sample(adjusted): 1977:4 1995:4
Included observations: 73 after adjusting endpoints
Convergence achieved after 7 iterations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-3.741502</td>
<td>0.919484</td>
<td>-4.069133</td>
<td>0.0001</td>
</tr>
<tr>
<td>IN9</td>
<td>0.615732</td>
<td>0.194350</td>
<td>3.168163</td>
<td>0.0024</td>
</tr>
<tr>
<td>EX33</td>
<td>0.233198</td>
<td>0.184480</td>
<td>1.264078</td>
<td>0.2109</td>
</tr>
<tr>
<td>S27</td>
<td>-0.476059</td>
<td>0.239248</td>
<td>-1.989812</td>
<td>0.0510</td>
</tr>
<tr>
<td>D2</td>
<td>0.719333</td>
<td>0.143880</td>
<td>4.999547</td>
<td>0.0000</td>
</tr>
<tr>
<td>D3</td>
<td>-1.721353</td>
<td>0.396684</td>
<td>-4.359262</td>
<td>0.0000</td>
</tr>
<tr>
<td>D4</td>
<td>2.138932</td>
<td>0.396684</td>
<td>5.351555</td>
<td>0.0000</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.521531</td>
<td>0.136909</td>
<td>-3.809325</td>
<td>0.0003</td>
</tr>
<tr>
<td>TREND</td>
<td>0.040982</td>
<td>0.019152</td>
<td>2.139889</td>
<td>0.0363</td>
</tr>
<tr>
<td>T13(-4)</td>
<td>0.535476</td>
<td>0.081834</td>
<td>6.543431</td>
<td>0.0000</td>
</tr>
<tr>
<td>AR(3)</td>
<td>0.346730</td>
<td>0.102183</td>
<td>3.393247</td>
<td>0.0012</td>
</tr>
</tbody>
</table>

R-squared 0.956933  Mean dependent var -0.290435
Adjusted R-squared 0.949987  S.D. dependent var 1.117578
S.E. of regression 0.249931  Akaike info criterion -2.635093
Sum squared resid 3.872875  Schwarz criterion -2.289955
Log likelihood 3.598367  F-statistic 137.7614
Durbin-Watson stat 1.863784  Prob(F-statistic) 0.000000

Inverted AR Roots .70  -.35+.61i  -.35 -.61i

LS // Dependent Variable is T13
Date: 12/17/97  Time: 15:42
Sample(adjusted): 1978:1 1995:4
Included observations: 72 after adjusting endpoints
Convergence achieved after 8 iterations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-2.438712</td>
<td>0.870105</td>
<td>-2.802780</td>
<td>0.0068</td>
</tr>
<tr>
<td>IN9</td>
<td>0.312455</td>
<td>0.109387</td>
<td>2.856422</td>
<td>0.0058</td>
</tr>
<tr>
<td>EX33</td>
<td>0.357145</td>
<td>0.140520</td>
<td>2.541596</td>
<td>0.0135</td>
</tr>
<tr>
<td>D2</td>
<td>0.754853</td>
<td>0.282802</td>
<td>2.669187</td>
<td>0.0097</td>
</tr>
<tr>
<td>D3</td>
<td>-1.781669</td>
<td>0.648894</td>
<td>-2.745700</td>
<td>0.0079</td>
</tr>
<tr>
<td>D4</td>
<td>2.161802</td>
<td>0.803541</td>
<td>2.690344</td>
<td>0.0092</td>
</tr>
<tr>
<td>DM91</td>
<td>-0.501522</td>
<td>0.139679</td>
<td>-3.590520</td>
<td>0.0007</td>
</tr>
<tr>
<td>TREND</td>
<td>0.053238</td>
<td>0.013914</td>
<td>3.826122</td>
<td>0.0003</td>
</tr>
<tr>
<td>T13(-4)</td>
<td>0.515537</td>
<td>0.175076</td>
<td>2.944648</td>
<td>0.0045</td>
</tr>
<tr>
<td>AR(4)</td>
<td>0.156032</td>
<td>0.192856</td>
<td>0.809059</td>
<td>0.4216</td>
</tr>
</tbody>
</table>

R-squared 0.960955  Mean dependent var -0.283094
Adjusted R-squared 0.955287  S.D. dependent var 1.123646
S.E. of regression 0.379599  Akaike info criterion -2.746092
Sum squared resid 3.500116  Schwarz criterion -2.429888
Log likelihood 6.695743  F-statistic 169.5460
Durbin-Watson stat 2.192345  Prob(F-statistic) 0.000000

Inverted AR Roots .63

Breusch-Godfrey Serial Correlation LM Test:
F-statistic 1.328237  Probability 0.270316
Obs*R-squared 6.041927  Probability 0.196039

White Heteroskedasticity Test:
F-statistic 1.408840  Probability 0.187782
Obs*R-squared 16.03610  Probability 0.189588

Ramsey RESET Test:
F-statistic 9.184430  Probability 0.003578
Log likelihood ratio 10.09819  Probability 0.001484

Estimation Command:
LS T13 C IN9 EX33 D2 D3 D4 DM91 TREND T13(-4) SAR(4)

Estimation Equation:
T13 = C(1) + C(2)*IN9 + C(3)*EX33 + C(4)*D2 + C(5)*D3 + C(6)*D4 + C(7)*DM91 + C(8)*TREND + C(9)*T13(-4) + [AR(4)=C(10)]

Substituted Coefficients:

T13 = -2.4387125 + 0.31245464*IN9 + 0.35714494*EX33 + 0.75485267*D2 - 1.7816689*D3 + 2.1618017*D4 - 0.50152166*DM91 + 0.053237678*TREND + 0.51553685*T13(-4) + [AR(4)=0.15603215]
2. UROOT TESTS IN TSP WITH 4 LAGGED INCLUDING CONSTANT AND TREND VARIABLE:
8 OCT, 1997

2.1 DEPENDENT VARIABLES:

LS // Dependent Variable is D(D(A1))
Date: 10-08-1997 / Time: 14:37
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(A1)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(A1(-1)))</td>
<td>1.84602125</td>
<td>0.6142221</td>
<td>3.0054478</td>
<td>0.0037</td>
</tr>
<tr>
<td>D(D(A1(-2)))</td>
<td>0.8057558</td>
<td>0.4413890</td>
<td>2.0067462</td>
<td>0.0488</td>
</tr>
<tr>
<td>D(D(A1(-3)))</td>
<td>-0.0649222</td>
<td>0.2717333</td>
<td>-0.2391397</td>
<td>0.8117</td>
</tr>
<tr>
<td>D(D(A1(-4)))</td>
<td>-0.0417333</td>
<td>0.1199937</td>
<td>-0.3681299</td>
<td>0.7139</td>
</tr>
<tr>
<td>D(A1(-1))</td>
<td>-3.8060871</td>
<td>0.6958868</td>
<td>-5.5792422</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>0.0564476</td>
<td>0.0290013</td>
<td>1.9463818</td>
<td>0.0558</td>
</tr>
</tbody>
</table>

TREND: -0.0011694

R-squared: 0.998445
Adjusted R-squared: 0.998305
S.E. of regression: 0.102675
Log likelihood: 67.11303
Durbin-Watson stat: 2.013227

LS // Dependent Variable is D(D(A2))
Date: 10-08-1997 / Time: 14:40
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(A2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(A2(-1)))</td>
<td>0.7253971</td>
<td>0.5449770</td>
<td>1.3310599</td>
<td>0.1877</td>
</tr>
<tr>
<td>D(D(A2(-2)))</td>
<td>0.0679812</td>
<td>0.3937740</td>
<td>0.1726402</td>
<td>0.8635</td>
</tr>
<tr>
<td>D(D(A2(-3)))</td>
<td>-0.565969</td>
<td>0.2459823</td>
<td>-2.3160484</td>
<td>0.0236</td>
</tr>
<tr>
<td>D(D(A2(-4)))</td>
<td>-0.2328874</td>
<td>0.1161872</td>
<td>-2.0044161</td>
<td>0.0481</td>
</tr>
<tr>
<td>D(A2(-1))</td>
<td>-2.6191117</td>
<td>0.6157002</td>
<td>-4.2538751</td>
<td>0.0001</td>
</tr>
<tr>
<td>C</td>
<td>0.0865958</td>
<td>0.0485259</td>
<td>1.7842526</td>
<td>0.0789</td>
</tr>
</tbody>
</table>

TREND: -0.0015782

R-squared: 0.994151
Adjusted R-squared: 0.993627
S.E. of regression: 0.169513
Log likelihood: 30.01248
Durbin-Watson stat: 2.073602

LS // Dependent Variable is D(D(A3))
Date: 10-08-1997 / Time: 14:41
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(A3)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(A3(-1)))</td>
<td>0.2935157</td>
<td>0.3989576</td>
<td>0.7357065</td>
<td>0.4645</td>
</tr>
<tr>
<td>D(D(A3(-2)))</td>
<td>-0.1707796</td>
<td>0.2910917</td>
<td>-0.5868866</td>
<td>0.5594</td>
</tr>
<tr>
<td>D(D(A3(-3)))</td>
<td>-0.6261779</td>
<td>0.1966733</td>
<td>-3.3010335</td>
<td>0.0015</td>
</tr>
<tr>
<td>D(D(A3(-4)))</td>
<td>-0.1189990</td>
<td>0.1114831</td>
<td>-1.0674179</td>
<td>0.2886</td>
</tr>
<tr>
<td>D(A3(-1))</td>
<td>-1.9090669</td>
<td>0.4858646</td>
<td>-4.2559468</td>
<td>0.0001</td>
</tr>
<tr>
<td>C</td>
<td>0.0971454</td>
<td>0.0339077</td>
<td>2.8649966</td>
<td>0.0056</td>
</tr>
</tbody>
</table>

TREND: -0.0019256

R-squared: 0.994151
Adjusted R-squared: 0.993627
S.E. of regression: 0.111069
Log likelihood: 61.29772
Durbin-Watson stat: 2.030736

LS // Dependent Variable is D(D(A4))
Date: 10-08-1997 / Time: 14:42
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(A4)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(A4(-1)))</td>
<td>0.5505329</td>
<td>0.3862476</td>
<td>1.4253368</td>
<td>0.1587</td>
</tr>
<tr>
<td>D(D(A4(-2)))</td>
<td>0.0890351</td>
<td>0.2857326</td>
<td>0.3119304</td>
<td>0.7563</td>
</tr>
<tr>
<td>D(D(A4(-3)))</td>
<td>-0.3595055</td>
<td>0.1902809</td>
<td>-1.8641512</td>
<td>0.0687</td>
</tr>
</tbody>
</table>
LS // Dependent Variable is D(D(A5))
Date: 10-08-1997 / Time: 14:42
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(A5)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(A5(-1))</td>
<td>1.036165</td>
<td>0.335398</td>
<td>3.0971140</td>
<td>0.0029</td>
</tr>
<tr>
<td>D(A5(-2))</td>
<td>0.0155625</td>
<td>0.0547233</td>
<td>0.2836757</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared: 0.999990
Adjusted R-squared: 0.998900
S.D. of dependent var: 0.088053
Sum of squared resid: 78.48195
F-statistic: 19.85187
Prob(F-statistic): 0.000000

D(D(A4(-1))) 0.1530152 0.1178970 1.2978719 0.01988
D(A4(-2)) -1.8425622 0.4260162 -4.3250985 0.00003
C 0.0136871 0.0401357 0.3410214 0.7342
TREND -0.0005587 0.0008358 -0.6684838 0.5061

LS // Dependent Variable is D(D(A6))
Date: 10-08-1997 / Time: 14:43
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(A6)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(A6(-1))</td>
<td>1.201392</td>
<td>0.3535796</td>
<td>-0.1926490</td>
<td>0.8482</td>
</tr>
</tbody>
</table>

R-squared: 0.909990
Adjusted R-squared: 0.908900
S.D. of dependent var: 0.131110
Sum of squared resid: 15.27495
F-statistic: 15.27495
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(A7))
Date: 10-08-1997 / Time: 14:43
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(A7)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(A7(-1))</td>
<td>0.1201392</td>
<td>0.3535796</td>
<td>-0.1926490</td>
<td>0.8482</td>
</tr>
</tbody>
</table>

R-squared: 0.909990
Adjusted R-squared: 0.908900
S.D. of dependent var: 0.131110
Sum of squared resid: 15.27495
F-statistic: 15.27495
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(M1))
Date: 10-08-1997 / Time: 14:44
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(M1)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(M1(-1))</td>
<td>1.201392</td>
<td>0.3535796</td>
<td>-0.1926490</td>
<td>0.8482</td>
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</table>

R-squared: 0.909990
Adjusted R-squared: 0.908900
S.D. of dependent var: 0.131110
Sum of squared resid: 15.27495
F-statistic: 15.27495
Prob(F-statistic): 0.000000
<table>
<thead>
<tr>
<th>DATE</th>
<th>TIME</th>
<th>SMPL RANGE</th>
<th>NUMBER OF OBSERVATIONS</th>
<th>AUGMENTED Dickey-Fuller: UROOT(T,4)</th>
<th>D(M2)</th>
<th>D(M3)</th>
<th>D(M4)</th>
<th>D(M5)</th>
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<tr>
<td>10-08-1997</td>
<td>14:45</td>
<td>1977.3 - 1995.4</td>
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<td>D(M2)</td>
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<td>D(M3)</td>
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<td>D(M4)</td>
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<td>D(M5)</td>
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</table>

### LS // Dependent Variable is D(D(M2))

**R-squared**

0.910129

Mean of dependent var -0.031878

Adjusted R-squared 1.183509

S.E. of regression 0.370344

Sum of squared resid 9.189368

F-statistic 113.0855

Prob(F-statistic) 0.000000

Mean of dependent var -0.006722

S.D. of dependent var 0.598208

Sum of squared resid 4.419552

F-statistic 54.83759

Prob(F-statistic) 0.000000

Mean of dependent var -0.010357

S.D. of dependent var 0.518576

Sum of squared resid 2.378162

F-statistic 81.01170

Prob(F-statistic) 0.000000

Mean of dependent var -0.031235

S.D. of dependent var 0.431234

Sum of squared resid 4.931234

F-statistic 113.0855

Prob(F-statistic) 0.000000

### LS // Dependent Variable is D(D(M3))

**R-squared**

0.830819

Mean of dependent var -0.006722

Adjusted R-squared 1.183509

S.E. of regression 0.370344

Sum of squared resid 9.189368

F-statistic 113.0855

Prob(F-statistic) 0.000000

Mean of dependent var -0.010357

S.D. of dependent var 0.598208

Sum of squared resid 4.419552

F-statistic 54.83759

Prob(F-statistic) 0.000000

Mean of dependent var -0.010357

S.D. of dependent var 0.518576

Sum of squared resid 2.378162

F-statistic 81.01170

Prob(F-statistic) 0.000000

Mean of dependent var -0.031235

S.D. of dependent var 0.431234

Sum of squared resid 4.931234

F-statistic 113.0855

Prob(F-statistic) 0.000000

### LS // Dependent Variable is D(D(M4))

**R-squared**

0.878858

Mean of dependent var -0.006722

Adjusted R-squared 1.183509

S.E. of regression 0.370344

Sum of squared resid 9.189368

F-statistic 113.0855

Prob(F-statistic) 0.000000

Mean of dependent var -0.010357

S.D. of dependent var 0.598208

Sum of squared resid 4.419552

F-statistic 54.83759

Prob(F-statistic) 0.000000

Mean of dependent var -0.031235

S.D. of dependent var 0.431234

Sum of squared resid 4.931234

F-statistic 113.0855

Prob(F-statistic) 0.000000

### LS // Dependent Variable is D(D(M5))

**R-squared**

0.982198

Mean of dependent var -0.031235

Adjusted R-squared 1.183509

S.E. of regression 0.370344

Sum of squared resid 9.189368

F-statistic 113.0855

Prob(F-statistic) 0.000000

Mean of dependent var -0.031235

S.D. of dependent var 0.431234

Sum of squared resid 4.931234

F-statistic 113.0855

Prob(F-statistic) 0.000000

### LS // Dependent Variable is D(D(M6))

**R-squared**

0.980604

Mean of dependent var -0.031235

Adjusted R-squared 1.183509

S.E. of regression 0.370344

Sum of squared resid 9.189368

F-statistic 113.0855

Prob(F-statistic) 0.000000

Mean of dependent var -0.031235

S.D. of dependent var 0.431234

Sum of squared resid 4.931234

F-statistic 113.0855

Prob(F-statistic) 0.000000

### LS // Dependent Variable is D(D(M7))

**R-squared**

0.986057

Mean of dependent var -0.031235

Adjusted R-squared 1.183509

S.E. of regression 0.370344

Sum of squared resid 9.189368

F-statistic 113.0855

Prob(F-statistic) 0.000000

Mean of dependent var -0.031235

S.D. of dependent var 0.431234

Sum of squared resid 4.931234

F-statistic 113.0855

Prob(F-statistic) 0.000000
### LS // Dependent Variable is D(D(M6))

Date: 10-08-1997 / Time: 14:46  
SMPL range: 1977.3 - 1995.4  
Number of observations: 74

Augmented Dickey-Fuller: UROOT(T, 4) D(M6)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(M6(-1)))</td>
<td>0.2754228</td>
<td>0.4255263</td>
<td>0.6472521</td>
<td>0.5197</td>
</tr>
<tr>
<td>D(D(M6(-2)))</td>
<td>-0.3326559</td>
<td>0.3211547</td>
<td>-1.0358120</td>
<td>0.3040</td>
</tr>
<tr>
<td>D(D(M6(-3)))</td>
<td>-0.5604895</td>
<td>0.2024592</td>
<td>-2.7684080</td>
<td>0.0073</td>
</tr>
<tr>
<td>D(D(M6(-4)))</td>
<td>-1.7558696</td>
<td>0.1177688</td>
<td>-3.6540137</td>
<td>0.0005</td>
</tr>
<tr>
<td>C</td>
<td>0.0755284</td>
<td>0.0670857</td>
<td>1.1258484</td>
<td>0.2642</td>
</tr>
</tbody>
</table>

| R-squared | 0.898774 | Mean of dependent var | -0.016283 |
| Adjusted R-squared | 0.898870 | S.D. of dependent var | 0.068780 |
| S.E. of regression | 0.369872 | Sum of squared resid | 4.144884 |
| Log likelihood | 0.832378 | F-statistic | 137.2742 |
| Durbin-Watson stat | 0.3859 | Prob(F-statistic) | 0.000000 |

### LS // Dependent Variable is D(D(M7))

Date: 10-08-1997 / Time: 14:47  
SMPL range: 1977.3 - 1995.4  
Number of observations: 74

Augmented Dickey-Fuller: UROOT(T, 4) D(M7)

<table>
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<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(D(M7(-1)))</td>
<td>0.2845965</td>
<td>0.3536179</td>
<td>0.8048134</td>
<td>0.4238</td>
</tr>
<tr>
<td>D(D(M7(-2)))</td>
<td>-0.1932750</td>
<td>0.2679649</td>
<td>-0.7212696</td>
<td>0.4733</td>
</tr>
<tr>
<td>D(D(M7(-3)))</td>
<td>-0.4730381</td>
<td>0.1782002</td>
<td>-2.6545312</td>
<td>0.0346892</td>
</tr>
<tr>
<td>D(D(M7(-4)))</td>
<td>-1.5637066</td>
<td>0.1172060</td>
<td>-3.9356646</td>
<td>0.0002</td>
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<tr>
<td>C</td>
<td>-0.0596695</td>
<td>0.0469971</td>
<td>-1.2696416</td>
<td>0.2086</td>
</tr>
</tbody>
</table>

| R-squared | 0.926036 | Mean of dependent var | -0.008994 |
| Adjusted R-squared | 0.919413 | S.D. of dependent var | 0.608396 |
| S.E. of regression | 0.172711 | Sum of squared resid | 0.179854 |
| Log likelihood | 0.926396 | F-statistic | 139.8083 |
| Durbin-Watson stat | 0.931492 | Prob(F-statistic) | 0.000000 |

### LS // Dependent Variable is D(D(N1,2))

Date: 10-08-1997 / Time: 14:48  
SMPL range: 1984.4 - 1995.4  
Number of observations: 45

Augmented Dickey-Fuller: UROOT(T, 4) D(N1,2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(N1(-1)),2)</td>
<td>2.5609289</td>
<td>0.8740414</td>
<td>2.9299858</td>
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</tr>
<tr>
<td>D(D(N1(-2)),2)</td>
<td>1.2603298</td>
<td>0.6418226</td>
<td>1.9636730</td>
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</tr>
<tr>
<td>D(D(N1(-3)),2)</td>
<td>0.3081070</td>
<td>0.3731795</td>
<td>0.8256269</td>
<td>0.4122</td>
</tr>
<tr>
<td>D(D(N1(-4)),2)</td>
<td>-0.0279045</td>
<td>0.1525525</td>
<td>-0.1829175</td>
<td>0.8687</td>
</tr>
<tr>
<td>D(N1(-1),2)</td>
<td>-4.9031123</td>
<td>0.1971548</td>
<td>-5.0013141</td>
<td>0.0005</td>
</tr>
<tr>
<td>C</td>
<td>-0.0274952</td>
<td>0.0035331</td>
<td>-1.2035205</td>
<td>0.2330</td>
</tr>
</tbody>
</table>

| R-squared | 0.901150 | Mean of dependent var | -0.016556 |
| Adjusted R-squared | 0.895542 | S.D. of dependent var | 0.906726 |
| S.E. of regression | 0.306760 | Sum of squared resid | 3.575686 |
| Log likelihood | 198549 | F-statistic | 57.73677 |
| Durbin-Watson stat | 1.957352 | Prob(F-statistic) | 0.000000 |

### LS // Dependent Variable is D(D(N2,2))

Date: 10-08-1997 / Time: 14:49  
SMPL range: 1984.4 - 1995.4  
Number of observations: 45

Augmented Dickey-Fuller: UROOT(T, 4) D(N2,2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(N2(-1)),2)</td>
<td>2.7199114</td>
<td>0.8546556</td>
<td>3.1824648</td>
<td>0.0057</td>
</tr>
<tr>
<td>D(D(N2(-2)),2)</td>
<td>1.4890358</td>
<td>0.6205203</td>
<td>2.3965700</td>
<td>0.0214</td>
</tr>
<tr>
<td>D(D(N2(-3)),2)</td>
<td>0.1127038</td>
<td>0.3777663</td>
<td>0.3161480</td>
<td>0.7514</td>
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<tr>
<td>D(D(N2(-4)),2)</td>
<td>0.0654985</td>
<td>0.1646440</td>
<td>0.3978190</td>
<td>0.6930</td>
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<tr>
<td>D(N2(-1),2)</td>
<td>-4.8569733</td>
<td>0.9711393</td>
<td>-5.0013141</td>
<td>0.0005</td>
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<tr>
<td>C</td>
<td>0.0478891</td>
<td>0.2209659</td>
<td>0.8263</td>
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</tr>
</tbody>
</table>

| R-squared | 0.901150 | Mean of dependent var | -0.016556 |
| Adjusted R-squared | 0.895542 | S.D. of dependent var | 0.906726 |
| S.E. of regression | 0.306760 | Sum of squared resid | 3.575686 |
| Log likelihood | 198549 | F-statistic | 57.73677 |
| Durbin-Watson stat | 1.957352 | Prob(F-statistic) | 0.000000 |
### LS // Dependent Variable is D(D(N3,2))
Date: 10-08-1997 / Time: 14:49
SMPL range: 1984.4 - 1995.4
Number of observations: 45

Augmented Dickey-Fuller: UROOT(T,

<table>
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<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(N3(-1),2)</td>
<td>2.0614744</td>
<td>0.8425468</td>
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</tr>
<tr>
<td>D(N3(-2),2)</td>
<td>1.0086772</td>
<td>0.6031310</td>
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<tr>
<td>D(N3(-3),2)</td>
<td>0.0138449</td>
<td>0.3632343</td>
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<td>0.9698</td>
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<tr>
<td>D(N3(-4),2)</td>
<td>-0.0983865</td>
<td>0.1439992</td>
<td>-0.6832430</td>
<td>0.4996</td>
</tr>
<tr>
<td>D(N3(-1),2)</td>
<td>-4.2425790</td>
<td>0.9670696</td>
<td>-4.3870463</td>
<td>0.0001</td>
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</table>

Mean of dependent var | 2.011363
S.D. of dependent var | 0.000000
Sum of squared resid | 175.2228
F-statistic | 175.2228
Prob(F-statistic) | 0.000000

R-squared | 0.965116
Adjusted R-squared | 0.959608
S.E. of regression | 0.316136
Log likelihood | -8.226760
Durbin-Watson stat | 2.011363

### LS // Dependent Variable is D(D(N4,2))
Date: 10-08-1997 / Time: 14:50
SMPL range: 1984.4 - 1995.4
Number of observations: 45

Augmented Dickey-Fuller: UROOT(T,

<table>
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<tr>
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<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(N4(-1),2)</td>
<td>2.8349713</td>
<td>0.8679736</td>
<td>3.2661954</td>
<td>0.0023</td>
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<tr>
<td>D(N4(-2),2)</td>
<td>1.6071376</td>
<td>0.6156725</td>
<td>2.6103773</td>
<td>0.0129</td>
</tr>
<tr>
<td>D(N4(-3),2)</td>
<td>0.4821637</td>
<td>0.3645541</td>
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<tr>
<td>D(N4(-4),2)</td>
<td>0.2021565</td>
<td>0.4078556</td>
<td>0.5079173</td>
<td>0.6088</td>
</tr>
<tr>
<td>D(N4(-1),2)</td>
<td>-5.1974468</td>
<td>1.0014200</td>
<td>-5.1900766</td>
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</table>

Mean of dependent var | 1.969095
S.D. of dependent var | 0.7207
Sum of squared resid | 289.2934
F-statistic | 289.2934
Prob(F-statistic) | 0.000000

R-squared | 0.977022
Adjusted R-squared | 0.973394
S.E. of regression | 0.326585
Log likelihood | -9.690122
Durbin-Watson stat | 1.977495

### LS // Dependent Variable is D(D(N5,2))
Date: 10-08-1997 / Time: 14:51
SMPL range: 1984.4 - 1995.4
Number of observations: 45

Augmented Dickey-Fuller: UROOT(T,

<table>
<thead>
<tr>
<th>VARIABLE</th>
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<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(N5(-1),2)</td>
<td>2.3386986</td>
<td>0.8624591</td>
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<tr>
<td>D(N5(-2),2)</td>
<td>1.1595222</td>
<td>0.6558968</td>
<td>1.7611298</td>
<td>0.0863</td>
</tr>
<tr>
<td>D(N5(-3),2)</td>
<td>0.3328232</td>
<td>0.4078556</td>
<td>0.8149510</td>
<td>0.4202</td>
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<tr>
<td>D(N5(-4),2)</td>
<td>-0.0023444</td>
<td>0.1782616</td>
<td>-0.1307648</td>
<td>0.8967</td>
</tr>
<tr>
<td>D(N5(-1),2)</td>
<td>-4.5205566</td>
<td>0.9767137</td>
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</tbody>
</table>

Mean of dependent var | 1.857216
S.D. of dependent var | 0.7463
Sum of squared resid | 98.94921
F-statistic | 98.94921
Prob(F-statistic) | 0.000000

R-squared | 0.872789
Adjusted R-squared | 0.852704
S.E. of regression | 0.978442
Log likelihood | -59.06727
Durbin-Watson stat | 1.977495

### LS // Dependent Variable is D(D(N5))
Date: 10-08-1997 / Time: 14:52
SMPL range: 1984.3 - 1995.4
Number of observations: 46

Augmented Dickey-Fuller: UROOT(T,

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(N5(-1))</td>
<td>0.7454217</td>
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<td>D(N5(-2))</td>
<td>0.2682211</td>
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<td>D(N5(-3))</td>
<td>0.0246142</td>
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<td>D(N5(-4))</td>
<td>-0.0982615</td>
<td>0.1784529</td>
<td>-0.046950</td>
<td>0.9633</td>
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<tr>
<td>D(N5(-1))</td>
<td>-2.2341112</td>
<td>0.6274656</td>
<td>-3.5605320</td>
<td>0.0010</td>
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</table>

Mean of dependent var | 0.939844
S.D. of dependent var | 0.852704
Sum of squared resid | 36.37922
F-statistic | 36.37922
Prob(F-statistic) | 0.000000

R-squared | 0.852704
Adjusted R-squared | 0.852704
S.E. of regression | 0.978442
Log likelihood | -59.06727
Durbin-Watson stat | 1.977495

### LS // Dependent Variable is D(D(N5))
Date: 10-08-1997 / Time: 14:53
SMPL range: 1984.3 - 1995.4
Number of observations: 46

Augmented Dickey-Fuller: UROOT(T,

<table>
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<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(N5(-1))</td>
<td>0.9937079</td>
<td>0.5569244</td>
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<td>0.8672</td>
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<td>D(N5(-2))</td>
<td>0.0094247</td>
<td>0.0094247</td>
<td>-0.0980446</td>
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<td>Variable</td>
<td>Coefficient</td>
<td>Std. Error</td>
<td>T-Stat.</td>
<td>2-Tail Sig.</td>
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<td>----------</td>
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</tr>
<tr>
<td>D(N6(-1))</td>
<td>0.1959017</td>
<td>0.4089506</td>
<td>0.4790351</td>
<td>0.633</td>
</tr>
<tr>
<td>D(N6(-2))</td>
<td>-0.2635910</td>
<td>0.3089397</td>
<td>-0.8532117</td>
<td>0.3966</td>
</tr>
<tr>
<td>D(N6(-3))</td>
<td>-0.5514089</td>
<td>0.2031961</td>
<td>-2.7136780</td>
<td>0.0085</td>
</tr>
<tr>
<td>D(N6(-4))</td>
<td>-0.1317847</td>
<td>0.1188860</td>
<td>-1.084966</td>
<td>0.2716</td>
</tr>
<tr>
<td>C</td>
<td>-0.5508842</td>
<td>0.0918168</td>
<td>-3.228393</td>
<td>0.0809</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0007855</td>
<td>0.0011156</td>
<td>0.7041217</td>
<td>0.4838</td>
</tr>
</tbody>
</table>

R-squared: 0.860894
Adjusted R-squared: 0.848437
S.E. of regression: 0.200904
Sum of squared resid: 17.44003
F-statistic: 1.801202
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(T1))
Date: 10-08-1997 / Time: 14:55
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(T1)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Stat.</th>
<th>2-Tail Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(T1(-1))</td>
<td>0.2925397</td>
<td>0.4567818</td>
<td>0.6404364</td>
<td>0.5281</td>
</tr>
<tr>
<td>D(T1(-2))</td>
<td>-0.2131511</td>
<td>0.3374785</td>
<td>-0.6315990</td>
<td>0.5298</td>
</tr>
<tr>
<td>D(T1(-3))</td>
<td>-0.6408366</td>
<td>0.2163080</td>
<td>-2.9626125</td>
<td>0.0042</td>
</tr>
<tr>
<td>D(T1(-4))</td>
<td>-0.1649035</td>
<td>0.1215179</td>
<td>-1.3570313</td>
<td>0.1793</td>
</tr>
<tr>
<td>C</td>
<td>-0.032142</td>
<td>0.0711701</td>
<td>-0.4666882</td>
<td>0.6422</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0017998</td>
<td>0.0014863</td>
<td>1.2109070</td>
<td>0.2302</td>
</tr>
</tbody>
</table>

R-squared: 0.970501
Adjusted R-squared: 0.967859
S.E. of regression: 0.269307
Sum of squared resid: 4.243895
F-statistic: 2.013136
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(T2)
Date: 10-08-1997 / Time: 14:56
SMPL range: 1977.2 - 1995.4
Number of observations: 75
Augmented Dickey-Fuller: UROOT(T,4) D(T2)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Stat.</th>
<th>2-Tail Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(T2(-1))</td>
<td>0.1218671</td>
<td>0.1585127</td>
<td>0.768158</td>
<td>0.4447</td>
</tr>
<tr>
<td>D(T2(-2))</td>
<td>-0.1599567</td>
<td>0.1367117</td>
<td>-1.700298</td>
<td>0.2461</td>
</tr>
<tr>
<td>D(T2(-3))</td>
<td>-0.1415613</td>
<td>0.1099615</td>
<td>-1.287313</td>
<td>0.2023</td>
</tr>
<tr>
<td>D(T2(-4))</td>
<td>0.5376467</td>
<td>0.0979314</td>
<td>5.4900328</td>
<td>0.0000</td>
</tr>
<tr>
<td>T2(-1)</td>
<td>-0.5623537</td>
<td>0.1542381</td>
<td>-3.6660128</td>
<td>0.0005</td>
</tr>
<tr>
<td>C</td>
<td>-0.0535842</td>
<td>0.0910607</td>
<td>-0.5884440</td>
<td>0.5582</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0117788</td>
<td>0.0036253</td>
<td>3.2490215</td>
<td>0.0018</td>
</tr>
</tbody>
</table>

R-squared: 0.902901
Adjusted R-squared: 0.894363
S.E. of regression: 0.341199
Sum of squared resid: 22.08181
F-statistic: 2.315074
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(T3))
Date: 10-08-1997 / Time: 14:56
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(T3)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Stat.</th>
<th>2-Tail Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(T3(-1))</td>
<td>0.4277044</td>
<td>0.3841417</td>
<td>1.1134025</td>
<td>0.2685</td>
</tr>
<tr>
<td>D(T3(-2))</td>
<td>-0.0550403</td>
<td>0.2878002</td>
<td>-0.1928570</td>
<td>0.8477</td>
</tr>
<tr>
<td>D(T3(-3))</td>
<td>-0.4221840</td>
<td>0.1899951</td>
<td>-2.2220785</td>
<td>0.0297</td>
</tr>
<tr>
<td>D(T3(-4))</td>
<td>0.0570948</td>
<td>0.1194313</td>
<td>0.4792118</td>
<td>0.6333</td>
</tr>
<tr>
<td>C</td>
<td>-0.5508842</td>
<td>0.0918168</td>
<td>-0.5541925</td>
<td>0.5813</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0014194</td>
<td>0.0019021</td>
<td>0.7462532</td>
<td>0.4561</td>
</tr>
</tbody>
</table>
### LS // Dependent Variable is $D(T7)$

**Date:** 10-08-1997 / **Time:** 14:57  
**SMPL range:** 1977.3 - 1995.4  
**Number of observations:** 74  
**Augmented Dickey-Fuller:** UROOT(T, 4) $D(T7)$

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$D(T7(-1))$</td>
<td>0.1953263</td>
<td>0.3942763</td>
<td>0.4953976</td>
<td>0.6219</td>
</tr>
<tr>
<td>$D(T7(-2))$</td>
<td>-0.2284457</td>
<td>0.2968796</td>
<td>-0.7694084</td>
<td>0.4443</td>
</tr>
<tr>
<td>$D(T7(-3))$</td>
<td>-0.6111990</td>
<td>0.1990746</td>
<td>-3.0702004</td>
<td>0.0031</td>
</tr>
<tr>
<td>$D(T7(-4))$</td>
<td>-0.0103537</td>
<td>0.1293807</td>
<td>-0.0800203</td>
<td>0.9365</td>
</tr>
<tr>
<td>$D(T7(-1))$</td>
<td>-1.5716774</td>
<td>0.4331579</td>
<td>-3.6284168</td>
<td>0.0006</td>
</tr>
<tr>
<td>$D(T7(-2))$</td>
<td>-0.0350767</td>
<td>0.0710644</td>
<td>-0.4935900</td>
<td>0.6232</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0015567</td>
<td>0.0015045</td>
<td>1.0346995</td>
<td>0.3045</td>
</tr>
</tbody>
</table>

**R-squared:** 0.975852  
**Mean of dependent var:** -0.027449

---

### LS // Dependent Variable is $D(T5)$

**Date:** 10-08-1997 / **Time:** 14:58  
**SMPL range:** 1977.3 - 1995.4  
**Number of observations:** 74  
**Augmented Dickey-Fuller:** UROOT(T, 4) $D(T5)$

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$D(T5(-1))$</td>
<td>0.4633969</td>
<td>0.3915899</td>
<td>1.1833729</td>
<td>0.2408</td>
</tr>
<tr>
<td>$D(T5(-2))$</td>
<td>-0.3946492</td>
<td>0.2930642</td>
<td>-1.0835864</td>
<td>0.3936</td>
</tr>
<tr>
<td>$D(T5(-3))$</td>
<td>-0.3992894</td>
<td>0.1944887</td>
<td>-2.0530207</td>
<td>0.0440</td>
</tr>
<tr>
<td>$D(T5(-4))$</td>
<td>0.0794286</td>
<td>0.1210667</td>
<td>0.6560838</td>
<td>0.5140</td>
</tr>
<tr>
<td>$D(T5(-1))$</td>
<td>-1.7694512</td>
<td>0.4325982</td>
<td>-4.0902876</td>
<td>0.0001</td>
</tr>
<tr>
<td>$D(T5(-2))$</td>
<td>-0.0110969</td>
<td>0.0852309</td>
<td>-0.1301975</td>
<td>0.8968</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0005000</td>
<td>0.0017591</td>
<td>0.2842613</td>
<td>0.7771</td>
</tr>
</tbody>
</table>

**R-squared:** 0.961691  
**Mean of dependent var:** -0.027757

---

### LS // Dependent Variable is $D(T6)$

**Date:** 10-08-1997 / **Time:** 14:58  
**SMPL range:** 1977.2 - 1995.4  
**Number of observations:** 75  
**Augmented Dickey-Fuller:** UROOT(T, 4) $D(T6)$

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$D(T6(-1))$</td>
<td>0.1718837</td>
<td>0.1240427</td>
<td>1.3856817</td>
<td>0.1704</td>
</tr>
<tr>
<td>$D(T6(-2))$</td>
<td>0.0356475</td>
<td>0.1053686</td>
<td>0.3402105</td>
<td>0.7347</td>
</tr>
<tr>
<td>$D(T6(-3))$</td>
<td>-0.0719979</td>
<td>0.0887559</td>
<td>-0.8109842</td>
<td>0.4202</td>
</tr>
<tr>
<td>$D(T6(-4))$</td>
<td>0.7676733</td>
<td>0.0796594</td>
<td>9.6369504</td>
<td>0.0000</td>
</tr>
<tr>
<td>$T(-6)$</td>
<td>-0.4848905</td>
<td>0.1105129</td>
<td>-4.3876367</td>
<td>0.0000</td>
</tr>
<tr>
<td>$C$</td>
<td>-1.0490885</td>
<td>0.2438265</td>
<td>-4.3026028</td>
<td>0.0001</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0024338</td>
<td>0.0015279</td>
<td>1.5928903</td>
<td>0.1158</td>
</tr>
</tbody>
</table>

**R-squared:** 0.913229  
**Mean of dependent var:** 0.017284

---

### LS // Dependent Variable is $D(T7)$

**Date:** 10-08-1997 / **Time:** 14:59  
**SMPL range:** 1977.4 - 1995.4  
**Number of observations:** 33  
**Augmented Dickey-Fuller:** UROOT(T, 4) $D(T7)$

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$D(T7(-1),2)$</td>
<td>3.0773340</td>
<td>1.0907129</td>
<td>2.9177388</td>
<td>0.0091</td>
</tr>
<tr>
<td>$D(T7(-2),2)$</td>
<td>1.7130037</td>
<td>0.7958684</td>
<td>2.1802777</td>
<td>0.0385</td>
</tr>
<tr>
<td>$D(T7(-3),2)$</td>
<td>0.3839115</td>
<td>0.4785305</td>
<td>0.8022716</td>
<td>0.4297</td>
</tr>
<tr>
<td>$D(T7(-4),2)$</td>
<td>0.0161504</td>
<td>0.1917437</td>
<td>0.0842291</td>
<td>0.9335</td>
</tr>
<tr>
<td>$D(T7(-1),2)$</td>
<td>-5.4239444</td>
<td>1.2427509</td>
<td>-4.3644663</td>
<td>0.0002</td>
</tr>
<tr>
<td>$D(T7(-2),2)$</td>
<td>-0.2243162</td>
<td>0.2191296</td>
<td>-1.0236691</td>
<td>0.3154</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0035011</td>
<td>0.0033924</td>
<td>1.0320170</td>
<td>0.3116</td>
</tr>
</tbody>
</table>

**R-squared:** 0.982970  
**Mean of dependent var:** -0.035865
### Adjusted R-squared
0.979039
S.D. of dependent var 1.256203

S.E. of regression 0.181870
Sum of squared resid 0.859997

Log likelihood 13.35605
F-statistic 250.1122

Durbin-Watson stat 2.014100
Prob(F-statistic) 0.000000

---

**LS // Dependent Variable is D(D(T8),2)**

**Date:** 10-08-1997 / **Time:** 14:59

**SMPL range:** 1987.4 - 1995.4

**Number of observations:** 33

Augmented Dickey-Fuller: UROOT(T,4) D(T8,2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(T8(-1),2)</td>
<td>3.0973065</td>
<td>1.0884452</td>
<td>2.845624</td>
<td>0.0085</td>
</tr>
<tr>
<td>D(T8(-2),2)</td>
<td>1.6567031</td>
<td>0.7918822</td>
<td>2.092108</td>
<td>0.0463</td>
</tr>
<tr>
<td>D(T8(-3),2)</td>
<td>0.4315637</td>
<td>0.4684891</td>
<td>0.921181</td>
<td>0.3654</td>
</tr>
<tr>
<td>D(T8(-4),2)</td>
<td>-0.0513460</td>
<td>0.1874535</td>
<td>-0.273913</td>
<td>0.7863</td>
</tr>
<tr>
<td>C</td>
<td>-5.4664778</td>
<td>1.2485464</td>
<td>-4.378273</td>
<td>0.0002</td>
</tr>
</tbody>
</table>

**TREND**

-0.1200632 | 0.0012711 | 0.117000 | 0.108640 | 0.9143 |

---

### Adjusted R-squared
0.957954
Mean of dependent var -0.052732

S.D. of dependent var 0.948251
Sum of squared resid 13.35605

F-statistic 2.014100
Prob(F-statistic) 0.000000

---

**LS // Dependent Variable is D(D(T9))**

**Date:** 10-08-1997 / **Time:** 15:00

**SMPL range:** 1977.3 - 1995.4

**Number of observations:** 74

Augmented Dickey-Fuller: UROOT(T,4) D(T9)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(T9(-1))</td>
<td>0.9874370</td>
<td>0.4428523</td>
<td>2.229721</td>
<td>0.0291</td>
</tr>
<tr>
<td>D(T9(-2))</td>
<td>0.2855143</td>
<td>0.3322921</td>
<td>0.859227</td>
<td>0.3933</td>
</tr>
<tr>
<td>D(T9(-3))</td>
<td>-0.2165965</td>
<td>0.2119658</td>
<td>-1.021846</td>
<td>0.3105</td>
</tr>
<tr>
<td>D(T9(-4))</td>
<td>0.0617914</td>
<td>0.1225657</td>
<td>0.504149</td>
<td>0.6158</td>
</tr>
<tr>
<td>C</td>
<td>-2.4405159</td>
<td>0.4982912</td>
<td>-4.897770</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

**TREND**

-0.0278517 | 0.1061622 | 1.106242 | 0.2726 |

---

### Adjusted R-squared
0.948222
Mean of dependent var -0.028219

S.D. of dependent var 0.943586
Sum of squared resid 13.35605

F-statistic 2.001546
Prob(F-statistic) 98.7241

---

**LS // Dependent Variable is D(D(T10))**

**Date:** 10-08-1997 / **Time:** 15:01

**SMPL range:** 1977.3 - 1995.4

**Number of observations:** 74

Augmented Dickey-Fuller: UROOT(T,4) D(T10)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(T10(-1))</td>
<td>0.2239177</td>
<td>0.3517157</td>
<td>0.636644</td>
<td>0.5265</td>
</tr>
<tr>
<td>D(T10(-2))</td>
<td>0.2145886</td>
<td>0.2648492</td>
<td>-0.810229</td>
<td>0.4207</td>
</tr>
<tr>
<td>D(T10(-3))</td>
<td>-0.2165965</td>
<td>0.1790830</td>
<td>-3.187479</td>
<td>0.0022</td>
</tr>
<tr>
<td>D(T10(-4))</td>
<td>-0.0461669</td>
<td>0.1176213</td>
<td>-4.174001</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>-1.5024603</td>
<td>0.3904017</td>
<td>-3.642329</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

**TREND**

-0.0405478 | 0.1025575 | -0.394489 | 0.6945 |

---

### Adjusted R-squared
0.940235
Mean of dependent var -0.028241

S.D. of dependent var 0.935972
Sum of squared resid 13.35605

F-statistic 2.013470
Prob(F-statistic) 178.8555

---

**LS // Dependent Variable is D(D(T11))**

**Date:** 10-08-1997 / **Time:** 15:01

**SMPL range:** 1977.3 - 1995.4

**Number of observations:** 74

Augmented Dickey-Fuller: UROOT(T,4) D(T11)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(T11(-1))</td>
<td>0.2020509</td>
<td>0.3734828</td>
<td>0.590413</td>
<td>0.5669</td>
</tr>
<tr>
<td>D(T11(-2))</td>
<td>-0.2127532</td>
<td>0.2864426</td>
<td>-0.742742</td>
<td>0.4602</td>
</tr>
<tr>
<td>D(T11(-3))</td>
<td>-0.4535475</td>
<td>0.1940722</td>
<td>-2.337004</td>
<td>0.0224</td>
</tr>
<tr>
<td>D(T11(-4))</td>
<td>-0.0252339</td>
<td>0.1240440</td>
<td>-0.203427</td>
<td>0.8394</td>
</tr>
<tr>
<td>C</td>
<td>-1.5024603</td>
<td>0.4124999</td>
<td>-3.642329</td>
<td>0.0005</td>
</tr>
</tbody>
</table>

**TREND**

-0.0014397 | 0.0018427 | -0.876430 | 0.3639 |

---

### Adjusted R-squared
0.835884
Mean of dependent var -0.006558

S.D. of dependent var 0.821187
Sum of squared resid 13.35605

F-statistic 0.000000
Prob(F-statistic) 0.681585
### LS // Dependent Variable is D(D(T12))

**Date:** 10-08-1997 / **Time:** 15:02  
**SMPL range:** 1977.3 - 1995.4  
**Number of observations:** 74

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(T12(-1))</td>
<td>0.1100251</td>
<td>0.3706241</td>
<td>0.2968644</td>
<td>0.7675</td>
</tr>
<tr>
<td>D(T12(-2))</td>
<td>-0.5360077</td>
<td>0.2826020</td>
<td>-1.8966872</td>
<td>0.0622</td>
</tr>
<tr>
<td>D(T12(-3))</td>
<td>-0.6334058</td>
<td>0.1728871</td>
<td>-3.6636969</td>
<td>0.0005</td>
</tr>
<tr>
<td>D(T12(-4))</td>
<td>-0.3070555</td>
<td>0.1039173</td>
<td>-2.9548046</td>
<td>0.0043</td>
</tr>
<tr>
<td>D(T12(-5))</td>
<td>-1.5248848</td>
<td>0.4277148</td>
<td>-3.5651907</td>
<td>0.0007</td>
</tr>
<tr>
<td>C</td>
<td>-0.0478291</td>
<td>0.0955416</td>
<td>-0.5006103</td>
<td>0.6183</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0019145</td>
<td>0.0019778</td>
<td>0.9679598</td>
<td>0.3365</td>
</tr>
</tbody>
</table>

**R-squared:** 0.955591  
**Mean of dependent var:** -0.029685

### LS // Dependent Variable is D(D(T13))

**Date:** 10-08-1997 / **Time:** 15:02  
**SMPL range:** 1977.3 - 1995.4  
**Number of observations:** 74

<table>
<thead>
<tr>
<th>VARIABLE</th>
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<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(T13(-1))</td>
<td>0.5605086</td>
<td>0.4279678</td>
<td>1.3096979</td>
<td>0.1948</td>
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<tr>
<td>D(T13(-2))</td>
<td>-0.0436979</td>
<td>0.3168171</td>
<td>-0.1379278</td>
<td>0.8907</td>
</tr>
<tr>
<td>D(T13(-3))</td>
<td>-0.4970743</td>
<td>0.2011938</td>
<td>-2.4706248</td>
<td>0.0160</td>
</tr>
<tr>
<td>D(T13(-4))</td>
<td>-0.1255669</td>
<td>0.1142816</td>
<td>-1.0987501</td>
<td>0.2758</td>
</tr>
<tr>
<td>D(U1(-1))</td>
<td>-1.7582691</td>
<td>0.4862514</td>
<td>-4.3945905</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>-0.0010173</td>
<td>0.0877679</td>
<td>-0.0115912</td>
<td>0.9908</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0012824</td>
<td>0.0017962</td>
<td>0.7139178</td>
<td>0.4778</td>
</tr>
</tbody>
</table>

**R-squared:** 0.964754  
**Mean of dependent var:** -0.033152

### LS // Dependent Variable is D(D(U1))

**Date:** 10-08-1997 / **Time:** 15:03  
**SMPL range:** 1977.3 - 1995.4  
**Number of observations:** 74

<table>
<thead>
<tr>
<th>VARIABLE</th>
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<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(U1(-1))</td>
<td>0.5025230</td>
<td>0.3822979</td>
<td>1.3144803</td>
<td>0.1932</td>
</tr>
<tr>
<td>D(U1(-2))</td>
<td>-0.0517547</td>
<td>0.2916305</td>
<td>-0.1774665</td>
<td>0.8597</td>
</tr>
<tr>
<td>D(U1(-3))</td>
<td>-0.3521476</td>
<td>0.1882707</td>
<td>-1.8704327</td>
<td>0.0658</td>
</tr>
<tr>
<td>D(U1(-4))</td>
<td>-0.1255669</td>
<td>0.1142816</td>
<td>-1.0987501</td>
<td>0.2758</td>
</tr>
<tr>
<td>D(U1(-5))</td>
<td>-3.3490025</td>
<td>0.4249304</td>
<td>-8.647E-05</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>0.0130320</td>
<td>0.0387471</td>
<td>0.0007934</td>
<td>0.9794</td>
</tr>
<tr>
<td>TREND</td>
<td>-2.059E-05</td>
<td>0.0007934</td>
<td>-0.0259571</td>
<td>0.7377</td>
</tr>
</tbody>
</table>

**R-squared:** 0.972665  
**Mean of dependent var:** 0.016365

### LS // Dependent Variable is D(D(U2))

**Date:** 10-08-1997 / **Time:** 15:03  
**SMPL range:** 1977.3 - 1995.4  
**Number of observations:** 74

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(U2(-1))</td>
<td>1.3866566</td>
<td>0.5503973</td>
<td>2.5193739</td>
<td>0.0141</td>
</tr>
<tr>
<td>D(U2(-2))</td>
<td>0.4686650</td>
<td>0.4036031</td>
<td>1.1616983</td>
<td>0.2495</td>
</tr>
<tr>
<td>D(U2(-3))</td>
<td>-0.2703488</td>
<td>0.2442930</td>
<td>-1.106681</td>
<td>0.2724</td>
</tr>
<tr>
<td>D(U2(-4))</td>
<td>-0.2057675</td>
<td>0.1141158</td>
<td>-1.8031464</td>
<td>0.0759</td>
</tr>
<tr>
<td>D(U2(-5))</td>
<td>-3.3490025</td>
<td>0.6272017</td>
<td>-5.3410288</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>0.0244805</td>
<td>0.0300287</td>
<td>0.0152347</td>
<td>0.4178</td>
</tr>
<tr>
<td>TREND</td>
<td>-8.647E-05</td>
<td>0.0005986</td>
<td>-0.1444672</td>
<td>0.8856</td>
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</table>

**R-squared:** 0.972665  
**Mean of dependent var:** -0.014371

**S.E. of regression:** 0.970168  
**Mean of dependent var:** 0.628300

**S.E. of regression:** 0.108520  
**Sum of squared resid:** 0.789025
LS // Dependent Variable is D(D(U3))
Date: 10-08-1997 / Time: 15:03
SMPL range: 1978.3 - 1995.4
Number of observations: 70
Augmented Dickey-Fuller: UROOT(T,4) D(U3)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(U3(-1))</td>
<td>1.07039358</td>
<td>0.6527960</td>
<td>2.513755</td>
<td>0.0015</td>
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<tr>
<td>D(U3(-2))</td>
<td>0.7165652</td>
<td>0.4730064</td>
<td>1.541966</td>
<td>0.1344</td>
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<tr>
<td>D(U3(-3))</td>
<td>-0.1592059</td>
<td>0.2878625</td>
<td>-0.551062</td>
<td>0.5822</td>
</tr>
<tr>
<td>D(U3(-4))</td>
<td>-0.1677749</td>
<td>0.1224719</td>
<td>-1.369905</td>
<td>0.1756</td>
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</table>

R-squared 0.961534
Adjusted R-squared 0.957871
Mean of dependent var 0.206739
S.D. of dependent var 0.262489
Sum of squared resid 14.70295
F-statistic 262.4718
Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(U4))
Date: 10-08-1997 / Time: 15:04
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(U4)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(U4(-1))</td>
<td>2.4040428</td>
<td>0.6266278</td>
<td>3.836477</td>
<td>0.0003</td>
</tr>
<tr>
<td>D(U4(-2))</td>
<td>1.2243469</td>
<td>0.4575621</td>
<td>2.675804</td>
<td>0.0094</td>
</tr>
<tr>
<td>D(U4(-3))</td>
<td>0.2105694</td>
<td>0.2736347</td>
<td>0.769527</td>
<td>0.4443</td>
</tr>
<tr>
<td>D(U4(-4))</td>
<td>0.0066201</td>
<td>0.1191408</td>
<td>0.055656</td>
<td>0.9559</td>
</tr>
<tr>
<td>D(U4(-1))</td>
<td>-4.4654174</td>
<td>0.7157900</td>
<td>-6.238459</td>
<td>0.0000</td>
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R-squared 0.959352
Adjusted R-squared 0.955712
Mean of dependent var 0.145707
S.D. of dependent var 0.142244
Sum of squared resid 41.21117
F-statistic 263.5528
Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(U5))
Date: 10-08-1997 / Time: 15:05
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(U5)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(U5(-1))</td>
<td>1.0425649</td>
<td>0.4521648</td>
<td>2.305719</td>
<td>0.0242</td>
</tr>
<tr>
<td>D(U5(-2))</td>
<td>0.5495294</td>
<td>0.3370119</td>
<td>1.630593</td>
<td>0.0997</td>
</tr>
<tr>
<td>D(U5(-3))</td>
<td>-0.0294405</td>
<td>0.2297900</td>
<td>-0.128117</td>
<td>0.8984</td>
</tr>
<tr>
<td>D(U5(-4))</td>
<td>0.1013904</td>
<td>0.1191408</td>
<td>0.8526495</td>
<td>0.3969</td>
</tr>
<tr>
<td>D(U5(-1))</td>
<td>-2.6542954</td>
<td>0.5114304</td>
<td>-5.189944</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared 0.929985
Adjusted R-squared 0.923716
Mean of dependent var -0.009167
S.D. of dependent var 0.307246
Sum of squared resid 5.947214
F-statistic 148.3240
Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(U6))
Date: 10-08-1997 / Time: 15:05
SMPL range: 1978.3 - 1995.4
Number of observations: 70
Augmented Dickey-Fuller: UROOT(T,4) D(U6)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(U6(-1))</td>
<td>1.0538445</td>
<td>0.5148502</td>
<td>2.048312</td>
<td>0.0449</td>
</tr>
<tr>
<td>D(U6(-2))</td>
<td>0.3626839</td>
<td>0.3818653</td>
<td>0.947691</td>
<td>0.3459</td>
</tr>
<tr>
<td>D(U6(-3))</td>
<td>-0.2067120</td>
<td>0.2409373</td>
<td>-0.857949</td>
<td>0.3942</td>
</tr>
<tr>
<td>D(U6(-4))</td>
<td>-0.0328197</td>
<td>0.1249800</td>
<td>-0.262599</td>
<td>0.7937</td>
</tr>
<tr>
<td>D(U6(-1))</td>
<td>-2.7265973</td>
<td>0.5818228</td>
<td>-4.907816</td>
<td>0.0000</td>
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<tr>
<td>C</td>
<td>0.0111590</td>
<td>0.0908286</td>
<td>0.1228570</td>
<td>0.9026</td>
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</table>

R-squared 0.883730
Adjusted R-squared 0.872656
Mean of dependent var -0.009167
S.D. of dependent var 0.860989
Sum of squared resid 5.947214
F-statistic 79.80678
Prob(F-statistic) 0.000000
### Augmented Dickey-Fuller: UROOT(T,4) D(U7)

<table>
<thead>
<tr>
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<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(U7(-1),1)</td>
<td>0.7518302</td>
<td>0.5153223</td>
<td>1.4589514</td>
<td>0.1493</td>
</tr>
<tr>
<td>D(U7(-2),2)</td>
<td>0.1252307</td>
<td>0.3765208</td>
<td>0.3325997</td>
<td>0.7405</td>
</tr>
<tr>
<td>D(U7(-3),3)</td>
<td>-0.4755983</td>
<td>0.2397532</td>
<td>-1.9836991</td>
<td>0.0514</td>
</tr>
<tr>
<td>D(U7(-4),4)</td>
<td>-0.1448199</td>
<td>0.1215114</td>
<td>-1.1918216</td>
<td>0.2375</td>
</tr>
<tr>
<td>(D(-1),2)</td>
<td>-2.5238486</td>
<td>0.5775567</td>
<td>-4.3697199</td>
<td>0.0000</td>
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<tr>
<td>C</td>
<td>-0.0032606</td>
<td>0.0395228</td>
<td>-0.0811169</td>
<td>0.9356</td>
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</tbody>
</table>

**TREND**

- R-squared: 0.960396
- Mean of dependent var: -0.005674
- Adjusted R-squared: 0.958494
- S.D. of regression: 0.194922
- Sum of squared resid: 1.495099
- Mean of dependent var: 0.719316
- Durbin-Watson stat: 2.005358
- Prob(F-statistic): 0.000000

### Augmented Dickey-Fuller: UROOT(T,4) D(U8,2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(U8(-1),2)</td>
<td>5.8572385</td>
<td>0.9698940</td>
<td>5.9170362</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(U8(-2),3)</td>
<td>0.7218289</td>
<td>0.7186333</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>D(U8(-3),4)</td>
<td>1.6559686</td>
<td>0.4339622</td>
<td>3.8150062</td>
<td>0.0006</td>
</tr>
<tr>
<td>D(U8(-4),5)</td>
<td>0.4799815</td>
<td>0.1645258</td>
<td>2.9173623</td>
<td>0.0066</td>
</tr>
<tr>
<td>(U8(-1),2)</td>
<td>-8.5490735</td>
<td>1.1203604</td>
<td>-7.6304640</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>-0.0285987</td>
<td>0.1743753</td>
<td>-0.1640237</td>
<td>0.8675</td>
</tr>
</tbody>
</table>

**TREND**

- R-squared: 0.971533
- Mean of dependent var: 0.009988
- Adjusted R-squared: 0.965839
- S.D. of regression: 0.179679
- Sum of squared resid: 0.968536
- Mean of dependent var: 0.972151
- Durbin-Watson stat: 1.725223
- Prob(F-statistic): 0.000000

### Augmented Dickey-Fuller: UROOT(T,4) D(U11,2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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</thead>
<tbody>
<tr>
<td>D(U11(-1),2)</td>
<td>4.4916343</td>
<td>1.0527476</td>
<td>4.2665522</td>
<td>0.0002</td>
</tr>
<tr>
<td>D(U11(-2),3)</td>
<td>2.5030987</td>
<td>0.7748159</td>
<td>3.3857112</td>
<td>0.0020</td>
</tr>
<tr>
<td>D(U11(-3),4)</td>
<td>1.0224065</td>
<td>0.4483045</td>
<td>2.2802003</td>
<td>0.0299</td>
</tr>
<tr>
<td>D(U11(-4),5)</td>
<td>0.1567454</td>
<td>0.1792460</td>
<td>0.8747100</td>
<td>0.3888</td>
</tr>
<tr>
<td>(U11(-1),2)</td>
<td>-6.9761539</td>
<td>1.2116986</td>
<td>-5.7573341</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>0.0776826</td>
<td>0.0682553</td>
<td>-0.0916489</td>
<td>0.9217</td>
</tr>
</tbody>
</table>

**TREND**

- R-squared: 0.968571
- Mean of dependent var: -0.012302
- Adjusted R-squared: 0.962285
- S.D. of regression: 0.703405
- Sum of squared resid: 1.484337
- Mean of dependent var: 3.620210
- Durbin-Watson stat: 2.043902
- Prob(F-statistic): 0.000000

### Augmented Dickey-Fuller: UROOT(T,4) D(I2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(I2(-1),2)</td>
<td>3.2924456</td>
<td>1.1594777</td>
<td>2.8395937</td>
<td>0.0101</td>
</tr>
<tr>
<td>D(I2(-2),3)</td>
<td>1.7473425</td>
<td>0.8498675</td>
<td>2.0506177</td>
<td>0.0531</td>
</tr>
<tr>
<td>D(I2(-3),4)</td>
<td>0.5104799</td>
<td>0.5005969</td>
<td>1.0197425</td>
<td>0.3200</td>
</tr>
<tr>
<td>D(I2(-4),5)</td>
<td>-0.0023324</td>
<td>0.2043478</td>
<td>-0.0114140</td>
<td>0.9910</td>
</tr>
<tr>
<td>(I2(-1),2)</td>
<td>-5.5738539</td>
<td>1.3310145</td>
<td>-4.1876733</td>
<td>0.0005</td>
</tr>
<tr>
<td>C</td>
<td>0.1841649</td>
<td>0.6017212</td>
<td>0.3060634</td>
<td>0.7627</td>
</tr>
</tbody>
</table>

**TREND**

- R-squared: 0.979488
- Mean of dependent var: -0.451666
- Adjusted R-squared: 0.973334
- S.D. of regression: 0.544455
- Sum of squared resid: 5.928629
2.2 EXPLANATORY VARIABLES:

2.2.1 INCOME PER CAPITA: (GDP per head, IN)

LS // Dependent Variable is D(D(IN1,2))
Date: 10-08-1997 / Time: 15:19
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T,4) D(IN1,2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(IN1(-1,2))</td>
<td>1.8134566</td>
<td>0.5533687</td>
<td>3.2771219</td>
<td>0.0017</td>
</tr>
<tr>
<td>D(IN1(-2,2))</td>
<td>0.9337036</td>
<td>0.4120986</td>
<td>2.2657285</td>
<td>0.0268</td>
</tr>
<tr>
<td>D(IN1(-3,2))</td>
<td>0.1412723</td>
<td>0.2649546</td>
<td>0.5331944</td>
<td>0.5957</td>
</tr>
<tr>
<td>D(IN1(-4,2))</td>
<td>0.0894258</td>
<td>0.1223216</td>
<td>0.7310715</td>
<td>0.4673</td>
</tr>
<tr>
<td>D(IN1(-1,2))</td>
<td>-3.7418895</td>
<td>0.6235515</td>
<td>-6.0009311</td>
<td>0.0000</td>
</tr>
<tr>
<td>TREND</td>
<td>-8.319E-05</td>
<td>0.005187</td>
<td>-0.1603727</td>
<td>0.8731</td>
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R-squared 0.924043 Mean of dependent var 0.004287
Adjusted R-squared 0.917138 S.D. of dependent var 0.322153
S.E. of regression 0.092734 Sum of squared resid 0.567575
Log likelihood 73.69222 F-statistic 133.8194
Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(IN2))
Date: 10-08-1997 / Time: 15:17
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(IN2)

<table>
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<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(IN2(-1))</td>
<td>0.1420106</td>
<td>0.2551001</td>
<td>0.5568659</td>
<td>0.5796</td>
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<tr>
<td>D(IN2(-2))</td>
<td>0.0771613</td>
<td>0.2083471</td>
<td>0.3250170</td>
<td>0.7462</td>
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<tr>
<td>D(IN2(-3))</td>
<td>-0.0490186</td>
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<td>-0.2983298</td>
<td>0.7664</td>
</tr>
<tr>
<td>D(IN2(-4))</td>
<td>0.3049902</td>
<td>0.1120301</td>
<td>2.7223939</td>
<td>0.0083</td>
</tr>
<tr>
<td>D(IN2(-1))</td>
<td>-1.171510</td>
<td>0.2793244</td>
<td>-4.131567</td>
<td>0.0001</td>
</tr>
<tr>
<td>C</td>
<td>-0.0167461</td>
<td>0.0212481</td>
<td>-0.7881212</td>
<td>0.4334</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0005108</td>
<td>0.0004844</td>
<td>1.1392212</td>
<td>0.2587</td>
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R-squared 0.714738 Mean of dependent var 0.001771
Adjusted R-squared 0.689193 S.D. of dependent var 0.139816
S.E. of regression 0.077948 Sum of squared resid 0.407083
Log likelihood 87.50227 F-statistic 27.97869
Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(IN3))
Date: 10-08-1997 / Time: 15:21
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T,4) D(IN3)

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<th>VARIABLE</th>
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<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(IN3(-1,2))</td>
<td>1.5780798</td>
<td>0.5598169</td>
<td>2.8189215</td>
<td>0.0064</td>
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<tr>
<td>D(IN3(-2,2))</td>
<td>0.7737689</td>
<td>0.4154285</td>
<td>1.8625802</td>
<td>0.0670</td>
</tr>
<tr>
<td>D(IN3(-3,2))</td>
<td>0.0261681</td>
<td>0.2660596</td>
<td>0.0983544</td>
<td>0.9219</td>
</tr>
<tr>
<td>D(IN3(-4,2))</td>
<td>0.0673702</td>
<td>0.1237746</td>
<td>0.5442977</td>
<td>0.5881</td>
</tr>
<tr>
<td>D(IN3(-1,2))</td>
<td>-3.4534594</td>
<td>0.6284709</td>
<td>-5.4950184</td>
<td>0.0000</td>
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<tr>
<td>C</td>
<td>-0.0028705</td>
<td>0.0230586</td>
<td>-0.1244811</td>
<td>0.9013</td>
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<td>TREND</td>
<td>-3.971859</td>
<td>0.0004731</td>
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<td>0.9334</td>
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R-squared 0.944759 Mean of dependent var 0.001771
Adjusted R-squared 0.939737 S.D. of dependent var 0.346078
S.E. of regression 0.084957 Sum of squared resid 0.476366
Log likelihood 80.08564 F-statistic 188.1285
Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(IN4))
Date: 10-08-1997 / Time: 15:21
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T,4) D(IN4)

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<tr>
<th>VARIABLE</th>
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<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(IN4(-1,2))</td>
<td>1.6921504</td>
<td>0.6134109</td>
<td>2.7585920</td>
<td>0.0075</td>
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<tr>
<td>D(IN4(-2,2))</td>
<td>0.7805896</td>
<td>0.4558150</td>
<td>1.7125360</td>
<td>0.0915</td>
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<tr>
<td>D(IN4(-3,2))</td>
<td>0.0240750</td>
<td>0.2852180</td>
<td>0.0844090</td>
<td>0.9330</td>
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<tr>
<td>D(IN4(-4,2))</td>
<td>-0.0414380</td>
<td>0.1232098</td>
<td>-0.3362101</td>
<td>0.7377</td>
</tr>
<tr>
<td>D(IN4(-1,2))</td>
<td>-3.7689123</td>
<td>0.6922445</td>
<td>-5.444816</td>
<td>0.0000</td>
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</table>
### LS // Dependent Variable is D(D(IN5))

**Date**: 10-08-1997 / **Time**: 15:22  
**SMPL range**: 1977.3 - 1995.4  
**Number of observations**: 74  

**Augmented Dickey-Fuller**: UR00T(T, 4) D(IN5)

<table>
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<tr>
<th>VARIABLE</th>
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<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(IN5(-1))</td>
<td>0.7774456</td>
<td>0.4925830</td>
<td>1.5783037</td>
<td>0.1192</td>
</tr>
<tr>
<td>D(IN5(-2))</td>
<td>-0.2148471</td>
<td>0.3665868</td>
<td>0.5860741</td>
<td>0.5598</td>
</tr>
<tr>
<td>D(IN5(-3))</td>
<td>-0.2659113</td>
<td>0.2393846</td>
<td>-1.1108121</td>
<td>0.2706</td>
</tr>
<tr>
<td>D(IN5(-4))</td>
<td>-0.1431327</td>
<td>0.1162295</td>
<td>-1.2316558</td>
<td>0.2225</td>
</tr>
<tr>
<td>D(IN5(-1))</td>
<td>-2.5858376</td>
<td>0.5606538</td>
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<td>0.0000</td>
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<tr>
<td>C</td>
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<td>0.0010454</td>
<td>0.4816563</td>
<td>0.6316</td>
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</tbody>
</table>

**TREND**: 0.0009773  
**S.E. of regression**: 0.0250820  
**Log likelihood**: 0.9690  
**Durbin-Watson stat**: 1.935815  

**R-squared**: 0.908952  
**Adjusted R-squared**: 0.900675  
**S.E. of regression**: 0.0005145  
**Log likelihood**: 109.8156  
**Durbin-Watson stat**: 0.908952  

**Mean of dependent var**: 0.002986  
**S.D. of dependent var**: 0.292982  
**Sum of squared resid**: 0.562709  
**F-statistic**: 74.00650  
**Prob(F-statistic)**: 0.000000

### LS // Dependent Variable is D(D(IN6))

**Date**: 10-08-1997 / **Time**: 15:23  
**SMPL range**: 1977.3 - 1995.4  
**Number of observations**: 74  

**Augmented Dickey-Fuller**: UR00T(T, 4) D(IN6)

<table>
<thead>
<tr>
<th>VARIABLE</th>
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<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
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<tbody>
<tr>
<td>D(IN6(-1))</td>
<td>-0.0698815</td>
<td>0.2090237</td>
<td>-0.3343235</td>
<td>0.7392</td>
</tr>
<tr>
<td>D(IN6(-2))</td>
<td>-0.0069905</td>
<td>0.1748344</td>
<td>-0.0399834</td>
<td>0.9682</td>
</tr>
<tr>
<td>D(IN6(-3))</td>
<td>-0.1163969</td>
<td>0.1482007</td>
<td>-0.7854005</td>
<td>0.4350</td>
</tr>
<tr>
<td>D(IN6(-4))</td>
<td>0.2796746</td>
<td>0.1095464</td>
<td>2.5530247</td>
<td>0.0130</td>
</tr>
<tr>
<td>D(IN6(-1))</td>
<td>-0.8007233</td>
<td>0.2206416</td>
<td>-3.6290676</td>
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</tr>
<tr>
<td>C</td>
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<td>0.0211279</td>
<td>-0.1665873</td>
<td>0.8682</td>
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</tbody>
</table>

**TREND**: 0.0005035  
**S.E. of regression**: 0.1669267  
**Log likelihood**: 86.12488  
**Durbin-Watson stat**: 2.014586  

**R-squared**: 0.856386  
**Adjusted R-squared**: 0.843525  
**S.E. of regression**: 0.079412  
**Log likelihood**: 20.89712  
**Durbin-Watson stat**: 1.874588

### LS // Dependent Variable is D(D(IN7))

**Date**: 10-08-1997 / **Time**: 15:24  
**SMPL range**: 1977.3 - 1995.4  
**Number of observations**: 74  

**Augmented Dickey-Fuller**: UR00T(T, 4) D(IN7)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(IN7(-1))</td>
<td>-0.1280507</td>
<td>0.1669267</td>
<td>-0.7671072</td>
<td>0.4457</td>
</tr>
<tr>
<td>D(IN7(-2))</td>
<td>-0.0687354</td>
<td>0.1478441</td>
<td>-0.4649246</td>
<td>0.6435</td>
</tr>
<tr>
<td>D(IN7(-3))</td>
<td>-0.1163969</td>
<td>0.1223249</td>
<td>1.6543714</td>
<td>0.1027</td>
</tr>
<tr>
<td>D(IN7(-4))</td>
<td>0.2023709</td>
<td>0.1033882</td>
<td>1.0760712</td>
<td>0.2854</td>
</tr>
<tr>
<td>D(IN7(-1))</td>
<td>-0.9573116</td>
<td>0.1741570</td>
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<td>0.0005</td>
</tr>
<tr>
<td>C</td>
<td>0.0133728</td>
<td>0.0177871</td>
<td>0.7518286</td>
<td>0.4548</td>
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</table>

**TREND**: 0.0002448  
**S.E. of regression**: 0.0194402 | 0.5561747 | 0.5799 |

**R-squared**: 0.667800  
**Adjusted R-squared**: 0.638051  
**S.E. of regression**: 0.1669267  
**Log likelihood**: 86.12488  
**Durbin-Watson stat**: 2.014586  

**Mean of dependent var**: 0.000618  
**S.D. of dependent var**: 0.082059  
**Sum of squared resid**: 0.285246  
**F-statistic**: 8.076556  
**Prob(F-statistic)**: 0.000000

### LS // Dependent Variable is D(D(IN8))

**Date**: 10-08-1997 / **Time**: 15:24  
**SMPL range**: 1977.3 - 1995.4  
**Number of observations**: 74  

**Augmented Dickey-Fuller**: UR00T(T, 4) D(IN8)

<table>
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<tr>
<th>VARIABLE</th>
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<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(IN8(-1))</td>
<td>-0.0885877</td>
<td>0.2214378</td>
<td>-0.4000570</td>
<td>0.6904</td>
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<tr>
<td>D(IN8(-2))</td>
<td>-0.0972298</td>
<td>0.1748241</td>
<td>-0.013545</td>
<td>0.9761</td>
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<tr>
<td>D(IN8(-3))</td>
<td>-0.0543716</td>
<td>0.1360015</td>
<td>-0.397866</td>
<td>0.6906</td>
</tr>
<tr>
<td>D(IN8(-4))</td>
<td>0.1224423</td>
<td>0.0911872</td>
<td>1.3427569</td>
<td>0.1839</td>
</tr>
<tr>
<td>D(IN8(-1))</td>
<td>-0.9573116</td>
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<td>C</td>
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<td>0.0683936</td>
<td>0.9457</td>
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</table>

**R-squared**: 0.419709  
**Adjusted R-squared**: 0.367743  
**S.E. of regression**: 0.050249 | 0.285246 |

**Mean of dependent var**: 0.000618  
**S.D. of dependent var**: 0.082059  
**Sum of squared resid**: 0.285246  
**F-statistic**: 8.076556  
**Prob(F-statistic)**: 0.000000

**Mean of dependent var**: 0.000618  
**S.D. of dependent var**: 0.082059  
**Sum of squared resid**: 0.285246  
**F-statistic**: 8.076556  
**Prob(F-statistic)**: 0.000000
R-squared 0.518948  Mean of dependent var 0.000955
Adjusted R-squared 0.475868  S.D. of dependent var 0.165287
S.E. of regression 0.119662  Sum of squared resid 0.959380
Log likelihood 55.78329  F-statistic 12.04634
Durbin-Watson stat 1.992301  Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(IN10))
Date: 10-08-1997 / Time: 15:26
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(IN10)

<table>
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<th>VARIABLE</th>
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<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
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<tr>
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<tr>
<td>D(IN10(-3))</td>
<td>-0.3118809</td>
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<td>0.0301299</td>
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</table>

R-squared 0.0316269  Mean of dependent var 0.0002789
Adjusted R-squared 0.0006409  S.D. of dependent var 0.0006548
S.E. of regression 0.0006191  Sum of squared resid 0.4258504
Log likelihood 55.78329  F-statistic 12.04634
Durbin-Watson stat 1.992301  Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(IN11))
Date: 10-08-1997 / Time: 15:26
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(IN11)

<table>
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<tr>
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<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(IN11(-1))</td>
<td>-0.0589043</td>
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<td>0.8257</td>
</tr>
<tr>
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<td>-0.0979715</td>
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</tr>
<tr>
<td>D(IN11(-3))</td>
<td>-0.2333941</td>
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<tr>
<td>D(IN11(-4))</td>
<td>0.2176927</td>
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<td>1.6437990</td>
<td>0.0987</td>
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<tr>
<td>D(IN11(-1))</td>
<td>-1.0057952</td>
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</table>

R-squared 0.0316269  Mean of dependent var 0.0002789
Adjusted R-squared 0.0006409  S.D. of dependent var 0.0006548
S.E. of regression 0.0006191  Sum of squared resid 0.4258504
Log likelihood 55.78329  F-statistic 12.04634
Durbin-Watson stat 1.992301  Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(IN12))
Date: 10-08-1997 / Time: 15:27
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(IN12)

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<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(IN12(-1))</td>
<td>0.3211210</td>
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</tr>
<tr>
<td>D(IN12(-2))</td>
<td>0.0724536</td>
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<td>0.6970</td>
</tr>
<tr>
<td>D(IN12(-3))</td>
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</tr>
<tr>
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<td>0.2647130</td>
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</tr>
<tr>
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<td><strong>STD. ERROR</strong></td>
<td><strong>T-STAT.</strong></td>
<td><strong>2-TAIL SIG.</strong></td>
</tr>
<tr>
<td>D(IN13(-1))</td>
<td>0.0443509</td>
<td>0.2341408</td>
<td>0.1894196</td>
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<tr>
<td>D(IN13(-2))</td>
<td>0.0051477</td>
<td>0.2021360</td>
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<td>0.8000</td>
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<tr>
<td>D(IN13(-3))</td>
<td>-0.0248851</td>
<td>0.1669200</td>
<td>0.1490841</td>
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<tr>
<td>D(IN13(-4))</td>
<td>-0.1100056</td>
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<td>-0.9143517</td>
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<td>0.0689492</td>
<td>0.0456868</td>
<td>1.5091705</td>
<td>0.1360</td>
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<tr>
<td>TREND</td>
<td>-0.0011723</td>
<td>0.0009228</td>
<td>-1.2705979</td>
<td>0.2083</td>
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<tr>
<td>R-squared: 0.508948</td>
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<td>S.E. of regression: 0.162626</td>
<td>Log likelihood: 33.08150</td>
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<td>Durbin-Watson stat: 2.029732</td>
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<th>Date: 10-08-1997 / Time: 15:28</th>
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<td><strong>COEFFICIENT</strong></td>
<td><strong>STD. ERROR</strong></td>
<td><strong>T-STAT.</strong></td>
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<tr>
<td>D(IN14(-1),2)</td>
<td>1.4965986</td>
<td>0.5635317</td>
<td>2.6572113</td>
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<tr>
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<td>0.6528961</td>
<td>0.4130797</td>
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<tr>
<td>D(IN14(-3),2)</td>
<td>-0.0702030</td>
<td>0.2569395</td>
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<td>D(IN14(-4),2)</td>
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<td>0.1198929</td>
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<td>0.0026026</td>
<td>0.0218124</td>
<td>-0.0945638</td>
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<tr>
<td>TREND</td>
<td>-3.9370040</td>
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<tr>
<td>Mean of dependent var: 0.652896</td>
<td>S.D. of dependent var: 0.5473E-05</td>
<td>Sum of squared resid: 8.420847</td>
<td>F-statistic: 11.57362</td>
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<tr>
<td>Prob(F-statistic): 0.000000</td>
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<th>SMPL range: 1977.4 - 1995.4</th>
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<tr>
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<td><strong>VARIABLE</strong></td>
<td><strong>COEFFICIENT</strong></td>
<td><strong>STD. ERROR</strong></td>
<td><strong>T-STAT.</strong></td>
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<td>D(IN15(-1),2)</td>
<td>1.3537048</td>
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<td>D(IN15(-2),2)</td>
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<td>Prob(F-statistic): 0.000000</td>
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<th>SMPL range: 1977.2 - 1995.4</th>
<th>Number of observations: 75</th>
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<td><strong>VARIABLE</strong></td>
<td><strong>COEFFICIENT</strong></td>
<td><strong>STD. ERROR</strong></td>
<td><strong>T-STAT.</strong></td>
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<tr>
<td>D(IN16(-1))</td>
<td>0.0627260</td>
<td>0.3835133</td>
<td>0.7525257</td>
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<tr>
<td>D(IN16(-2))</td>
<td>-0.0555550</td>
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<tr>
<td>D(IN16(-3))</td>
<td>-0.0112228</td>
<td>0.0798587</td>
<td>-0.152620</td>
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<tr>
<td>D(IN16(-4))</td>
<td>-0.0011723</td>
<td>0.0433335</td>
<td>-0.7185390</td>
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<td>C</td>
<td>0.0616853</td>
<td>0.1736512</td>
<td>3.6952393</td>
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<td>TREND</td>
<td>0.0006700</td>
<td>0.0003814</td>
<td>1.7565791</td>
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<tr>
<td>Mean of dependent var: 0.823289</td>
<td>S.D. of dependent var: 0.000186</td>
<td>Sum of squared resid: 45.62815</td>
<td>F-statistic: 54.62815</td>
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<td>Prob(F-statistic): 0.000000</td>
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### LS // Dependent Variable is D(D(IN17,2))

**Date:** 10-08-1997 / **Time:** 15:30
**SMPL range:** 1974.4 - 1995.4

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<tr>
<td><strong>VARIABLE</strong></td>
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<tr>
<td>D(IN17(-1),2)</td>
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<tr>
<td>D(IN17(-2),2)</td>
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<tr>
<td>D(IN17(-3),2)</td>
</tr>
<tr>
<td>D(IN17(-4),2)</td>
</tr>
<tr>
<td>D(IN17(-1),2)</td>
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<tr>
<td>C</td>
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<tr>
<td><strong>TREND</strong></td>
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| **Mean of dependent var:** 0.002250 |
| **S.D. of dependent var:** 0.0176434 |
| **Sum of squared resid:** 0.789954 |
| **S.E. of regression:** 0.1647206 |
| **R-squared:** 0.687179 |

### LS // Dependent Variable is D(D(IN18,2))

**Date:** 10-08-1997 / **Time:** 15:31
**SMPL range:** 1974.4 - 1995.4

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<td><strong>VARIABLE</strong></td>
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<td>D(IN18(-2),2)</td>
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<td>D(IN18(-3),2)</td>
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<td>D(IN18(-4),2)</td>
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<td>D(IN18(-1),2)</td>
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<tr>
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<tr>
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| **Mean of dependent var:** 0.000319 |
| **S.D. of dependent var:** 0.0167566 |
| **Sum of squared resid:** 0.294121 |
| **S.E. of regression:** 0.1776434 |
| **R-squared:** 0.759418 |

### LS // Dependent Variable is D(D(IN19))

**Date:** 10-08-1997 / **Time:** 15:31
**SMPL range:** 1973.3 - 1995.4

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<tbody>
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<tr>
<td><strong>VARIABLE</strong></td>
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<tr>
<td>D(IN19(-1))</td>
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<tr>
<td>D(IN19(-2))</td>
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<td>D(IN19(-3))</td>
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<td>D(IN19(-1))</td>
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<tr>
<td>C</td>
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<tr>
<td><strong>TREND</strong></td>
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</table>

| **Mean of dependent var:** 0.000983 |
| **S.D. of dependent var:** 0.0050701 |
| **Sum of squared resid:** 0.283697 |
| **S.E. of regression:** 0.1723069 |
| **R-squared:** 0.500983 |

### LS // Dependent Variable is D(D(IN20,2))

**Date:** 10-08-1997 / **Time:** 15:32
**SMPL range:** 1974.4 - 1995.4

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<td><strong>VARIABLE</strong></td>
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<td>D(IN20(-1),2)</td>
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<tr>
<td>C</td>
</tr>
<tr>
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</table>

| **Mean of dependent var:** 0.820200 |
| **S.D. of dependent var:** 0.000983 |
| **Sum of squared resid:** 0.789954 |
| **S.E. of regression:** 0.1647206 |
| **R-squared:** 0.624240 |
### 2.2.2 COST OF LIVING: (CL)

**LS // Dependent Variable is D(D(IN21))**

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<td><strong>VARIABLE</strong></td>
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<tr>
<td>D(IN21(-1))</td>
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<td>D(IN21(-2))</td>
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<td>D(IN21(-1))</td>
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<td><strong>TREND</strong></td>
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<tr>
<td><strong>R-squared</strong></td>
</tr>
<tr>
<td><strong>Adjusted R-squared</strong></td>
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<tr>
<td><strong>S.E. of regression</strong></td>
</tr>
<tr>
<td><strong>Log likelihood</strong></td>
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<tr>
<td><strong>Durbin-Watson stat</strong></td>
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**LS // Dependent Variable is D(D(IN22))**

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<tr>
<td>D(IN22(-1))</td>
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<td>D(IN22(-2))</td>
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<td>D(IN22(-1))</td>
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<tr>
<td><strong>R-squared</strong></td>
</tr>
<tr>
<td><strong>Adjusted R-squared</strong></td>
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<tr>
<td><strong>S.E. of regression</strong></td>
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<td><strong>Log likelihood</strong></td>
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<td><strong>Durbin-Watson stat</strong></td>
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**LS // Dependent Variable is D(IN23)**

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<td>D(IN23(-1))</td>
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<tr>
<td><strong>R-squared</strong></td>
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<td><strong>Adjusted R-squared</strong></td>
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<td><strong>S.E. of regression</strong></td>
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<td><strong>Log likelihood</strong></td>
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<td><strong>Durbin-Watson stat</strong></td>
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**2.2.2 COST OF LIVING: (CL)**

**LS // Dependent Variable is D(D(CL1,2))**

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<tr>
<td><strong>VARIABLE</strong></td>
</tr>
<tr>
<td>D(CL1(-1),2)</td>
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<td>D(CL1(-3),2)</td>
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<tr>
<td>D(CL1(-4),2)</td>
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<td>D(CL1(-1),2)</td>
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### LS // Dependent Variable is D(D(CL2,2))

- **Date:** 10-08-1997 / **Time:** 15:43
- **SMPL range:** 1977.4 - 1995.4
- **Number of observations:** 73
- **Augmented Dickey-Fuller:** UROOT(T,4) D(CL2)

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<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
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<td>1.0981898</td>
<td>0.5063021</td>
<td>2.1690406</td>
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<tr>
<td>D(CL2(-2),2)</td>
<td>0.4184965</td>
<td>0.3912755</td>
<td>1.0695698</td>
<td>0.2887</td>
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<tr>
<td>D(CL2(-3),2)</td>
<td>0.0409039</td>
<td>0.2517820</td>
<td>0.1624574</td>
<td>0.8714</td>
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<tr>
<td>D(CL2(-4),2)</td>
<td>0.0058820</td>
<td>0.1257570</td>
<td>0.0467727</td>
<td>0.9628</td>
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<td>C</td>
<td>-2.8603492</td>
<td>0.5729021</td>
<td>-4.9927367</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

| TREND | 3.431E-05 | 0.0003800 | 0.0903067 | 0.9283 |

- **R-squared:** 0.791864
- **Adjusted R-squared:** 0.777294
- **S.E. of regression:** 0.068617
- **Log likelihood:** 95.68008
- **Durbin-Watson stat:** 1.994592
- **Prob(F-statistic):** 0.000000

### LS // Dependent Variable is D(D(CL3))

- **Date:** 10-08-1997 / **Time:** 15:43
- **SMPL range:** 1977.3 - 1995.4
- **Number of observations:** 74
- **Augmented Dickey-Fuller:** UROOT(T,4) D(CL3)

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<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
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<td>0.0206085</td>
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<td>D(CL3(-3))</td>
<td>0.1473444</td>
<td>0.1500146</td>
<td>0.9822002</td>
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<td>D(CL3(-4))</td>
<td>0.2291697</td>
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</table>

| TREND | 0.0002338 | 0.0003376 | 0.6923108 | 0.4911 |

| R-squared:** 0.482164 | **Adjusted R-squared:** 0.435791 | **S.E. of regression:** 0.060782 | **Log likelihood:** 176.6783
| **Durbin-Watson stat:** 1.890168 | **Prob(F-statistic):** 0.000000 |

### LS // Dependent Variable is D(D(CL4,2))

- **Date:** 10-08-1997 / **Time:** 15:43
- **SMPL range:** 1977.4 - 1995.4
- **Number of observations:** 73
- **Augmented Dickey-Fuller:** UROOT(T,4) D(CL4)

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<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(CL4(-1),2)</td>
<td>2.6400451</td>
<td>0.5801435</td>
<td>4.5506763</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(CL4(-2),2)</td>
<td>1.5109176</td>
<td>0.4451919</td>
<td>3.3938571</td>
<td>0.0012</td>
</tr>
<tr>
<td>D(CL4(-3),2)</td>
<td>0.7264419</td>
<td>0.2710914</td>
<td>2.6730539</td>
<td>0.0095</td>
</tr>
<tr>
<td>D(CL4(-4),2)</td>
<td>0.2922214</td>
<td>0.1228214</td>
<td>2.3320556</td>
<td>0.0228</td>
</tr>
<tr>
<td>C</td>
<td>-4.7505551</td>
<td>0.6529201</td>
<td>-7.2758603</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

| TREND | 0.0003156 | 0.0001261 | -0.2236719 | 0.8237 |

| R-squared:** 0.866231 | **Adjusted R-squared:** 0.854070 | **S.E. of regression:** 0.022623 | **Log likelihood:** 176.6783
| **Durbin-Watson stat:** 1.954313 | **F-statistic:** 71.23127 |

### LS // Dependent Variable is D(D(CL5))

- **Date:** 10-08-1997 / **Time:** 15:44
- **SMPL range:** 1977.3 - 1995.4
- **Number of observations:** 74
- **Augmented Dickey-Fuller:** UROOT(T,4) D(CL5)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CL5(-1))</td>
<td>0.0466766</td>
<td>0.1896702</td>
<td>0.2460934</td>
<td>0.0864</td>
</tr>
<tr>
<td>D(CL5(-2))</td>
<td>-0.119689</td>
<td>0.1874543</td>
<td>-0.6873263</td>
<td>0.4942</td>
</tr>
<tr>
<td>D(CL5(-3))</td>
<td>0.0770418</td>
<td>0.1450755</td>
<td>0.5310465</td>
<td>0.9791</td>
</tr>
<tr>
<td>D(CL5(-4),2)</td>
<td>0.0087155</td>
<td>0.1214305</td>
<td>1.3729302</td>
<td>0.1744</td>
</tr>
<tr>
<td>C</td>
<td>-0.7008407</td>
<td>0.0265001</td>
<td>-0.1621241</td>
<td>0.8717</td>
</tr>
</tbody>
</table>

| TREND | 0.0002219 | 0.0005468 | 0.4057667 | 0.8862 |

| R-squared:** 0.866231 | **Adjusted R-squared:** 0.854070 | **S.E. of regression:** 0.022623 | **Log likelihood:** 176.6783
| **Durbin-Watson stat:** 1.954313 | **Prob(F-statistic):** 0.000000 |

---

TREND | -3.453E-05 | 0.0003822 | -0.0903581 | 0.9283
---

R-squared | 0.791864 | Mean of dependent var | -0.000459 |

Adjusted R-squared | 0.777294 | S.D. of dependent var | 0.144000 |

S.E. of regression | 0.068617 | Sum of squared resid | 0.310743 |

Log likelihood | 95.68008 | F-statistic | 41.85016 |

Durbin-Watson stat | 1.994592 | Prob(F-statistic): | 0.000000 |
R-squared 0.792379 Mean of dependent var 0.000414
Adjusted R-squared 0.773504 S.D. of dependent var 0.140393
S.E. of regression 0.066815 Sum of squared resid 0.294643
Log likelihood 97.62188 F-statistic 41.98106
Durbin-Watson stat 1.983366 Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(CL10,2))
Date: 10-08-1997 / Time: 15:48
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T,4) D(CL10,2)

VARIABLE COEFFICIENT STD. ERROR T-STAT. 2-TAIL SIG.
D(D(CL10(-1),2)) 0.9530899 0.5177208 1.8409339 0.0701
D(D(CL10(-2),2)) 0.2372963 0.4008470 0.5919874 0.5459
D(D(CL10(-3),2)) -0.0813309 0.2542300 -0.3198857 0.7501
D(D(CL10(-4),2)) -0.0637540 0.1256348 -0.5074551 0.6135
D(CL10(-1),2) -2.7144901 0.5848302 -4.6415011 0.0000
C -0.0038536 0.0189827 -0.2030047 0.8398

Mean of dependent var 0.799717 S.D. of dependent var 0.781509
Sum of squared resid 0.069850 F-statistic 94.37944
Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(CL11,2))
Date: 10-08-1997 / Time: 15:49
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T,4) D(CL11,2)

VARIABLE COEFFICIENT STD. ERROR T-STAT. 2-TAIL SIG.
D(D(CL11(-1),2)) 0.9666622 0.4560904 2.1194531 0.0378
D(D(CL11(-2),2)) 0.3104261 0.3572482 0.8689368 0.3880
D(D(CL11(-3),2)) 0.0551731 0.2310776 0.2387645 0.8120
D(D(CL11(-4),2)) -0.0178980 0.1231489 -0.1453362 0.8849
D(CL11(-1),2) -2.5618926 0.5211400 -4.9159389 0.0000
C -0.0044697 0.0169908 -0.2630692 0.7933

Mean of dependent var 0.7933 S.D. of dependent var 0.7283
Sum of squared resid 0.000477 F-statistic 43.92216
Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(CL12,2))
Date: 10-08-1997 / Time: 15:49
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T,4) D(CL12,2)

VARIABLE COEFFICIENT STD. ERROR T-STAT. 2-TAIL SIG.
D(D(CL12(-1),2)) 1.8686980 0.6008251 3.102196 0.0028
D(D(CL12(-2),2)) 0.8739179 0.4610218 1.8956109 0.0624
D(D(CL12(-3),2)) 0.2388467 0.2897822 0.8242283 0.4128
D(D(CL12(-4),2)) 0.0174259 0.1447031 -0.1204253 0.9045
D(CL12(-1),2) -3.8198184 0.6789585 -5.6259971 0.0000
C -0.0050741 0.0108228 -0.4688378 0.6407

Mean of dependent var 0.000477 S.D. of dependent var 0.039771
Sum of squared resid 0.6407 F-statistic 34.45758
Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(CL13))
Date: 10-08-1997 / Time: 15:50
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(CL13)

VARIABLE COEFFICIENT STD. ERROR T-STAT. 2-TAIL SIG.
D(D(CL13(-1),2)) 0.2260535 0.2174209 1.0397046 0.3022
D(D(CL13(-2),2)) 0.2260535 0.2174209 1.0397046 0.3022
D(D(CL13(-3),2)) 0.0106497 0.1931024 0.0551504 0.9562
D(D(CL13(-4),2)) 0.1437588 0.1501383 0.9570898 0.3418
D(D(CL13(-1),2)) -0.0136368 0.0186147 -0.8444953 0.4014
C -0.0136368 0.0186147 -0.8444953 0.4014

Mean of dependent var 0.492915 S.D. of dependent var 0.000477
Sum of squared resid 0.000477 F-statistic 34.45758
Prob(F-statistic) 0.000000
<table>
<thead>
<tr>
<th>Adjusted R-squared</th>
<th>S.D. of dependent var</th>
<th>0.080758</th>
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<tbody>
<tr>
<td>S.E. of regression</td>
<td>Sum of squared resid</td>
<td>0.241423</td>
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<tr>
<td>Log likelihood</td>
<td>106.8336 F-statistic</td>
<td>10.85411</td>
</tr>
<tr>
<td>Durbin-Watson stat</td>
<td>1.912134  Prob(F-statistic)</td>
<td>0.000000</td>
</tr>
</tbody>
</table>

**LS // Dependent Variable is D(D(CL14),2)**

<table>
<thead>
<tr>
<th>Date: 10-08-1997 / Time: 15:51</th>
<th>SMPL range: 1977.4 - 1995.4</th>
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<tbody>
<tr>
<td>Number of observations: 73</td>
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</tbody>
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Augmented Dickey-Fuller: UROOT(T,4) D(CL14,2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(CL14(-1))</td>
<td>1.0065530</td>
<td>0.4669079</td>
<td>2.1557850</td>
<td>0.0348</td>
</tr>
<tr>
<td>D(CL14(-2))</td>
<td>0.3247069</td>
<td>0.3453634</td>
<td>0.934524</td>
<td>0.3509</td>
</tr>
<tr>
<td>D(CL14(-3))</td>
<td>-0.1057215</td>
<td>0.2186042</td>
<td>-0.481484</td>
<td>0.6318</td>
</tr>
<tr>
<td>D(CL14(-4))</td>
<td>-0.0898287</td>
<td>0.1109959</td>
<td>-0.809321</td>
<td>0.4212</td>
</tr>
<tr>
<td>C</td>
<td>-0.0026738</td>
<td>0.0032585</td>
<td>-0.820529</td>
<td>0.4149</td>
</tr>
<tr>
<td>TREND</td>
<td>5.713E-05</td>
<td>6.681E-05</td>
<td>8.555323</td>
<td>0.3956</td>
</tr>
</tbody>
</table>

R-squared | 0.804550 | Mean of dependent var | 0.000381 |
Adjusted R-squared | 0.786781 | S.D. of dependent var | 0.025890 |
S.E. of regression | 0.011955 | Sum of squared resid | 0.009432 |
F-statistic | 223.2408 | Prob(F-statistic) | 0.000000 |

**LS // Dependent Variable is D(D(CL15))**

<table>
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<tr>
<td>Number of observations: 66</td>
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</table>

Augmented Dickey-Fuller: UROOT(T,4) D(CL15)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CL15(-1))</td>
<td>0.3625030</td>
<td>0.4516772</td>
<td>0.802530</td>
<td>0.4254</td>
</tr>
<tr>
<td>D(CL15(-2))</td>
<td>-0.0984293</td>
<td>0.3395370</td>
<td>-0.289893</td>
<td>0.7729</td>
</tr>
<tr>
<td>D(CL15(-3))</td>
<td>-0.4710442</td>
<td>0.2282146</td>
<td>-2.064040</td>
<td>0.0434</td>
</tr>
<tr>
<td>D(CL15(-4))</td>
<td>-0.0705217</td>
<td>0.1294304</td>
<td>-0.544861</td>
<td>0.5879</td>
</tr>
<tr>
<td>C</td>
<td>-1.8809045</td>
<td>0.5053845</td>
<td>-3.721726</td>
<td>0.0004</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.0018572</td>
<td>0.0041033</td>
<td>-0.820529</td>
<td>0.4149</td>
</tr>
</tbody>
</table>

R-squared | 0.865932 | Mean of dependent var | 0.003081 |
Adjusted R-squared | 0.852298 | S.D. of dependent var | 1.636018 |
S.E. of regression | 0.655682 | Sum of squared resid | 23.32456 |
F-statistic | 53.03240 | Prob(F-statistic) | 0.000000 |

**LS // Dependent Variable is D(D(CL16))**

<table>
<thead>
<tr>
<th>Date: 10-08-1997 / Time: 15:52</th>
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<tbody>
<tr>
<td>Number of observations: 66</td>
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</tbody>
</table>

Augmented Dickey-Fuller: UROOT(T,4) D(CL16)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
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<tbody>
<tr>
<td>D(CL16(-1))</td>
<td>0.5459556</td>
<td>0.4310835</td>
<td>1.058597</td>
<td>0.2948</td>
</tr>
<tr>
<td>D(CL16(-2))</td>
<td>0.0634813</td>
<td>0.3267589</td>
<td>0.180951</td>
<td>0.8570</td>
</tr>
<tr>
<td>D(CL16(-3))</td>
<td>-0.4710442</td>
<td>0.2282146</td>
<td>-2.064040</td>
<td>0.0434</td>
</tr>
<tr>
<td>D(CL16(-4))</td>
<td>-0.0705217</td>
<td>0.1294304</td>
<td>-0.544861</td>
<td>0.5879</td>
</tr>
<tr>
<td>C</td>
<td>-1.8809045</td>
<td>0.5053845</td>
<td>-3.721726</td>
<td>0.0004</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.0018572</td>
<td>0.0041033</td>
<td>-0.820529</td>
<td>0.4149</td>
</tr>
</tbody>
</table>

R-squared | 0.843582 | Mean of dependent var | 0.010349 |
Adjusted R-squared | 0.827675 | S.D. of dependent var | 1.636018 |
S.E. of regression | 0.655682 | Sum of squared resid | 23.32456 |
F-statistic | 53.03240 | Prob(F-statistic) | 0.000000 |

**LS // Dependent Variable is D(D(CL17))**

<table>
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<th>SMPL range: 1979.3 - 1995.4</th>
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<tbody>
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<td>Number of observations: 66</td>
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Augmented Dickey-Fuller: UROOT(T,4) D(CL17)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CL17(-1))</td>
<td>0.4563436</td>
<td>0.4310835</td>
<td>1.058597</td>
<td>0.2948</td>
</tr>
<tr>
<td>D(CL17(-2))</td>
<td>0.2237840</td>
<td>0.3267589</td>
<td>0.180951</td>
<td>0.8570</td>
</tr>
<tr>
<td>D(CL17(-3))</td>
<td>-0.0798940</td>
<td>0.2237840</td>
<td>-0.544861</td>
<td>0.5879</td>
</tr>
<tr>
<td>D(CL17(-4))</td>
<td>-0.0798940</td>
<td>0.2237840</td>
<td>-0.544861</td>
<td>0.5879</td>
</tr>
<tr>
<td>C</td>
<td>-1.8809045</td>
<td>0.5053845</td>
<td>-3.721726</td>
<td>0.0004</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.0018572</td>
<td>0.0041033</td>
<td>-0.820529</td>
<td>0.4149</td>
</tr>
</tbody>
</table>

R-squared | 0.837281 | Mean of dependent var | 0.012313 |
Adjusted R-squared | 0.820733 | S.D. of dependent var | 1.608876 |

### S.E. of regression
0.681196

### Sum of squared resid
27.37768

### Log likelihood
-64.6236

### F-statistic
50.59810

### Prob(F-statistic)
0.000000

---

### Dependent Variable is D(D(CL18))

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Stat.</th>
<th>2-Tail Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CL18(1))</td>
<td>0.4931104</td>
<td>0.4478805</td>
<td>1.100986</td>
</tr>
<tr>
<td>D(CL18(2))</td>
<td>0.0397198</td>
<td>0.3391024</td>
<td>0.1171322</td>
</tr>
<tr>
<td>D(CL18(3))</td>
<td>-0.3473854</td>
<td>0.2310254</td>
<td>-1.503668</td>
</tr>
<tr>
<td>D(CL18(4))</td>
<td>0.0114819</td>
<td>0.1317971</td>
<td>0.011283</td>
</tr>
<tr>
<td>D(CL18(-1))</td>
<td>-1.9540489</td>
<td>0.4991531</td>
<td>-3.947284</td>
</tr>
</tbody>
</table>

### Durbin-Watson stat
0.681196

### Sum of squared resid
-64.61236

### F-statistic
2.011168

### Prob(F-statistic)
0.000000

---

### Dependent Variable is D(D(CL19))

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Stat.</th>
<th>2-Tail Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CL19(1))</td>
<td>0.4421314</td>
<td>0.4473888</td>
<td>0.988249</td>
</tr>
<tr>
<td>D(CL19(2))</td>
<td>-0.0019791</td>
<td>0.3388731</td>
<td>-0.00584</td>
</tr>
<tr>
<td>D(CL19(3))</td>
<td>-0.3772972</td>
<td>0.2308731</td>
<td>-1.634183</td>
</tr>
<tr>
<td>D(CL19(4))</td>
<td>-0.0142474</td>
<td>0.131537</td>
<td>-1.079726</td>
</tr>
<tr>
<td>D(CL19(-1))</td>
<td>-1.909806</td>
<td>0.4980583</td>
<td>-3.831641</td>
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</table>

### Durbin-Watson stat
0.844799

---

### Dependent Variable is D(D(CL20))

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<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Stat.</th>
<th>2-Tail Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CL20(1))</td>
<td>0.3625030</td>
<td>0.4516772</td>
<td>0.802571</td>
</tr>
<tr>
<td>D(CL20(2))</td>
<td>-0.0984293</td>
<td>0.339537</td>
<td>-0.289928</td>
</tr>
<tr>
<td>D(CL20(3))</td>
<td>-0.4710442</td>
<td>0.2282146</td>
<td>-2.06404</td>
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<tr>
<td>D(CL20(4))</td>
<td>-0.0705217</td>
<td>0.1294304</td>
<td>-0.548618</td>
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<tr>
<td>D(CL20(-1))</td>
<td>-1.8809045</td>
<td>0.5053945</td>
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### Durbin-Watson stat
0.865932

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### Dependent Variable is D(D(CL21))

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<th>T-Stat.</th>
<th>2-Tail Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CL21(1))</td>
<td>0.0095534</td>
<td>0.2060948</td>
<td>0.046354</td>
</tr>
<tr>
<td>D(CL21(2))</td>
<td>-0.0877314</td>
<td>0.1882286</td>
<td>-0.466089</td>
</tr>
<tr>
<td>D(CL21(3))</td>
<td>0.0697825</td>
<td>0.1578691</td>
<td>0.441917</td>
</tr>
<tr>
<td>D(CL21(4))</td>
<td>0.1581544</td>
<td>0.1234219</td>
<td>1.281412</td>
</tr>
<tr>
<td>D(CL21(-1))</td>
<td>-0.7871774</td>
<td>0.2189733</td>
<td>-3.594790</td>
</tr>
</tbody>
</table>

### Durbin-Watson stat
1.990296

---
Log likelihood 83.81072  F-statistic 8.965482
Durbin-Watson stat 2.024880  Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(CL22))
Date: 10-08-1997 / Time: 15:55
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(CL22)
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<tr>
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<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<td>D(CL22(-3))</td>
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<td>D(CL22(-4))</td>
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<td>C</td>
<td>-0.7971080</td>
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<tr>
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<td>0.0552812</td>
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<td>2.1258697</td>
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R-squared 0.459489  Mean of dependent var 0.001504
Adjusted R-squared 0.411085  S.D. of dependent var 0.108326
S.E. of regression 0.083130  Sum of squared resid 82.73904
F-statistic 2.025640  Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(CL23,2))
Date: 10-08-1997 / Time: 15:56
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T,4) D(CL23,2)
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<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<td>0.0237372</td>
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R-squared 0.737887  Mean of dependent var 0.000566
Adjusted R-squared 0.714058  S.D. of dependent var 0.163497
S.E. of regression 0.087428  Sum of squared resid 77.99374
F-statistic 2.038211  Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(CL24))
Date: 10-08-1997 / Time: 15:56
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(CL24)
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<td>D(CL24(-2))</td>
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R-squared 0.518738  Mean of dependent var 0.002421
Adjusted R-squared 0.475639  S.D. of dependent var 0.106750
S.E. of regression 0.074780  Sum of squared resid 90.57250
F-statistic 2.3976847  Prob(F-statistic) 0.000000

LS // Dependent Variable is D(D(CL25))
Date: 10-08-1997 / Time: 15:56
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(CL25)
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<td>TREND</td>
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R-squared 0.389889  Mean of dependent var 0.002145
Adjusted R-squared 0.335252  S.D. of dependent var 0.091718
S.E. of regression 0.074660  Sum of squared resid 90.57250
F-statistic 2.0769126  Prob(F-statistic) 0.0416
### Durbin-Watson Stat 1.963886 Prob(F-statistic) 0.000007

**LS // Dependent Variable is D(D(CL26))**

- **Date**: 10-08-1997 / Time: 15:58
- **SMPL range**: 1977.3 - 1995.4
- **Number of observations**: 74

**Augmented Dickey-Fuller: UROOT(T,4) D(CL26)**

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**TREND**

0.0008096 0.0003650 2.218229 0.0289

- **R-squared**: 0.459294
- **Mean of dependent var**: 0.410873
- **S.D. of dependent var**: 0.051915
- **Sum of squared resid**: 117.5789
- **F-statistic**: 1.998451
- **Prob(F-statistic)**: 0.000007

### LS // Dependent Variable is D(CL27)

- **Date**: 10-08-1997 / Time: 15:59
- **SMPL range**: 1979.2 - 1995.4
- **Number of observations**: 67

**Augmented Dickey-Fuller: UROOT(T,4) CL27**

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**C**

-4.2074126 0.8451232 0.0031 2.7852013

**TREND**

-0.0042778 0.0041872 -1.0216401 0.3111

- **R-squared**: 0.640106
- **Mean of dependent var**: 0.604117
- **S.D. of dependent var**: 0.621191
- **Sum of squared resid**: 59.47237
- **F-statistic**: 2.174479
- **Prob(F-statistic)**: 0.000000

### LS // Dependent Variable is D(D(CL28,2))

- **Date**: 10-08-1997 / Time: 16:00
- **SMPL range**: 1977.4 - 1995.4
- **Number of observations**: 73

**Augmented Dickey-Fuller: UROOT(T,4) D(CL28,2)**

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<th>VARIABLE</th>
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<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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**D(CL28(-1),2)**

-2.7121000 0.5193929 -5.2216732 0.0001

**C**

-3.2074126 0.8451232 0.0031 -3.7852013

**TREND**

-0.0042778 0.0041872 -1.0216401 0.3111

- **R-squared**: 0.679422
- **Mean of dependent var**: 0.650278
- **S.D. of dependent var**: 0.141423
- **Sum of squared resid**: 42.88468
- **F-statistic**: 1.899401
- **Prob(F-statistic)**: 0.000000

### LS // Dependent Variable is D(D(CL29,2))

- **Date**: 10-08-1997 / Time: 16:01
- **SMPL range**: 1977.4 - 1995.4
- **Number of observations**: 73

**Augmented Dickey-Fuller: UROOT(T,4) D(CL29,2)**

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**D(CL29(-1),2)**

-2.7121000 0.5193929 -5.2216732 0.0000

**C**

-0.01171280 0.0385586 -0.4442067 0.6583

**TREND**

-0.0042778 0.0041872 -1.0216401 0.3111

- **R-squared**: 0.750165
- **Mean of dependent var**: 0.000306
- **S.D. of dependent var**: 0.163383
- **Sum of squared resid**: 0.480177
- **Log likelihood**: 23.31299
- **Durbin-Watson stat**: 33.02902
- **Prob(F-statistic)**: 0.000000
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<td>0.1252095</td>
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<td>D(CL32(-1),2)</td>
<td>-2.5974687</td>
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<td>0.9623</td>
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<tr>
<td>R-squared</td>
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<td>Mean of dependent var</td>
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<td>Adjusted R-squared</td>
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<td>S.E. of regression</td>
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<td>Log likelihood</td>
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<td>F-statistic</td>
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<td>Durbin-Watson stat</td>
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<td>Prob(F-statistic)</td>
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<tr>
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<th>Time</th>
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<th>Number of observations: 74</th>
<th>Augmented Dickey-Fuller: UROOT(T,4) D(CL33)</th>
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<td>T-STAT. 2-TAIL SIG.</td>
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<tr>
<td>D(CL33(-1))</td>
<td>0.1404124</td>
<td>0.1831040</td>
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<td>D(CL33(-2))</td>
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<td>0.1699865</td>
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<td>D(CL33(-3))</td>
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<td>0.6886611</td>
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<td>D(CL33(-4))</td>
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<td>TREND</td>
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<td>R-squared</td>
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<td>S.E. of regression</td>
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<td>F-statistic</td>
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<td>Durbin-Watson stat</td>
<td>1.995802</td>
<td>Prob(F-statistic)</td>
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### LS // Dependent Variable is D(D(CL34))

Date: 10-08-1997 / Time: 16:04

SMPR range: 1977.3 - 1995.4

Number of observations: 74

Augmented Dickey-Fuller: UROOT(T,4) D(CL34)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CL34(-1))</td>
<td>0.0204091</td>
<td>0.204146</td>
<td>0.099740</td>
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<td>D(CL34(-2))</td>
<td>-0.0009818</td>
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<td>0.9596</td>
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<td>D(CL34(-3))</td>
<td>-0.0332469</td>
<td>0.148495</td>
<td>-0.2238915</td>
<td>0.8235</td>
</tr>
<tr>
<td>D(CL34(-4))</td>
<td>0.2718396</td>
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<td>2.461097</td>
<td>0.0164</td>
</tr>
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<td>Log(CL36-1)</td>
<td>-0.095443</td>
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<td>C</td>
<td>0.0052223</td>
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S.E. of regression 4.755E-05 4.909E-05 -0.968534 0.3363

R-squared 0.618318 Mean of dependent var -0.000280

Adjusted R-squared 0.584137 S.D. of dependent var 0.012797

S.E. of regression 0.008252 Sum of squared resid 0.004563

Log likelihood 253.6722 F-statistic 18.08979

Durbin-Watson stat 1.997101 Prob(F-statistic) 0.000000

### LS // Dependent Variable is D(CL35,2)

Date: 10-08-1997 / Time: 16:05

SMPR range: 1977.4 - 1995.4

Number of observations: 73

Augmented Dickey-Fuller: UROOT(T,4) D(CL35,2)

<table>
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<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(CL35(-1),2)</td>
<td>1.0846350</td>
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<td>D(CL35(-2),2)</td>
<td>0.3679883</td>
<td>0.596148</td>
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<td>0.3566</td>
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<tr>
<td>D(CL35(-3),2)</td>
<td>0.0040410</td>
<td>0.2525536</td>
<td>0.0060006</td>
<td>0.9873</td>
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<tr>
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<td>0.18602</td>
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<td>0.094867</td>
<td>0.9247</td>
</tr>
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<td>D(CL36(-1),2)</td>
<td>-2.8353737</td>
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<td>C</td>
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S.E. of regression 4.240E-05 0.0003939 0.1076793 0.9146

R-squared 0.800149 Mean of dependent var 0.000832

Adjusted R-squared 0.781980 S.D. of dependent var 0.151152

S.E. of regression 0.070577 Sum of squared resid 0.328751

Log likelihood 93.62388 F-statistic 44.04094

Durbin-Watson stat 1.969860 Prob(F-statistic) 0.000000

### LS // Dependent Variable is D(CL36,2)

Date: 10-08-1997 / Time: 16:05

SMPR range: 1977.4 - 1995.4

Number of observations: 73

Augmented Dickey-Fuller: UROOT(T,4) D(CL36,2)

<table>
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<tr>
<th>VARIABLE</th>
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<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
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<td>0.3170319</td>
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<td>D(CL36(-3),2)</td>
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S.E. of regression 3.469E-05 0.0003920 0.0884981 0.9297

R-squared 0.805562 Mean of dependent var 0.001088

Adjusted R-squared 0.787885 S.D. of dependent var 0.152563

S.E. of regression 0.070577 Sum of squared resid 0.328584

Log likelihood 93.56277 F-statistic 45.57317

Durbin-Watson stat 1.964216 Prob(F-statistic) 0.000000

### LS // Dependent Variable is D(CL37,2)

Date: 10-08-1997 / Time: 16:06

SMPR range: 1977.4 - 1995.4

Number of observations: 73

Augmented Dickey-Fuller: UROOT(T,4) D(CL37,2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
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<td>1.0319723</td>
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<td>D(CL37(-1),2)</td>
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<td>C</td>
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S.E. of regression 6.387E-05 0.0003781 0.1689226 0.8664

R-squared 0.785271 Mean of dependent var 0.000557

Adjusted R-squared 0.765368 S.D. of dependent var 0.139736

S.E. of regression 0.067946 Sum of squared resid 0.304697

Log likelihood 96.39727 F-statistic 39.75633

Durbin-Watson stat 1.994760 Prob(F-statistic) 0.000000

### LS // Dependent Variable is D(CL38))

<table>
<thead>
<tr>
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<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
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<tr>
<td>D(CL38(-1))</td>
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S.E. of regression 6.387E-05 0.0003781 0.1689226 0.8664

R-squared 0.785271 Mean of dependent var 0.000557

Adjusted R-squared 0.765368 S.D. of dependent var 0.139736

S.E. of regression 0.067946 Sum of squared resid 0.304697

Log likelihood 96.39727 F-statistic 39.75633

Durbin-Watson stat 1.994760 Prob(F-statistic) 0.000000
Date: 10-08-1997 / Time: 16:06
SMPl range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(CL38)

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<td>D(CL38(-4))</td>
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<td>D(CL38(-1))</td>
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<td>TEND</td>
<td>-0.0001278</td>
<td>0.0182830</td>
<td>-0.3690764</td>
<td>0.7131</td>
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</table>

R-squared: 0.530475
Mean of dependent var: -0.001249
Adjusted R-squared: 0.488427
S.D. of dependent var: 0.086777
Sum of squared resid: 0.052358
F-statistic: 111.2372
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(CL39))
Date: 10-08-1997 / Time: 16:07
SMPl range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(CL39)

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<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<td>D(D(CL39(-3)))</td>
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<tr>
<td>D(CL39(-1))</td>
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<tr>
<td>TREND</td>
<td>-0.001249</td>
<td>0.0182830</td>
<td>-0.3690764</td>
<td>0.7131</td>
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</tbody>
</table>

R-squared: 0.477275
Mean of dependent var: 0.000403
Adjusted R-squared: 0.430464
S.D. of dependent var: 0.066388
Sum of squared resid: 0.183668
F-statistic: 116.9500
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(CL40,2))
Date: 10-08-1997 / Time: 16:08
SMPl range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T,4) D(CL40,2)

<table>
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<tr>
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<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(CL40(-1),2)</td>
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<td>0.1344653</td>
<td>0.1442441</td>
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<td>TREND</td>
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</table>

R-squared: 0.813796
Mean of dependent var: 0.000369
Adjusted R-squared: 0.796869
S.D. of dependent var: 0.064334
Sum of squared resid: 0.273167
F-statistic: 100.3842
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(CL41))
Date: 10-08-1997 / Time: 16:09
SMPl range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(CL41)

<table>
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<tr>
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<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tr>
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</tbody>
</table>

R-squared: 0.502669
Mean of dependent var: 0.000211
Adjusted R-squared: 0.458132
S.D. of dependent var: 0.076835
Sum of squared resid: 0.214333
F-statistic: 11.28652
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(CL42))
Date: 10-08-1997 / Time: 16:10
SMPl range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(CL42)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(CL42(-1))</td>
<td>0.502669</td>
<td>0.2155094</td>
<td>0.9243125</td>
<td>0.3586</td>
</tr>
<tr>
<td>D(CL42(-2))</td>
<td>-0.458132</td>
<td>0.2155094</td>
<td>-0.9243125</td>
<td>0.1247</td>
</tr>
<tr>
<td>D(CL42(-3))</td>
<td>0.502669</td>
<td>0.2155094</td>
<td>0.9243125</td>
<td>0.3586</td>
</tr>
<tr>
<td>D(CL42(-4))</td>
<td>-0.458132</td>
<td>0.2155094</td>
<td>-0.9243125</td>
<td>0.1247</td>
</tr>
<tr>
<td>D(CL42(-1))</td>
<td>0.502669</td>
<td>0.2155094</td>
<td>0.9243125</td>
<td>0.3586</td>
</tr>
<tr>
<td>TREND</td>
<td>1.972374</td>
<td>0.0149389</td>
<td>1.416524</td>
<td>0.8878</td>
</tr>
</tbody>
</table>

R-squared: 0.000000
Mean of dependent var: 0.000000
Adjusted R-squared: 0.000000
S.D. of dependent var: 0.000000
Sum of squared resid: 0.000000
F-statistic: 0.000000
Prob(F-statistic): 1.000000
Augmented Dickey-Fuller: UROOT(T, 4) D(CL42)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CL42(-1))</td>
<td>0.2332327</td>
<td>0.2132010</td>
<td>1.0939567</td>
<td>0.2779</td>
</tr>
<tr>
<td>D(CL42(-2))</td>
<td>-0.0062128</td>
<td>0.1914642</td>
<td>-0.0220030</td>
<td>0.9825</td>
</tr>
<tr>
<td>D(CL42(-3))</td>
<td>0.052642</td>
<td>0.1478770</td>
<td>0.3527059</td>
<td>0.7285</td>
</tr>
<tr>
<td>D(CL42(-4))</td>
<td>0.1533064</td>
<td>0.1193605</td>
<td>1.2843981</td>
<td>0.2034</td>
</tr>
<tr>
<td>D(CL42(-1))</td>
<td>-0.9856529</td>
<td>0.2363134</td>
<td>-4.1709409</td>
<td>0.0001</td>
</tr>
<tr>
<td>C</td>
<td>0.0006107</td>
<td>0.0152485</td>
<td>0.0400522</td>
<td>0.9682</td>
</tr>
<tr>
<td>TREND</td>
<td>3.706E-05</td>
<td>0.0003147</td>
<td>0.119759</td>
<td>0.9066</td>
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</table>

R-squared: 0.485482
Adjusted R-squared: 0.439405
S.E. of regression: 0.057784
Log likelihood: 10.53648
Durbin-Watson stat: 1.939154
Prob(F-statistic): 0.000000

Augmented Dickey-Fuller: UROOT(T, 4) D(CL43)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(CL43(-1))</td>
<td>0.0989991</td>
<td>0.2407245</td>
<td>0.4112550</td>
<td>0.6822</td>
</tr>
<tr>
<td>D(CL43(-2))</td>
<td>-0.1117908</td>
<td>0.2118427</td>
<td>-0.5277067</td>
<td>0.5994</td>
</tr>
<tr>
<td>D(CL43(-3))</td>
<td>0.0626582</td>
<td>0.1626155</td>
<td>0.3853149</td>
<td>0.7012</td>
</tr>
<tr>
<td>D(CL43(-4))</td>
<td>-0.0795970</td>
<td>0.1208875</td>
<td>-1.0014821</td>
<td>0.3125</td>
</tr>
<tr>
<td>D(CL43(-1))</td>
<td>-2.925E-05</td>
<td>0.0163097</td>
<td>-3.766777</td>
<td>0.0004</td>
</tr>
<tr>
<td>C</td>
<td>0.0021436</td>
<td>0.0003364</td>
<td>-0.0869462</td>
<td>0.9231</td>
</tr>
<tr>
<td>TREND</td>
<td>-2.925E-05</td>
<td>0.0003364</td>
<td>0.9310</td>
<td></td>
</tr>
</tbody>
</table>

R-squared: 0.523096
Adjusted R-squared: 0.480388
S.E. of regression: 0.061779
Log likelihood: 10.3264
Durbin-Watson stat: 1.939154
Prob(F-statistic): 0.000000

Augmented Dickey-Fuller: UROOT(T, 4) D(EX1,2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(EX1(-1),2)</td>
<td>1.2511070</td>
<td>0.4924982</td>
<td>2.5403283</td>
<td>0.0134</td>
</tr>
<tr>
<td>D(EX1(-2),2)</td>
<td>0.4455886</td>
<td>0.3732805</td>
<td>1.1937098</td>
<td>0.2369</td>
</tr>
<tr>
<td>D(EX1(-3),2)</td>
<td>0.1058590</td>
<td>0.2118427</td>
<td>-0.5277067</td>
<td>0.5994</td>
</tr>
<tr>
<td>D(EX1(-4),2)</td>
<td>-0.0585691</td>
<td>0.1626155</td>
<td>0.3853149</td>
<td>0.7012</td>
</tr>
<tr>
<td>D(EX1(-1),2)</td>
<td>-3.1935944</td>
<td>0.2658724</td>
<td>-7.667777</td>
<td>0.0004</td>
</tr>
<tr>
<td>C</td>
<td>0.0007112</td>
<td>0.0163097</td>
<td>0.1314285</td>
<td>0.8853837</td>
</tr>
<tr>
<td>TREND</td>
<td>-2.925E-05</td>
<td>0.0003364</td>
<td>0.9310</td>
<td></td>
</tr>
</tbody>
</table>

R-squared: 0.842875
Adjusted R-squared: 0.828591
S.E. of regression: 0.045106
Log likelihood: 10.47058
Durbin-Watson stat: 1.939154
Prob(F-statistic): 0.000000

Augmented Dickey-Fuller: UROOT(T, 4) D(EX2,2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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</thead>
<tbody>
<tr>
<td>D(EX2(-1),2)</td>
<td>1.2511070</td>
<td>0.4924982</td>
<td>2.5403283</td>
<td>0.0134</td>
</tr>
<tr>
<td>D(EX2(-2),2)</td>
<td>0.4455886</td>
<td>0.3732805</td>
<td>1.1937098</td>
<td>0.2369</td>
</tr>
<tr>
<td>D(EX2(-3),2)</td>
<td>0.1058590</td>
<td>0.2118427</td>
<td>-0.5277067</td>
<td>0.5994</td>
</tr>
<tr>
<td>D(EX2(-4),2)</td>
<td>-0.0585691</td>
<td>0.1626155</td>
<td>0.3853149</td>
<td>0.7012</td>
</tr>
<tr>
<td>D(EX2(-1),2)</td>
<td>-3.1935944</td>
<td>0.2658724</td>
<td>-7.667777</td>
<td>0.0004</td>
</tr>
<tr>
<td>C</td>
<td>0.0007112</td>
<td>0.0163097</td>
<td>0.1314285</td>
<td>0.8853837</td>
</tr>
<tr>
<td>TREND</td>
<td>-2.925E-05</td>
<td>0.0003364</td>
<td>0.9310</td>
<td></td>
</tr>
</tbody>
</table>

R-squared: 0.842875
Adjusted R-squared: 0.828591
S.E. of regression: 0.045106
Log likelihood: 10.47058
Durbin-Watson stat: 1.939154
Prob(F-statistic): 0.000000
LS // Dependent Variable is D(D(EX3))
Date: 10-08-1997 / Time: 16:19
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T, 4)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX3(-1)))</td>
<td>0.0081277</td>
<td>0.2194976</td>
<td>0.0371654</td>
<td>0.9705</td>
</tr>
<tr>
<td>D(D(EX3(-2)))</td>
<td>-0.1741776</td>
<td>0.1984652</td>
<td>-0.8776230</td>
<td>0.3833</td>
</tr>
<tr>
<td>D(D(EX3(-3)))</td>
<td>0.0487097</td>
<td>0.1580506</td>
<td>0.3081905</td>
<td>0.7589</td>
</tr>
<tr>
<td>D(D(EX3(-4)))</td>
<td>0.1334996</td>
<td>0.1228457</td>
<td>3.2251066</td>
<td>0.0008</td>
</tr>
<tr>
<td>D(EX3(-1))</td>
<td>-0.0011312</td>
<td>0.0294008</td>
<td>-0.0446465</td>
<td>0.9645</td>
</tr>
</tbody>
</table>

Mean of dependent var = -0.000663
S.D. of dependent var = 0.152324
Sum of squared resid = 0.831845
F-statistic = 11.57074
Prob(F-statistic) = 0.000000

LS // Dependent Variable is D(D(EX4,2))
Date: 10-08-1997 / Time: 16:20
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T, 4)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX4(-1),2))</td>
<td>1.0957293</td>
<td>0.3656756</td>
<td>0.3665</td>
<td></td>
</tr>
<tr>
<td>D(D(EX4(-2),2))</td>
<td>0.3656756</td>
<td>0.4021028</td>
<td>0.9093635</td>
<td></td>
</tr>
<tr>
<td>D(D(EX4(-3),2))</td>
<td>0.0556785</td>
<td>0.2555779</td>
<td>0.3022182</td>
<td></td>
</tr>
<tr>
<td>D(D(EX4(-4),2))</td>
<td>-0.0054112</td>
<td>0.1227816</td>
<td>-0.0431939</td>
<td></td>
</tr>
<tr>
<td>D(EX4(-1),2)</td>
<td>-2.8640975</td>
<td>0.5863240</td>
<td>-4.8848372</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>-0.0025646</td>
<td>0.0195359</td>
<td>0.0989954</td>
<td></td>
</tr>
</tbody>
</table>

Mean of dependent var = 0.782679
S.D. of dependent var = 0.071821
Sum of squared resid = 92.34853
F-statistic = 1.966916
Prob(F-statistic) = 0.000000

LS // Dependent Variable is D(D(EX5))
Date: 10-08-1997 / Time: 16:20
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T, 4)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX5(-1)))</td>
<td>1.0972335</td>
<td>0.3355979</td>
<td>0.3439</td>
<td></td>
</tr>
<tr>
<td>D(D(EX5(-2)))</td>
<td>0.3355979</td>
<td>0.2091890</td>
<td>0.0763</td>
<td></td>
</tr>
<tr>
<td>D(D(EX5(-3)))</td>
<td>0.1766630</td>
<td>0.1227030</td>
<td>0.154063</td>
<td></td>
</tr>
<tr>
<td>D(D(EX5(-4)))</td>
<td>-2.5511783</td>
<td>0.4452646</td>
<td>0.340441</td>
<td></td>
</tr>
<tr>
<td>D(EX5(-1))</td>
<td>-0.8248971</td>
<td>0.0087869</td>
<td>25.88637</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>0.0087869</td>
<td>0.0028687</td>
<td>0.000714</td>
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</tr>
</tbody>
</table>

Mean of dependent var = 0.000332
S.D. of dependent var = 0.149349
Sum of squared resid = 0.313440
F-statistic = 25.88637
Prob(F-statistic) = 0.000000

LS // Dependent Variable is D(D(EX6,2))
Date: 10-08-1997 / Time: 16:21
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T, 4)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX6(-1),2))</td>
<td>1.0972335</td>
<td>0.3355979</td>
<td>0.3439</td>
<td></td>
</tr>
<tr>
<td>D(D(EX6(-2),2))</td>
<td>0.3355979</td>
<td>0.4012082</td>
<td>0.0903635</td>
<td></td>
</tr>
<tr>
<td>D(D(EX6(-3),2))</td>
<td>0.0556785</td>
<td>0.2555779</td>
<td>0.0222182</td>
<td></td>
</tr>
<tr>
<td>D(D(EX6(-4),2))</td>
<td>-0.0054112</td>
<td>0.1227816</td>
<td>-0.0431939</td>
<td></td>
</tr>
<tr>
<td>D(EX6(-1),2)</td>
<td>-2.8640975</td>
<td>0.5863240</td>
<td>-4.8848372</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>0.0087869</td>
<td>0.0195359</td>
<td>0.0989954</td>
<td></td>
</tr>
</tbody>
</table>

Mean of dependent var = 0.000332
S.D. of dependent var = 0.149349
Sum of squared resid = 0.313440
F-statistic = 25.88637
Prob(F-statistic) = 0.000000

LS // Dependent Variable is D(D(EX7))
### Augmented Dickey-Fuller Test for D(D(EX7,2))

**Variables:**
- D(D(EX7(-1)),2)
- D(D(EX7(-2)),2)
- D(D(EX7(-3)),2)
- D(D(EX7(-4)),2)
- D(EX7(-1),2)
- C

**Coefficients:**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Stat.</th>
<th>2-Tail Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX7(-1)),2)</td>
<td>0.3340715</td>
<td>0.2224286</td>
<td>1.502</td>
<td>0.1378</td>
</tr>
<tr>
<td>D(D(EX7(-2)),2)</td>
<td>0.1090354</td>
<td>0.2062342</td>
<td>0.530</td>
<td>0.6274</td>
</tr>
<tr>
<td>D(D(EX7(-3)),2)</td>
<td>0.304092</td>
<td>0.1543082</td>
<td>0.340</td>
<td>0.7382</td>
</tr>
<tr>
<td>D(D(EX7(-4)),2)</td>
<td>0.0519405</td>
<td>0.2224286</td>
<td>0.724</td>
<td>0.4712</td>
</tr>
<tr>
<td>D(EX7(-1),2)</td>
<td>-1.1623623</td>
<td>0.2587693</td>
<td>-4.492</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>0.0947287</td>
<td>0.0316787</td>
<td>2.990</td>
<td>0.0039</td>
</tr>
</tbody>
</table>

**Statistics:**
- R-squared: 0.524442
- Adjusted R-squared: 0.481855
- Mean of dependent var: 0.002253
- S.D. of dependent var: 0.134698
- S.E. of regression: 0.096958
- Log likelihood: 71.35237
- Durbin-Watson stat: 2.009312

### Augmented Dickey-Fuller Test for D(D(EX8,2))

**Variables:**
- D(D(EX8(-1),2))
- D(D(EX8(-2),2))
- D(D(EX8(-3),2))
- D(D(EX8(-4),2))
- D(EX8(-1),2)
- C

**Coefficients:**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Stat.</th>
<th>2-Tail Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX8(-1),2))</td>
<td>1.1340726</td>
<td>0.5117305</td>
<td>2.216</td>
<td>0.0301</td>
</tr>
<tr>
<td>D(D(EX8(-2),2))</td>
<td>0.3939658</td>
<td>0.3968822</td>
<td>0.993</td>
<td>0.3245</td>
</tr>
<tr>
<td>D(D(EX8(-3),2))</td>
<td>0.0443303</td>
<td>0.2516008</td>
<td>0.177</td>
<td>0.8604</td>
</tr>
<tr>
<td>D(D(EX8(-4),2))</td>
<td>0.0184421</td>
<td>0.1255148</td>
<td>0.147</td>
<td>0.8836</td>
</tr>
<tr>
<td>D(EX8(-1),2)</td>
<td>-2.8838659</td>
<td>0.5775865</td>
<td>-5.168</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>-0.0008311</td>
<td>0.0000000</td>
<td>-0.000</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

**Statistics:**
- R-squared: 0.799331
- Adjusted R-squared: 0.781089
- Mean of dependent var: 0.794368
- S.D. of dependent var: 0.113314
- S.E. of regression: 0.115765
- Log likelihood: 57.49898
- Durbin-Watson stat: 1.969962

### Augmented Dickey-Fuller Test for D(D(EX9,2))

**Variables:**
- D(D(EX9(-1),2))
- D(D(EX9(-2),2))
- D(D(EX9(-3),2))
- D(D(EX9(-4),2))
- D(EX9(-1),2)
- C

**Coefficients:**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Stat.</th>
<th>2-Tail Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX9(-1),2))</td>
<td>1.2133991</td>
<td>0.5021051</td>
<td>2.416</td>
<td>0.0184</td>
</tr>
<tr>
<td>D(D(EX9(-2),2))</td>
<td>0.4680971</td>
<td>0.3907765</td>
<td>1.198</td>
<td>0.2353</td>
</tr>
<tr>
<td>D(D(EX9(-3),2))</td>
<td>0.1235436</td>
<td>0.2478079</td>
<td>0.498</td>
<td>0.6198</td>
</tr>
<tr>
<td>D(D(EX9(-4),2))</td>
<td>0.0503217</td>
<td>0.1246352</td>
<td>0.403</td>
<td>0.6877</td>
</tr>
<tr>
<td>D(EX9(-1),2)</td>
<td>-2.9413720</td>
<td>0.5679185</td>
<td>-5.179</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>0.0008311</td>
<td>0.0000000</td>
<td>-0.000</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

**Statistics:**
- R-squared: 0.794368
- Adjusted R-squared: 0.775674
- Mean of dependent var: 0.794368
- S.D. of dependent var: 0.247686
- S.E. of regression: 0.116123
- Log likelihood: 59.06086
- Durbin-Watson stat: 0.000000

### Augmented Dickey-Fuller Test for D(D(EX10,2))

**Variables:**
- D(D(EX10(-1),2))
- D(D(EX10(-2),2))
- D(D(EX10(-3),2))
- D(D(EX10(-4),2))

**Coefficients:**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Stat.</th>
<th>2-Tail Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX10(-1),2))</td>
<td>1.1461002</td>
<td>0.5088927</td>
<td>2.252</td>
<td>0.0276</td>
</tr>
<tr>
<td>D(D(EX10(-2),2))</td>
<td>0.4220452</td>
<td>0.3941299</td>
<td>1.070</td>
<td>0.2861</td>
</tr>
<tr>
<td>D(D(EX10(-3),2))</td>
<td>0.0592813</td>
<td>0.2509467</td>
<td>0.236</td>
<td>0.8140</td>
</tr>
<tr>
<td>D(D(EX10(-4),2))</td>
<td>0.0388314</td>
<td>0.1248735</td>
<td>0.304</td>
<td>0.7618</td>
</tr>
<tr>
<td>D(EX10(-1),2)</td>
<td>-2.8393574</td>
<td>0.5736936</td>
<td>-5.043</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>0.0012285</td>
<td>0.0314954</td>
<td>0.039</td>
<td>0.9660</td>
</tr>
</tbody>
</table>

**Statistics:**
- R-squared: 0.798515
- Adjusted R-squared: 0.780198
- Mean of dependent var: 0.000522
- S.D. of dependent var: 0.247686
- S.E. of regression: 0.116123
- Log likelihood: 42.49551
- Durbin-Watson stat: 0.000000

### Augmented Dickey-Fuller Test for D(D(EX11,2))

**Variables:**
- D(D(EX11(-1),2))

**Coefficients:**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Stat.</th>
<th>2-Tail Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX11(-1),2))</td>
<td>0.798515</td>
<td>0.0000000</td>
<td>-0.000</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

**Statistics:**
- R-squared: 0.798515
- Adjusted R-squared: 0.780198
- Mean of dependent var: 0.000522
- S.D. of dependent var: 0.247686
- S.E. of regression: 0.000000
- Log likelihood: 42.49551
- Durbin-Watson stat: 0.000000
<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(EX1(-1),2)</td>
<td>1.2068349</td>
<td>0.4565810</td>
<td>2.6432002</td>
<td>0.0102</td>
</tr>
<tr>
<td>D(EX1(-2),2)</td>
<td>0.5147264</td>
<td>0.3568589</td>
<td>1.4423809</td>
<td>0.1539</td>
</tr>
<tr>
<td>D(EX1(-3),2)</td>
<td>0.1830308</td>
<td>0.2297401</td>
<td>0.7966864</td>
<td>0.4285</td>
</tr>
<tr>
<td>D(EX1(-4),2)</td>
<td>0.1113246</td>
<td>0.0288505</td>
<td>0.1202049</td>
<td>0.8719</td>
</tr>
</tbody>
</table>

R-squared: 0.769043
Mean of dependent var: -0.000110
Adj. R-squared: 0.748046
S.E. of regression: 0.106458
Log likelihood: 128.3609
Durbin-Watson stat: 1.971405

**LS // Dependent Variable is D(D(EX13))**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(EX13(-1),2)</td>
<td>0.4388410</td>
<td>0.2407988</td>
<td>1.8224383</td>
<td>0.0729</td>
</tr>
<tr>
<td>D(EX13(-2),2)</td>
<td>0.2945728</td>
<td>0.2052742</td>
<td>1.4365301</td>
<td>0.1555</td>
</tr>
<tr>
<td>D(EX13(-3),2)</td>
<td>0.1758555</td>
<td>0.1589037</td>
<td>1.1473806</td>
<td>0.2608</td>
</tr>
<tr>
<td>D(EX13(-4),2)</td>
<td>-0.3900494</td>
<td>0.2787079</td>
<td>-1.4068801</td>
<td>0.1555</td>
</tr>
</tbody>
</table>

R-squared: 0.501799
Mean of dependent var: -0.000101
Adj. R-squared: 0.457184
S.E. of regression: 0.062907
Log likelihood: 11.24731
Durbin-Watson stat: 0.9935

**LS // Dependent Variable is D(D(EX14))**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(EX14(-1),2)</td>
<td>0.0018418</td>
<td>0.2247513</td>
<td>0.0081950</td>
<td>0.9935</td>
</tr>
<tr>
<td>D(EX14(-2),2)</td>
<td>-0.1289399</td>
<td>0.2015322</td>
<td>-0.6308001</td>
<td>0.5256</td>
</tr>
<tr>
<td>D(EX14(-3),2)</td>
<td>0.0487507</td>
<td>0.1612415</td>
<td>0.3023460</td>
<td>0.7633</td>
</tr>
<tr>
<td>D(EX14(-4),2)</td>
<td>0.1739783</td>
<td>0.1209848</td>
<td>1.4068801</td>
<td>0.1555</td>
</tr>
</tbody>
</table>

R-squared: 0.516080
Mean of dependent var: -0.000159
Adj. R-squared: 0.472744
S.E. of regression: 0.062961
Log likelihood: 11.90877
Durbin-Watson stat: 0.0006

**LS // Dependent Variable is D(D(EX9))**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(EX9(-1),2)</td>
<td>0.0049433</td>
<td>0.0121493</td>
<td>-0.4068801</td>
<td>0.6854</td>
</tr>
</tbody>
</table>

R-squared: 0.516080
Mean of dependent var: -0.000159
Adj. R-squared: 0.472744
S.E. of regression: 0.062961
Log likelihood: 11.90877
Durbin-Watson stat: 0.0006

---

**SMPL range: 1977.3 - 1995.4**

**Number of observations:** 73

Augmented Dickey-Fuller: UROOT(T,4) D(EX11,2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(EX11(-1),2)</td>
<td>1.1720849</td>
<td>0.4789487</td>
<td>2.4472037</td>
<td>0.0171</td>
</tr>
<tr>
<td>D(EX11(-2),2)</td>
<td>0.6815403</td>
<td>0.3735562</td>
<td>1.8244652</td>
<td>0.0726</td>
</tr>
<tr>
<td>D(EX11(-3),2)</td>
<td>0.2529037</td>
<td>0.2601488</td>
<td>0.9721500</td>
<td>0.3345</td>
</tr>
<tr>
<td>D(EX11(-4),2)</td>
<td>-0.0038989</td>
<td>0.1388959</td>
<td>-0.0280704</td>
<td>0.9777</td>
</tr>
</tbody>
</table>

R-squared: 0.4388410
Mean of dependent var: 0.000194
Adj. R-squared: 0.457184
S.E. of regression: 0.062907
Log likelihood: 11.90877
Durbin-Watson stat: 0.9935
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T, 4) D(E9) Renamed as ex15

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(E9(-1)))</td>
<td>0.0596655</td>
<td>0.2323717</td>
<td>0.2557767</td>
<td>0.7989</td>
</tr>
<tr>
<td>D(D(E9(-2)))</td>
<td>-0.1198269</td>
<td>0.2097356</td>
<td>-0.5713234</td>
<td>0.5697</td>
</tr>
<tr>
<td>D(D(E9(-3)))</td>
<td>0.1059754</td>
<td>0.2492055</td>
<td>0.4191245</td>
<td>0.6797</td>
</tr>
<tr>
<td>D(D(E9(-4)))</td>
<td>-0.0532013</td>
<td>0.1219918</td>
<td>-0.4361053</td>
<td>0.6642</td>
</tr>
<tr>
<td>D(E9(-1))</td>
<td>-0.9689712</td>
<td>0.2624165</td>
<td>-3.6924937</td>
<td>0.0004</td>
</tr>
<tr>
<td>C</td>
<td>0.0808477</td>
<td>0.0329025</td>
<td>2.4571883</td>
<td>0.0166</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0005877</td>
<td>0.0006048</td>
<td>0.9717515</td>
<td>0.3347</td>
</tr>
</tbody>
</table>

R-squared: 0.534282
Adjusted R-squared: 0.492576
S.E. of regression: 0.103392
Sum of squared resid: 0.716227
Log likelihood: 66.59799
F-statistic: 12.81064
Durbin-Watson stat: 1.965434
Prob(F-statistic): 0.00000

LS // Dependent Variable is D(D(EX16,2))
Date: 10-08-1997 / Time: 16:27
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T, 4) D(EX16,2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDEX16(-1,2)</td>
<td>1.6055341</td>
<td>0.5084786</td>
<td>3.1575252</td>
<td>0.0024</td>
</tr>
<tr>
<td>DDEX16(-2,2)</td>
<td>0.766838</td>
<td>0.3969794</td>
<td>1.9814219</td>
<td>0.0517</td>
</tr>
<tr>
<td>DDEX16(-3,2)</td>
<td>0.013351</td>
<td>0.2497075</td>
<td>0.4970922</td>
<td>0.6148</td>
</tr>
<tr>
<td>DDEX16(-4,2)</td>
<td>0.0456981</td>
<td>0.1328249</td>
<td>0.3690542</td>
<td>0.7133</td>
</tr>
<tr>
<td>DDEX16(-1,2)</td>
<td>-3.3928733</td>
<td>0.5859426</td>
<td>-5.7904534</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>-0.0118186</td>
<td>0.0381736</td>
<td>-0.3096003</td>
<td>0.7578</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0001831</td>
<td>0.0007824</td>
<td>0.2339994</td>
<td>0.8157</td>
</tr>
</tbody>
</table>

R-squared: 0.809988
Adjusted R-squared: 0.792715
S.E. of regression: 0.140437
Sum of squared resid: 0.308458
Log likelihood: 43.39568
F-statistic: 46.89117
Durbin-Watson stat: 1.977811
Prob(F-statistic): 0.00000

LS // Dependent Variable is D(D(EX17))
Date: 10-08-1997 / Time: 16:28
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T, 4) D(EX17)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDEX17(-1)</td>
<td>0.3304112</td>
<td>0.2266524</td>
<td>1.4577882</td>
<td>0.1496</td>
</tr>
<tr>
<td>DDEX17(-2)</td>
<td>0.0995533</td>
<td>0.2034529</td>
<td>0.4912048</td>
<td>0.6248</td>
</tr>
<tr>
<td>DDEX17(-3)</td>
<td>0.2912968</td>
<td>0.1563411</td>
<td>1.8623130</td>
<td>0.0668</td>
</tr>
<tr>
<td>DDEX17(-4)</td>
<td>0.0463666</td>
<td>0.1225455</td>
<td>0.3783620</td>
<td>0.7064</td>
</tr>
<tr>
<td>DDEX17(-1)</td>
<td>-1.1784542</td>
<td>0.2635265</td>
<td>-4.4718629</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>-0.0955662</td>
<td>0.0320063</td>
<td>-2.9858509</td>
<td>0.0039</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.0009308</td>
<td>0.0005875</td>
<td>-1.5842591</td>
<td>0.1178</td>
</tr>
</tbody>
</table>

R-squared: 0.527282
Adjusted R-squared: 0.484949
S.E. of regression: 0.097710
Sum of squared resid: 1.301685
Log likelihood: 70.78126
F-statistic: 12.45557
Durbin-Watson stat: 2.008540
Prob(F-statistic): 0.00000

LS // Dependent Variable is D(D(EX18))
Date: 10-08-1997 / Time: 16:28
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T, 4) D(EX18)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDEX18(-1)</td>
<td>0.0596656</td>
<td>0.2323717</td>
<td>0.2557767</td>
<td>0.7989</td>
</tr>
<tr>
<td>DDEX18(-2)</td>
<td>-0.1198269</td>
<td>0.2097356</td>
<td>-0.5713234</td>
<td>0.5697</td>
</tr>
<tr>
<td>DDEX18(-3)</td>
<td>0.1059754</td>
<td>0.2492055</td>
<td>0.4191245</td>
<td>0.6797</td>
</tr>
<tr>
<td>DDEX18(-4)</td>
<td>-0.0532013</td>
<td>0.1219918</td>
<td>-0.4361053</td>
<td>0.6642</td>
</tr>
<tr>
<td>DDEX18(-1)</td>
<td>-0.9689712</td>
<td>0.2624165</td>
<td>-3.6924937</td>
<td>0.0004</td>
</tr>
<tr>
<td>C</td>
<td>-0.0008477</td>
<td>0.0329025</td>
<td>-2.4571887</td>
<td>0.0166</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.0005877</td>
<td>0.0006048</td>
<td>-0.9717515</td>
<td>0.3347</td>
</tr>
</tbody>
</table>

R-squared: 0.534282
Adjusted R-squared: 0.492576
S.E. of regression: 0.103392
Sum of squared resid: 0.716227
Log likelihood: 66.59799
F-statistic: 12.81064
Durbin-Watson stat: 1.965434
Prob(F-statistic): 0.00000

LS // Dependent Variable is D(D(EX19,2))
Date: 10-08-1997 / Time: 16:29
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T, 4) D(EX19, 2)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(EX19(-1))</td>
<td>1.46901527</td>
<td>0.5380702</td>
<td>2.7701352</td>
<td>0.0073</td>
</tr>
<tr>
<td>D(EX19(-2))</td>
<td>0.6205119</td>
<td>0.4181022</td>
<td>1.4841153</td>
<td>0.1425</td>
</tr>
<tr>
<td>D(EX19(-3))</td>
<td>0.2326446</td>
<td>0.2588781</td>
<td>0.8986650</td>
<td>0.3721</td>
</tr>
<tr>
<td>D(EX19(-4))</td>
<td>-0.0319195</td>
<td>0.1230802</td>
<td>-0.2593388</td>
<td>0.7962</td>
</tr>
<tr>
<td>C</td>
<td>-3.3523369</td>
<td>0.6166769</td>
<td>-5.4361318</td>
<td>0.0000</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0002039</td>
<td>0.0006675</td>
<td>0.0002039</td>
<td>0.7610</td>
</tr>
</tbody>
</table>

R-squared: 0.833963
Adjusted R-squared: 0.818868
S.E. of regression: 0.119758
Log likelihood: 55.02347
Durbin-Watson stat: 1.964295

Augmented Dickey-Fuller: UROOT(T, 4) D(EX20)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(EX20(-1))</td>
<td>0.2165158</td>
<td>0.2132347</td>
<td>1.0153873</td>
<td>0.3136</td>
</tr>
<tr>
<td>D(EX20(-2))</td>
<td>-0.024732</td>
<td>0.1923827</td>
<td>-0.1285564</td>
<td>0.8981</td>
</tr>
<tr>
<td>D(EX20(-3))</td>
<td>0.193569</td>
<td>0.1482856</td>
<td>1.3053796</td>
<td>0.1962</td>
</tr>
<tr>
<td>D(EX20(-4))</td>
<td>0.13564</td>
<td>0.1198076</td>
<td>1.1321497</td>
<td>0.2616</td>
</tr>
<tr>
<td>C</td>
<td>-0.9753808</td>
<td>0.2368591</td>
<td>-4.1179786</td>
<td>0.0001</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0007477</td>
<td>0.0149608</td>
<td>0.0007477</td>
<td>0.8567</td>
</tr>
</tbody>
</table>

R-squared: 0.494349
Adjusted R-squared: 0.449066
S.E. of regression: 0.056674
Log likelihood: 70.78126
Durbin-Watson stat: 2.008540

Augmented Dickey-Fuller: UROOT(T, 4) D(EX21)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(EX21(-1))</td>
<td>0.3304112</td>
<td>0.2266524</td>
<td>1.4577882</td>
<td>0.1496</td>
</tr>
<tr>
<td>D(EX21(-2))</td>
<td>0.0999533</td>
<td>0.2034529</td>
<td>0.4912848</td>
<td>0.6248</td>
</tr>
<tr>
<td>D(EX21(-3))</td>
<td>0.1935960</td>
<td>0.1563411</td>
<td>1.8632132</td>
<td>0.0668</td>
</tr>
<tr>
<td>D(EX21(-4))</td>
<td>-0.9753808</td>
<td>0.2368591</td>
<td>-4.1179786</td>
<td>0.0001</td>
</tr>
<tr>
<td>C</td>
<td>0.0007477</td>
<td>0.0149608</td>
<td>0.0007477</td>
<td>0.8567</td>
</tr>
<tr>
<td>TREND</td>
<td>-5.9560-05</td>
<td>0.0003087</td>
<td>-5.9560-05</td>
<td>0.1378</td>
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</table>

R-squared: 0.527282
Adjusted R-squared: 0.484949
S.E. of regression: 0.097710
Log likelihood: 71.35238
Durbin-Watson stat: 2.009312

Augmented Dickey-Fuller: UROOT(T, 4) D(EX22)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(EX22(-1))</td>
<td>0.3340716</td>
<td>0.2224286</td>
<td>1.4577882</td>
<td>0.1496</td>
</tr>
<tr>
<td>D(EX22(-2))</td>
<td>0.0999533</td>
<td>0.2034529</td>
<td>0.4912848</td>
<td>0.6248</td>
</tr>
<tr>
<td>D(EX22(-3))</td>
<td>0.1935960</td>
<td>0.1563411</td>
<td>1.8632132</td>
<td>0.0668</td>
</tr>
<tr>
<td>D(EX22(-4))</td>
<td>-0.9753808</td>
<td>0.2368591</td>
<td>-4.1179786</td>
<td>0.0001</td>
</tr>
<tr>
<td>C</td>
<td>0.0007477</td>
<td>0.0149608</td>
<td>0.0007477</td>
<td>0.8567</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.0009308</td>
<td>0.0005875</td>
<td>-0.0009308</td>
<td>0.1378</td>
</tr>
</tbody>
</table>

R-squared: 0.524442
Adjusted R-squared: 0.484949
S.E. of regression: 0.097710
Log likelihood: 71.35238
Durbin-Watson stat: 2.009312

Augmented Dickey-Fuller: UROOT(T, 4) D(EX23)

<table>
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<tbody>
<tr>
<td>D(EX23(-1))</td>
<td>0.3340716</td>
<td>0.2224286</td>
<td>1.4577882</td>
<td>0.1496</td>
</tr>
<tr>
<td>D(EX23(-2))</td>
<td>0.0999533</td>
<td>0.2034529</td>
<td>0.4912848</td>
<td>0.6248</td>
</tr>
<tr>
<td>D(EX23(-3))</td>
<td>0.1935960</td>
<td>0.1563411</td>
<td>1.8632132</td>
<td>0.0668</td>
</tr>
<tr>
<td>D(EX23(-4))</td>
<td>-0.9753808</td>
<td>0.2368591</td>
<td>-4.1179786</td>
<td>0.0001</td>
</tr>
<tr>
<td>C</td>
<td>0.0007477</td>
<td>0.0149608</td>
<td>0.0007477</td>
<td>0.8567</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.0009308</td>
<td>0.0005875</td>
<td>-0.0009308</td>
<td>0.1378</td>
</tr>
</tbody>
</table>

R-squared: 0.524442
Adjusted R-squared: 0.484949
S.E. of regression: 0.097710
Log likelihood: 71.35238
Durbin-Watson stat: 2.009312
### Augmented Dickey-Fuller: UROOT(T, 4) D(EX23)

<table>
<thead>
<tr>
<th>VARIABLE</th>
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<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX23(-1)))</td>
<td>0.2840078</td>
<td>0.2162903</td>
<td>1.3130861</td>
<td>0.1936</td>
</tr>
<tr>
<td>D(D(EX23(-2)))</td>
<td>0.2570159</td>
<td>0.1955008</td>
<td>0.2594153</td>
<td>0.2002</td>
</tr>
<tr>
<td>D(D(EX23(-3)))</td>
<td>0.2595455</td>
<td>0.1514834</td>
<td>1.7669534</td>
<td>0.0957</td>
</tr>
<tr>
<td>D(D(EX23(-4)))</td>
<td>0.0154545</td>
<td>0.1220470</td>
<td>0.1264621</td>
<td>0.8997</td>
</tr>
<tr>
<td>D(EX23(-1))</td>
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<td>0.2505843</td>
<td>-4.2810208</td>
<td>0.0001</td>
</tr>
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<td>C</td>
<td>-0.0679795</td>
<td>0.0293064</td>
<td>-2.3475820</td>
<td>0.2219</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.0011016</td>
<td>0.0006195</td>
<td>-2.7205908</td>
<td>0.0071</td>
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</table>

R-squared: 0.499815

Number of observations: 74

### LS // Dependent Variable is D(D(EX24,2))

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX24(-1)),2)</td>
<td>1.6055341</td>
<td>0.5084786</td>
<td>3.1575252</td>
<td>0.0024</td>
</tr>
<tr>
<td>D(D(EX24(-2)),2)</td>
<td>0.7865838</td>
<td>0.3969794</td>
<td>1.9814219</td>
<td>0.0517</td>
</tr>
<tr>
<td>D(D(EX24(-3)),2)</td>
<td>0.3713351</td>
<td>0.2497075</td>
<td>1.4870802</td>
<td>0.1418</td>
</tr>
<tr>
<td>D(D(EX24(-4)),2)</td>
<td>-0.0456981</td>
<td>0.1238249</td>
<td>-0.3690542</td>
<td>0.7133</td>
</tr>
<tr>
<td>D(EX24(-1),2)</td>
<td>-3.3928733</td>
<td>0.5859426</td>
<td>-5.7904534</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>-0.0118186</td>
<td>0.0381736</td>
<td>-0.3096003</td>
<td>0.7578</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0001831</td>
<td>0.0007824</td>
<td>0.2339994</td>
<td>0.6492</td>
</tr>
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</table>

R-squared: 0.809988

Number of observations: 73

### LS // Dependent Variable is D(D(EX25))

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<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX25(-1)))</td>
<td>0.4242495</td>
<td>0.1624958</td>
<td>2.6181239</td>
<td>0.0091</td>
</tr>
<tr>
<td>D(D(EX25(-2)))</td>
<td>0.3119114</td>
<td>0.3119114</td>
<td>1.0232595</td>
<td>0.3084</td>
</tr>
<tr>
<td>D(D(EX25(-3)))</td>
<td>0.0362719</td>
<td>0.0362719</td>
<td>1.0325958</td>
<td>0.3079</td>
</tr>
<tr>
<td>D(D(EX25(-4)))</td>
<td>-1.2396977</td>
<td>0.5894794</td>
<td>-2.1176398</td>
<td>0.0342</td>
</tr>
<tr>
<td>C</td>
<td>-0.0010825</td>
<td>0.0007824</td>
<td>-0.1380277</td>
<td>0.8920</td>
</tr>
<tr>
<td>TREND</td>
<td>0.0001831</td>
<td>0.0007824</td>
<td>0.2339994</td>
<td>0.6492</td>
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</tbody>
</table>

R-squared: 0.512975

Number of observations: 74

### LS // Dependent Variable is D(D(EX26))

<table>
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<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX26(-1)))</td>
<td>0.0596656</td>
<td>0.2327171</td>
<td>0.2577774</td>
<td>0.7989</td>
</tr>
<tr>
<td>D(D(EX26(-2)))</td>
<td>0.1198267</td>
<td>0.2097356</td>
<td>-0.5713227</td>
<td>0.5697</td>
</tr>
<tr>
<td>D(D(EX26(-3)))</td>
<td>0.1017534</td>
<td>0.1643505</td>
<td>0.6191243</td>
<td>0.5379</td>
</tr>
<tr>
<td>D(D(EX26(-4)))</td>
<td>-0.0532013</td>
<td>0.1219181</td>
<td>-0.4361057</td>
<td>0.6642</td>
</tr>
<tr>
<td>C</td>
<td>-0.0808477</td>
<td>0.0329025</td>
<td>-2.4571887</td>
<td>0.0166</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.0005877</td>
<td>0.0006048</td>
<td>0.3075908</td>
<td>0.7578</td>
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</table>

R-squared: 0.512975

Number of observations: 74

### LS // Dependent Variable is D(D(EX28,2))

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(EX28(-1)))</td>
<td>0.534282</td>
<td>0.492576</td>
<td>1.0727564</td>
<td>0.2840078</td>
</tr>
<tr>
<td>D(D(EX28(-2)))</td>
<td>0.492576</td>
<td>0.492576</td>
<td>1.0727564</td>
<td>0.2840078</td>
</tr>
<tr>
<td>D(D(EX28(-3)))</td>
<td>0.103392</td>
<td>0.103392</td>
<td>1.0727564</td>
<td>0.2840078</td>
</tr>
<tr>
<td>D(D(EX28(-4)))</td>
<td>0.6659799</td>
<td>0.6659799</td>
<td>1.0727564</td>
<td>0.2840078</td>
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</table>

R-squared: 0.499815

Number of observations: 74
### Augmented Dickey-Fuller: UROOT(T,4) D(EX28)

<table>
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<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(EX28(-1,2))</td>
<td>0.608011</td>
<td>0.4498201</td>
<td>1.3534523</td>
<td>0.1805</td>
</tr>
<tr>
<td>D(EX28(-2,2))</td>
<td>0.1274221</td>
<td>0.3600336</td>
<td>0.3539173</td>
<td>0.7245</td>
</tr>
<tr>
<td>D(EX28(-3,2))</td>
<td>0.217791</td>
<td>0.2619023</td>
<td>0.8075521</td>
<td>0.4206</td>
</tr>
<tr>
<td>D(EX28(-4,2))</td>
<td>-0.0297022</td>
<td>0.1232113</td>
<td>-0.2410669</td>
<td>0.8103</td>
</tr>
<tr>
<td>D(EX28(-1,1))</td>
<td>-2.2980395</td>
<td>0.5086925</td>
<td>-4.5175413</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

C: 0.0090661

Log likelihood: 39.82080
F-statistic: 38.92551
Prob(F-statistic): 0.000000

### Augmented Dickey-Fuller: UROOT(T,4) D(EX29)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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</thead>
<tbody>
<tr>
<td>D(EX29(-1))</td>
<td>0.3247674</td>
<td>0.2329519</td>
<td>1.3941393</td>
<td>0.1679</td>
</tr>
<tr>
<td>D(EX29(-2))</td>
<td>0.0578241</td>
<td>0.2070447</td>
<td>0.2792833</td>
<td>0.7809</td>
</tr>
<tr>
<td>D(EX29(-3))</td>
<td>0.2328905</td>
<td>0.1572327</td>
<td>1.4812323</td>
<td>0.1432</td>
</tr>
<tr>
<td>D(EX29(-4))</td>
<td>-0.0001163</td>
<td>0.1219413</td>
<td>-0.0009538</td>
<td>0.9992</td>
</tr>
<tr>
<td>D(EX29(-1))</td>
<td>-1.1728705</td>
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<td>-4.3263302</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

C: -0.0762378

Log likelihood: 70.87794
F-statistic: 12.46500
Prob(F-statistic): 0.000000

### Augmented Dickey-Fuller: UROOT(T,4) D(EX30)

<table>
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<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(EX30(-1))</td>
<td>0.3949830</td>
<td>0.2241210</td>
<td>1.7623648</td>
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</tr>
<tr>
<td>D(EX30(-2))</td>
<td>0.230705</td>
<td>0.1997794</td>
<td>1.1531245</td>
<td>0.2530</td>
</tr>
<tr>
<td>D(EX30(-3))</td>
<td>0.3644090</td>
<td>0.1557991</td>
<td>2.3389675</td>
<td>0.0223</td>
</tr>
<tr>
<td>D(EX30(-4))</td>
<td>0.1764694</td>
<td>0.1205781</td>
<td>1.4635274</td>
<td>0.1480</td>
</tr>
<tr>
<td>D(EX30(-1))</td>
<td>-1.3097204</td>
<td>0.2595557</td>
<td>-5.0382450</td>
<td>0.0000</td>
</tr>
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</table>

C: -0.0639446

Log likelihood: 67.40108
F-statistic: 12.65150
Prob(F-statistic): 0.000000

### Augmented Dickey-Fuller: UROOT(T,4) D(EX31)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(EX31(-1))</td>
<td>0.121952</td>
<td>0.2310136</td>
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</tr>
<tr>
<td>D(EX31(-2))</td>
<td>-0.0020476</td>
<td>0.2077007</td>
<td>-0.0098584</td>
<td>0.9922</td>
</tr>
<tr>
<td>D(EX31(-3))</td>
<td>0.2024498</td>
<td>0.1642132</td>
<td>1.2328469</td>
<td>0.2219</td>
</tr>
<tr>
<td>D(EX31(-4))</td>
<td>0.0378981</td>
<td>0.1223408</td>
<td>0.3097747</td>
<td>0.7577</td>
</tr>
<tr>
<td>D(EX31(-1))</td>
<td>-1.0413615</td>
<td>0.2610199</td>
<td>-3.985859</td>
<td>0.0002</td>
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</table>

C: -0.0462651

Log likelihood: 67.33901
F-statistic: 12.36576
Prob(F-statistic): 0.000000

### Augmented Dickey-Fuller: UROOT(T,4) D(EX32)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tr>
<td>D(EX32(-1))</td>
<td>0.525477</td>
<td>0.2515651</td>
<td>2.1026306</td>
<td>0.0360</td>
</tr>
<tr>
<td>D(EX32(-2))</td>
<td>0.102362</td>
<td>0.2515651</td>
<td>0.4026206</td>
<td>0.6867</td>
</tr>
</tbody>
</table>

Log likelihood: 67.33901
F-statistic: 12.36576
Prob(F-statistic): 0.000000

### Summary

- **SMPL range:** 1977.4 - 1995.4
- **Number of observations:** 73
- **Adjusted R-squared:** 0.489185
- **Log likelihood:** 39.82080
- **F-statistic:** 38.92551
- **Prob(F-statistic):** 0.000000
- **Mean of dependent var:** -0.002191
- **Sum of squared resid:** 0.702026
- **S.D. of dependent var:** 0.300829
- **Durbin-Watson stat:** 1.872646
- **Prob(F-statistic):** 0.000000

- **SMPL range:** 1977.3 - 1995.4
- **Number of observations:** 74
- **Adjusted R-squared:** 0.465154
- **Log likelihood:** 70.87794
- **F-statistic:** 12.46500
- **Prob(F-statistic):** 0.000000
- **Mean of dependent var:** -0.002268
- **Sum of squared resid:** 0.702026
- **S.D. of dependent var:** 0.142360
- **Durbin-Watson stat:** 1.995879
- **Prob(F-statistic):** 0.000000

- **SMPL range:** 1977.3 - 1995.4
- **Number of observations:** 74
- **Adjusted R-squared:** 0.489185
- **Log likelihood:** 67.40108
- **F-statistic:** 12.65150
- **Prob(F-statistic):** 0.000000
- **Mean of dependent var:** -0.002142
- **Sum of squared resid:** 0.700849
- **S.D. of dependent var:** 0.124047
- **Durbin-Watson stat:** 1.975227
- **Prob(F-statistic):** 0.000000

- **SMPL range:** 1977.3 - 1995.4
- **Number of observations:** 74
- **Adjusted R-squared:** 0.489185
- **Log likelihood:** 67.40108
- **F-statistic:** 12.65150
- **Prob(F-statistic):** 0.000000
- **Mean of dependent var:** -0.002142
- **Sum of squared resid:** 0.700849
- **S.D. of dependent var:** 0.124047
- **Durbin-Watson stat:** 1.975227
- **Prob(F-statistic):** 0.000000

- **SMPL range:** 1977.3 - 1995.4
- **Number of observations:** 74
- **Adjusted R-squared:** 0.489185
- **Log likelihood:** 67.40108
- **F-statistic:** 12.65150
- **Prob(F-statistic):** 0.000000
- **Mean of dependent var:** -0.002142
- **Sum of squared resid:** 0.700849
- **S.D. of dependent var:** 0.124047
- **Durbin-Watson stat:** 1.975227
- **Prob(F-statistic):** 0.000000
<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(EX32(-1))</td>
<td>0.2638425</td>
<td>0.2207755</td>
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<td>0.2363</td>
</tr>
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<td>D(EX32(-2))</td>
<td>0.0140645</td>
<td>0.1963577</td>
<td>0.0704510</td>
<td>0.9440</td>
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<tr>
<td>D(EX32(-3))</td>
<td>0.2385886</td>
<td>0.1577767</td>
<td>1.5515777</td>
<td>0.1255</td>
</tr>
<tr>
<td>D(EX32(-4))</td>
<td>-0.131364</td>
<td>0.2229035</td>
<td>-0.0172385</td>
<td>0.8659</td>
</tr>
<tr>
<td>D(EX32(-1))</td>
<td>-1.0565728</td>
<td>0.2562113</td>
<td>-4.1023026</td>
<td>0.0001</td>
</tr>
<tr>
<td>C</td>
<td>-0.0748128</td>
<td>0.0307035</td>
<td>-2.4366225</td>
<td>0.0175</td>
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</table>

**TREND**

-0.0009949 0.0006125 -1.6242561 0.1090

R-squared 0.513864 Mean of dependent var -0.002294

Adjusted R-squared 0.470329 S.D. of dependent var 0.137339

S.E. of regression 0.099953 Sum of squared resid 0.669370

Log likelihood 69.10143 F-statistic 11.80358

Prob(F-statistic) 0.000000

---

**LS // Dependent Variable is D(D(EX33))**

Date: 10-08-1997 / Time: 16:38

SMPL range: 1977.3 - 1995.4

Number of observations: 74

Augmented Dickey-Fuller: UROOT(T,4) D(EX33)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(EX33(-1))</td>
<td>0.3390336</td>
<td>0.2266789</td>
<td>1.4956559</td>
<td>0.1394</td>
</tr>
<tr>
<td>D(EX33(-2))</td>
<td>0.1146492</td>
<td>0.2030628</td>
<td>0.5646000</td>
<td>0.5742</td>
</tr>
<tr>
<td>D(EX33(-3))</td>
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<td>0.1564003</td>
<td>1.8539638</td>
<td>0.0681</td>
</tr>
<tr>
<td>D(EX33(-4))</td>
<td>0.0372144</td>
<td>0.1225264</td>
<td>-0.3037259</td>
<td>0.7623</td>
</tr>
<tr>
<td>D(EX33(-1))</td>
<td>-1.1852768</td>
<td>0.2644432</td>
<td>-4.4821609</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>-0.0925069</td>
<td>0.0317020</td>
<td>-2.9180120</td>
<td>0.0048</td>
</tr>
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TREND

-0.0009977 0.0005973 -1.670237 0.0995

R-squared 0.521262 Mean of dependent var -0.002461

Adjusted R-squared 0.478390 S.D. of dependent var 0.076354

S.E. of regression 0.056674 Sum of squared resid 0.215199

Log likelihood 111.0880 F-statistic 12.15856

Prob(F-statistic) 0.000000

---

**LS // Dependent Variable is D(D(EX34))**

Date: 10-08-1997 / Time: 17:05

SMPL range: 1977.3 - 1995.4

Number of observations: 74

Augmented Dickey-Fuller: UROOT(T,4) D(EX34)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(EX34(-1))</td>
<td>0.2165158</td>
<td>0.2132347</td>
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</tr>
<tr>
<td>D(EX34(-2))</td>
<td>-0.0247320</td>
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</tr>
<tr>
<td>D(EX34(-3))</td>
<td>0.1935690</td>
<td>0.1482856</td>
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</tr>
<tr>
<td>D(EX34(-4))</td>
<td>0.1356400</td>
<td>0.1218897</td>
<td>0.9753808</td>
<td>0.3558</td>
</tr>
<tr>
<td>D(EX34(-1))</td>
<td>-0.8278115</td>
<td>0.2325997</td>
<td>-3.5589530</td>
<td>0.0007</td>
</tr>
<tr>
<td>C</td>
<td>-0.0007477</td>
<td>0.0003087</td>
<td>-0.0499752</td>
<td>0.9603</td>
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</table>

TREND

5.5955E-05 0.0003087 0.1812146 0.8567

R-squared 0.494349 Mean of dependent var 0.000260

Adjusted R-squared 0.478390 S.D. of dependent var 0.076354

S.E. of regression 0.056674 Sum of squared resid 0.215199

Log likelihood 111.0880 F-statistic 12.15856

Prob(F-statistic) 0.000000

---

**LS // Dependent Variable is D(D(EX35))**

Date: 10-08-1997 / Time: 17:05

SMPL range: 1977.3 - 1995.4

Number of observations: 74

Augmented Dickey-Fuller: UROOT(T,4) D(EX35)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(EX35(-1))</td>
<td>0.0116985</td>
<td>0.2184030</td>
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</tr>
<tr>
<td>D(EX35(-2))</td>
<td>-0.1544555</td>
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</tr>
<tr>
<td>D(EX35(-3))</td>
<td>0.0485220</td>
<td>0.1575197</td>
<td>0.3080278</td>
<td>0.7590</td>
</tr>
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<td>D(EX35(-4))</td>
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<td>0.9715</td>
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TREND

-6.4368-05 0.0006103 -0.1054910 0.9163

R-squared 0.503410 Mean of dependent var 0.000640

Adjusted R-squared 0.458939 S.D. of dependent var 0.152234

S.E. of regression 0.056674 Sum of squared resid 0.215199

Log likelihood 111.0880 F-statistic 12.15856

Prob(F-statistic) 0.000000

---

**LS // Dependent Variable is D(D(EX36))**

Date: 10-08-1997 / Time: 17:06

SMPL range: 1977.3 - 1995.4

Number of observations: 74
### Augmented Dickey-Fuller: $UROOT(T,4) \ D(EX36)$

<table>
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<tr>
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<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$D(EX36(-1))$</td>
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<td>0.21284976</td>
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<td>0.00000000</td>
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<tr>
<td>$D(EX36(-2))$</td>
<td>-0.1741776</td>
<td>0.198652</td>
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<td>0.38338736</td>
</tr>
<tr>
<td>$D(EX36(-3))$</td>
<td>0.0487100</td>
<td>0.1580507</td>
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</tr>
<tr>
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<td>0.1334996</td>
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</tr>
<tr>
<td>$C$</td>
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</tbody>
</table>

**TREND**

-6.008E-05

-0.0989954

-0.9214

**R-squared**

0.508886

**Mean of dependent var**

0.000663

**Adjusted R-squared**

0.464905

**S.D. of dependent var**

0.152324

**Sum of squared resid**

0.831845

**F-statistic**

61.06102

**Prob(F-statistic)**

0.00000000

**LS // Dependent Variable is $D(D(EX37))$**

Date: 10-08-1997 / Time: 17:06

Number of observations: 74

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
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<th>2-TAIL SIG.</th>
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</thead>
<tbody>
<tr>
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<td>-0.0104048</td>
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</tr>
<tr>
<td>$D(EX37(-2))$</td>
<td>-0.1658482</td>
<td>0.1911081</td>
<td>-0.8681851</td>
<td>0.38840118</td>
</tr>
<tr>
<td>$D(EX37(-3))$</td>
<td>0.0569577</td>
<td>0.1538655</td>
<td>0.3702303</td>
<td>0.71243907</td>
</tr>
<tr>
<td>$D(EX37(-4))$</td>
<td>0.1360932</td>
<td>0.1216343</td>
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<td>$C$</td>
<td>-0.7751474</td>
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</table>

**TREND**

-0.0002423

-0.0000605

-0.6904

**R-squared**

0.483423

**Mean of dependent var**

0.000369

**Adjusted R-squared**

0.437162

**S.D. of dependent var**

0.147295

**Sum of squared resid**

0.818153

**F-statistic**

61.67507

**Prob(F-statistic)**

0.00000000

**LS // Dependent Variable is $D(D(EX38))$**

Date: 10-08-1997 / Time: 17:07

Number of observations: 74

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$D(EX38(-1))$</td>
<td>0.1164546</td>
<td>0.2264399</td>
<td>0.5142846</td>
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</tr>
<tr>
<td>$D(EX38(-2))$</td>
<td>-0.0323390</td>
<td>0.2011061</td>
<td>-0.1608058</td>
<td>0.87272236</td>
</tr>
<tr>
<td>$D(EX38(-3))$</td>
<td>0.1134687</td>
<td>0.1605908</td>
<td>0.7065706</td>
<td>0.48239441</td>
</tr>
<tr>
<td>$D(EX38(-4))$</td>
<td>0.2494831</td>
<td>0.1208485</td>
<td>2.0644278</td>
<td>0.04293027</td>
</tr>
<tr>
<td>$C$</td>
<td>-0.9640943</td>
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<td>0.00025363</td>
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</table>

**TREND**

2.126E-05

0.306715

0.9709

**R-squared**

0.526145

**Mean of dependent var**

0.001355

**Adjusted R-squared**

0.483710

**S.D. of dependent var**

0.148110

**Sum of squared resid**

0.758818

**F-statistic**

64.46071

**Prob(F-statistic)**

0.00000000

**LS // Dependent Variable is $D(D(EX39))$**

Date: 10-08-1997 / Time: 17:07

Number of observations: 74

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$D(EX39(-1))$</td>
<td>0.1439613</td>
<td>0.1971635</td>
<td>0.7296666</td>
<td>0.48600984</td>
</tr>
<tr>
<td>$D(EX39(-2))$</td>
<td>0.1971635</td>
<td>0.1971635</td>
<td>0.7296666</td>
<td>0.48600984</td>
</tr>
<tr>
<td>$D(EX39(-3))$</td>
<td>0.1971635</td>
<td>0.1971635</td>
<td>0.7296666</td>
<td>0.48600984</td>
</tr>
<tr>
<td>$D(EX39(-4))$</td>
<td>0.1971635</td>
<td>0.1971635</td>
<td>0.7296666</td>
<td>0.48600984</td>
</tr>
<tr>
<td>$C$</td>
<td>0.0000000</td>
<td>0.0000000</td>
<td>0.0000000</td>
<td>0.00000000</td>
</tr>
</tbody>
</table>

**TREND**

-7.817E-05

-0.1446932

0.8854

**R-squared**

0.492618

**Mean of dependent var**

-0.000244

**Adjusted R-squared**

0.483710

**S.D. of dependent var**

0.148110

**Sum of squared resid**

0.758818

**F-statistic**

64.46071

**Prob(F-statistic)**

0.00000000

**LS // Dependent Variable is $D(D(EX40,2))$**

Date: 10-08-1997 / Time: 17:08

Number of observations: 73

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.0000000</td>
<td>0.0000000</td>
<td>0.0000000</td>
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</tr>
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</table>

**TREND**

-7.817E-05

-0.1446932

0.8854

**R-squared**

0.492618

**Mean of dependent var**

-0.000244

**Adjusted R-squared**

0.483710

**S.D. of dependent var**

0.148110

**Sum of squared resid**

0.758818

**F-statistic**

64.46071

**Prob(F-statistic)**

0.00000000
## ADF Test Statistic

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Statistic</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF1(-1))</td>
<td>-1.099110</td>
<td>0.304595</td>
<td>-3.608434</td>
<td>0.0006</td>
</tr>
<tr>
<td>D(FF1(-2))</td>
<td>-0.049517</td>
<td>0.276668</td>
<td>-0.178975</td>
<td>0.8585</td>
</tr>
<tr>
<td>D(FF1(-3))</td>
<td>-0.068711</td>
<td>0.233871</td>
<td>-0.297397</td>
<td>0.7698</td>
</tr>
<tr>
<td>D(FF1(-4))</td>
<td>-0.093291</td>
<td>0.185611</td>
<td>-0.502614</td>
<td>0.6169</td>
</tr>
<tr>
<td>D(FF1(-5))</td>
<td>0.055363</td>
<td>0.119743</td>
<td>0.462352</td>
<td>0.6453</td>
</tr>
<tr>
<td>D(FF1(-6))</td>
<td>-0.014220</td>
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<td>-1.747942</td>
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</table>

**ADF Test Statistic**

<table>
<thead>
<tr>
<th>Variable</th>
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<th>T-Statistic</th>
<th>P-Value</th>
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</thead>
<tbody>
<tr>
<td>Mean dep. var</td>
<td>0.521684</td>
<td>Mean of dependent var</td>
<td>0.000167</td>
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<tr>
<td>S.D. dep. var</td>
<td>0.478950</td>
<td>S.D. of dependent var</td>
<td>0.052325</td>
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<tr>
<td>S.E. of regression</td>
<td>0.037773</td>
<td>Sum of squared resid</td>
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<tr>
<td>Log likelihood</td>
<td>141.1103</td>
<td>F-statistic</td>
<td>12.17914</td>
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</tr>
<tr>
<td>Durbin-Watson stat</td>
<td>2.000002</td>
<td>Prob(F-statistic)</td>
<td>0.00000</td>
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</tr>
</tbody>
</table>

**Augmented Dickey-Fuller Test Equation**

LS / Dependent Variable is D(FF)

**ADF Test Statistic**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Statistic</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean dep. var</td>
<td>0.267572</td>
<td>Mean of dependent var</td>
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<tr>
<td>S.D. dep. var</td>
<td>0.226505</td>
<td>S.D. of dependent var</td>
<td>0.238996</td>
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</tr>
<tr>
<td>S.E. of regression</td>
<td>0.167097</td>
<td>Sum of squared resid</td>
<td>0.400716</td>
<td></td>
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<tr>
<td>Log likelihood</td>
<td>1.954936</td>
<td>F-statistic</td>
<td>40.37103</td>
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<tr>
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<td>Prob(F-statistic)</td>
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</table>

**Augmented Dickey-Fuller Test Equation**

LS / Dependent Variable is D(FF)

**ADF Test Statistic**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Statistic</th>
<th>P-Value</th>
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<tbody>
<tr>
<td>Mean dep. var</td>
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<tr>
<td>S.D. dep. var</td>
<td>0.226505</td>
<td>S.D. of dependent var</td>
<td>0.238996</td>
<td></td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>0.167097</td>
<td>Sum of squared resid</td>
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<tr>
<td>Log likelihood</td>
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<td>Prob(F-statistic)</td>
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</table>

**Augmented Dickey-Fuller Test Equation**

LS / Dependent Variable is D(FF)

**ADF Test Statistic**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
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<td>S.D. of dependent var</td>
<td>0.238996</td>
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<tr>
<td>S.E. of regression</td>
<td>0.167097</td>
<td>Sum of squared resid</td>
<td>0.400716</td>
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<tr>
<td>Log likelihood</td>
<td>0.003540</td>
<td>F-statistic</td>
<td>1.6259027</td>
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<tr>
<td>Durbin-Watson stat</td>
<td>1.954936</td>
<td>Prob(F-statistic)</td>
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</table>

**Augmented Dickey-Fuller Test Equation**

LS / Dependent Variable is D(FF)

**ADF Test Statistic**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Statistic</th>
<th>P-Value</th>
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<td>S.D. of dependent var</td>
<td>0.238996</td>
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<td>S.E. of regression</td>
<td>0.167097</td>
<td>Sum of squared resid</td>
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<tr>
<td>Log likelihood</td>
<td>0.003540</td>
<td>F-statistic</td>
<td>1.6259027</td>
<td></td>
</tr>
<tr>
<td>Durbin-Watson stat</td>
<td>1.954936</td>
<td>Prob(F-statistic)</td>
<td>0.000000</td>
<td></td>
</tr>
</tbody>
</table>
Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF2,3)
Date: 02/15/98 Time: 10:06
Sample(adjusted): 1977:4 1995:4
Included observations: 73 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF2(-1),2)</td>
<td>-2.878722</td>
<td>0.561412</td>
<td>-5.127642</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(FF2(-2),2)</td>
<td>0.462766</td>
<td>0.382412</td>
<td>1.210124</td>
<td>0.2305</td>
</tr>
<tr>
<td>D(FF2(-3),3)</td>
<td>0.093603</td>
<td>0.253676</td>
<td>0.368986</td>
<td>0.7133</td>
</tr>
<tr>
<td>D(FF2(-4),3)</td>
<td>0.065758</td>
<td>0.118728</td>
<td>0.553858</td>
<td>0.5815</td>
</tr>
<tr>
<td>C</td>
<td>0.000733</td>
<td>0.007069</td>
<td>0.103682</td>
<td>0.9177</td>
</tr>
<tr>
<td>TREND(1976:1)</td>
<td>7.80E-06</td>
<td>0.000147</td>
<td>0.052959</td>
<td>0.9579</td>
</tr>
</tbody>
</table>

R-squared: 0.871107
Mean dependent var: -0.000573
S.E. of regression: 0.026463
Akaike info criterion: -7.173003
Schwarz criterion: -6.953370
F-statistic: 74.34236
Prob(F-statistic): 0.000000

ADF Test Statistic: -4.793824
1% Critical Value: -4.0853
5% Critical Value: -3.4704
10% Critical Value: -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF3,2)
Date: 02/15/98 Time: 10:08
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF3(-1))</td>
<td>-1.353672</td>
<td>0.282378</td>
<td>-4.793824</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(FF3(-1),2)</td>
<td>0.319197</td>
<td>0.254462</td>
<td>1.254402</td>
<td>0.2141</td>
</tr>
<tr>
<td>D(FF3(-2),2)</td>
<td>0.242323</td>
<td>0.215107</td>
<td>1.126100</td>
<td>0.2641</td>
</tr>
<tr>
<td>D(FF3(-3),2)</td>
<td>0.187102</td>
<td>0.170313</td>
<td>1.098582</td>
<td>0.2759</td>
</tr>
<tr>
<td>D(FF3(-4),2)</td>
<td>0.289505</td>
<td>0.116506</td>
<td>2.484887</td>
<td>0.0155</td>
</tr>
<tr>
<td>C</td>
<td>0.000126</td>
<td>0.001317</td>
<td>0.095327</td>
<td>0.9243</td>
</tr>
<tr>
<td>TREND(1976:1)</td>
<td>-2.13E-06</td>
<td>2.77E-05</td>
<td>-0.077002</td>
<td>0.9389</td>
</tr>
</tbody>
</table>

R-squared: 0.583257
Mean dependent var: 0.0385-05
S.E. of regression: 0.321814
Akaike info criterion: -10.47304
Schwarz criterion: -10.25509
F-statistic: 15.62841
Prob(F-statistic): 0.000000

ADF Test Statistic: -4.607650
1% Critical Value: -4.0853
5% Critical Value: -3.4704
10% Critical Value: -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF4,2)
Date: 02/15/98 Time: 10:09
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF4(-1))</td>
<td>-1.482808</td>
<td>0.321814</td>
<td>-4.07650</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(FF4(-1),2)</td>
<td>0.445748</td>
<td>0.276454</td>
<td>1.612379</td>
<td>0.1116</td>
</tr>
<tr>
<td>D(FF4(-2),2)</td>
<td>0.188593</td>
<td>0.234631</td>
<td>0.804712</td>
<td>0.4238</td>
</tr>
<tr>
<td>D(FF4(-3),2)</td>
<td>0.198156</td>
<td>0.174380</td>
<td>1.136348</td>
<td>0.2599</td>
</tr>
<tr>
<td>D(FF4(-4),2)</td>
<td>0.052693</td>
<td>0.123056</td>
<td>0.428204</td>
<td>0.6699</td>
</tr>
<tr>
<td>C</td>
<td>-0.000104</td>
<td>0.002220</td>
<td>-0.471076</td>
<td>0.6391</td>
</tr>
<tr>
<td>TREND(1976:1)</td>
<td>3.21E-05</td>
<td>4.70E-05</td>
<td>0.683294</td>
<td>0.4968</td>
</tr>
</tbody>
</table>

R-squared: 0.506780
Mean dependent var: 0.545937
S.E. of regression: 0.005085
Akaike info criterion: -10.47304
Schwarz criterion: -10.25509
F-statistic: 15.62841
Prob(F-statistic): 0.000000

ADF Test Statistic: -4.607650
1% Critical Value: -4.0853
5% Critical Value: -3.4704
10% Critical Value: -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.
R-squared 0.552060  Mean dependent var  -4.69E-06
Adjusted R-squared 0.511946  S.D. dependent var  0.012141
S.E. of regression 0.008482  Akaike info criterion  -9.449814
Sum squared resid 0.004820  Schwarz criterion  -9.231862
Log likelihood 251.6417  F-statistic  13.76229
Durbin-Watson stat 2.002911  Prob(F-statistic)  0.000000

ADF Test Statistic -4.008562  1% Critical Value*  -4.0853
5% Critical Value  -3.4704
10% Critical Value  -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF5,2)
Date: 02/15/98 Time: 10:10
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF5(-1))</td>
<td>-0.899081</td>
<td>0.224290</td>
<td>-4.008562</td>
<td>0.0002</td>
</tr>
<tr>
<td>D(FF5(-1),2)</td>
<td>0.104408</td>
<td>0.211609</td>
<td>0.493432</td>
<td>0.6233</td>
</tr>
<tr>
<td>D(FF5(-2),2)</td>
<td>-0.048477</td>
<td>0.192862</td>
<td>-0.251357</td>
<td>0.8023</td>
</tr>
<tr>
<td>D(FF5(-3),2)</td>
<td>0.152547</td>
<td>0.211609</td>
<td>0.74332</td>
<td>0.4704</td>
</tr>
<tr>
<td>D(FF5(-4),2)</td>
<td>0.278670</td>
<td>0.121936</td>
<td>2.285369</td>
<td>0.0255</td>
</tr>
<tr>
<td>C</td>
<td>0.003985</td>
<td>0.009561</td>
<td>0.5209</td>
<td>0.5928</td>
</tr>
<tr>
<td>TREND(1976:1)</td>
<td>5.64E-05</td>
<td>9.48E-05</td>
<td>0.66342</td>
<td>0.5081</td>
</tr>
</tbody>
</table>

R-squared 0.532930  Mean dependent var  -4.70E-05
Adjusted R-squared 0.491103  S.D. dependent var  0.002134
S.E. of regression 0.015361  Akaike info criterion  -8.263976
Sum squared resid 0.015810  Schwarz criterion  -8.340223
Log likelihood 207.6916  F-statistic  12.74126
Durbin-Watson stat 2.061152  Prob(F-statistic)  0.000000

ADF Test Statistic -3.817210  1% Critical Value*  -4.0853
5% Critical Value  -3.4704
10% Critical Value  -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF6,2)
Date: 02/15/98 Time: 10:11
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF6(-1))</td>
<td>-1.105340</td>
<td>0.289568</td>
<td>-3.817210</td>
<td>0.0003</td>
</tr>
<tr>
<td>D(FF6(-1),2)</td>
<td>0.065164</td>
<td>0.265922</td>
<td>0.245050</td>
<td>0.8072</td>
</tr>
<tr>
<td>D(FF6(-2),2)</td>
<td>0.097126</td>
<td>0.230095</td>
<td>0.422112</td>
<td>0.6743</td>
</tr>
<tr>
<td>D(FF6(-3),2)</td>
<td>0.002618</td>
<td>0.177669</td>
<td>0.14736</td>
<td>0.9883</td>
</tr>
<tr>
<td>D(FF6(-4),2)</td>
<td>0.161684</td>
<td>0.123240</td>
<td>1.311945</td>
<td>0.1940</td>
</tr>
<tr>
<td>C</td>
<td>-0.001091</td>
<td>0.001312</td>
<td>-0.831766</td>
<td>0.4085</td>
</tr>
<tr>
<td>TREND(1976:1)</td>
<td>2.70E-05</td>
<td>2.78E-05</td>
<td>0.968918</td>
<td>0.3361</td>
</tr>
</tbody>
</table>

R-squared 0.582194  Mean dependent var  3.07E-06
Adjusted R-squared 0.495739  S.D. dependent var  0.002789
S.E. of regression 0.004924  Akaike info criterion  -10.53729
Sum squared resid 0.001625  Schwarz criterion  -10.31934
Log likelihood 291.8784  F-statistic  15.56027
Durbin-Watson stat 1.998393  Prob(F-statistic)  0.000000

ADF Test Statistic -6.171673  1% Critical Value*  -4.0853
5% Critical Value  -3.4704
10% Critical Value  -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF7,2)
### Augmented Dickey-Fuller Test Equation

- **Variable**: D(FF7(-1))-2.418773
  - **Coefficient**: 0.391915
  - **Std. Error**: 0.391915
  - **t-Statistic**: -6.171673
  - **Prob.**: 0.0000

- **Variable**: D(FF7(-1),2)
  - **Coefficient**: 0.711281
  - **Std. Error**: 0.271713
  - **t-Statistic**: 2.617766
  - **Prob.**: 0.0109

- **Variable**: D(FF7(-3),2)
  - **Coefficient**: 0.391679
  - **Std. Error**: 0.198794
  - **t-Statistic**: 1.970281
  - **Prob.**: 0.0529

- **Variable**: D(FF7(-4),2)
  - **Coefficient**: 0.302944
  - **Std. Error**: 0.115555
  - **t-Statistic**: 2.621652
  - **Prob.**: 0.0108

- **Variable**: C
  - **Coefficient**: -0.012367
  - **Std. Error**: 0.002937
  - **t-Statistic**: -4.210501
  - **Prob.**: 0.0001

- **Variable**: @TREND(1976:1)
  - **Coefficient**: 5.16E-05
  - **Std. Error**: 4.77E-05
  - **t-Statistic**: 1.081747
  - **Prob.**: 0.2832

**R-squared**: 0.723498

**Adjusted R-squared**: 0.698736

**S.E. of regression**: 0.008688

**Sum squared resid**: 0.005057

**Log likelihood**: 249.8642

**Durbin-Watson stat**: 1.890097

---

### Augmented Dickey-Fuller Test Equation

- **Variable**: D(FF8(-1))-1.328277
  - **Coefficient**: 0.303934
  - **Std. Error**: 0.269753
  - **t-Statistic**: 0.827616
  - **Prob.**: 0.4108

- **Variable**: D(FF8(-1),2)
  - **Coefficient**: 0.182778
  - **Std. Error**: 0.217397
  - **t-Statistic**: 0.808425
  - **Prob.**: 0.4217

- **Variable**: D(FF8(-2),2)
  - **Coefficient**: 0.094109
  - **Std. Error**: 0.176439
  - **t-Statistic**: 0.527402
  - **Prob.**: 0.5997

- **Variable**: D(FF8(-3),2)
  - **Coefficient**: 0.134998
  - **Std. Error**: 0.119136
  - **t-Statistic**: 1.133144
  - **Prob.**: 0.2612

- **Variable**: C
  - **Coefficient**: -0.000825
  - **Std. Error**: 0.002405
  - **t-Statistic**: -0.343132
  - **Prob.**: 0.7326

- **Variable**: @TREND(1976:1)
  - **Coefficient**: 0.00140
  - **Std. Error**: 6.98E-05
  - **t-Statistic**: 0.257232
  - **Prob.**: 0.7978

**R-squared**: 0.570835

**Adjusted R-squared**: 0.532403

**S.E. of regression**: 0.009263

**Sum squared resid**: 0.005748

**Log likelihood**: 245.1252

**Durbin-Watson stat**: 1.948301

---

### Augmented Dickey-Fuller Test Equation

- **Variable**: D(FF9(-1))-1.123543
  - **Coefficient**: 0.295266
  - **Std. Error**: 0.269753
  - **t-Statistic**: 0.827616
  - **Prob.**: 0.4108

- **Variable**: D(FF9(-1),2)
  - **Coefficient**: 0.182778
  - **Std. Error**: 0.217397
  - **t-Statistic**: 0.808425
  - **Prob.**: 0.4217

- **Variable**: D(FF9(-2),2)
  - **Coefficient**: 0.094109
  - **Std. Error**: 0.176439
  - **t-Statistic**: 0.527402
  - **Prob.**: 0.5997

- **Variable**: D(FF9(-3),2)
  - **Coefficient**: 0.134998
  - **Std. Error**: 0.119136
  - **t-Statistic**: 1.133144
  - **Prob.**: 0.2612

- **Variable**: C
  - **Coefficient**: -0.000825
  - **Std. Error**: 0.002405
  - **t-Statistic**: -0.343132
  - **Prob.**: 0.7326

- **Variable**: @TREND(1976:1)
  - **Coefficient**: 0.00140
  - **Std. Error**: 6.98E-05
  - **t-Statistic**: 0.257232
  - **Prob.**: 0.7978

**R-squared**: 0.661985

**Adjusted R-squared**: 0.631715

**S.D. dependent var**: 0.015829

**Akaike info criterion**: -9.273693

**Schwarz criterion**: -9.055741

**F-statistic**: 14.85286

**Prob(F-statistic)**: 0.000000

---

*MacKinnon critical values for rejection of hypothesis of a unit root.*
### Augmented Dickey-Fuller Test Equation

**Dependent Variable is D(FF10,2)**

**Date:** 02/15/98  **Time:** 10:15

**Sample (adjusted):** 1977:3 1995:4

**Included observations:** 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF10(-1))</td>
<td>-1.450763</td>
<td>0.307835</td>
<td>-4.712797</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(FF10(-1),2)</td>
<td>0.328936</td>
<td>0.272507</td>
<td>1.207074</td>
<td>0.2316</td>
</tr>
<tr>
<td>D(FF10(-2),2)</td>
<td>0.246454</td>
<td>0.221789</td>
<td>1.084799</td>
<td>0.2819</td>
</tr>
<tr>
<td>D(FF10(-3),2)</td>
<td>0.168603</td>
<td>0.176577</td>
<td>0.956753</td>
<td>0.3422</td>
</tr>
<tr>
<td>D(FF10(-4),2)</td>
<td>0.196692</td>
<td>0.171904</td>
<td>1.134905</td>
<td>0.2605</td>
</tr>
<tr>
<td>C</td>
<td>-0.001759</td>
<td>0.002392</td>
<td>-0.735390</td>
<td>0.4647</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>5.60E-05</td>
<td>5.11E-05</td>
<td>1.094930</td>
<td>0.2775</td>
</tr>
</tbody>
</table>

**R-squared: 0.584579**  **Mean dependent var: 2.625E-05**

**Adjusted R-squared:** 0.547378  **S.D. dependent var:** 0.013571

**S.E. of regression: 0.009131**  **Akaike info criterion: -9.302448**

**Sum squared resid: 0.005586**  **Schwarz criterion: -9.084496**

**Log likelihood: 246.1891**  **F-statistic: 15.71373**

**Durbin-Watson stat: 1.945563**  **Prob(F-statistic): 0.000000**

### Augmented Dickey-Fuller Test Equation

**Dependent Variable is D(FF11,2)**

**Date:** 02/15/98  **Time:** 10:15

**Sample (adjusted):** 1977:3 1995:4

**Included observations:** 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF11(-1))</td>
<td>-0.931934</td>
<td>0.241408</td>
<td>-3.860406</td>
<td>0.0003</td>
</tr>
<tr>
<td>D(FF11(-1),2)</td>
<td>0.04906</td>
<td>0.226499</td>
<td>0.198260</td>
<td>0.8424</td>
</tr>
<tr>
<td>D(FF11(-2),2)</td>
<td>0.025258</td>
<td>0.191233</td>
<td>0.132078</td>
<td>0.8953</td>
</tr>
<tr>
<td>D(FF11(-3),2)</td>
<td>-0.023193</td>
<td>0.157196</td>
<td>-0.147543</td>
<td>0.8831</td>
</tr>
<tr>
<td>D(FF11(-4),2)</td>
<td>0.232921</td>
<td>0.114689</td>
<td>2.030901</td>
<td>0.0462</td>
</tr>
<tr>
<td>C</td>
<td>-0.002475</td>
<td>0.003400</td>
<td>-0.728001</td>
<td>0.4631</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>3.13E-05</td>
<td>7.04E-05</td>
<td>0.445010</td>
<td>0.6577</td>
</tr>
</tbody>
</table>

**R-squared: 0.545741**  **Mean dependent var: 0.000133**

**Adjusted R-squared:** 0.505061  **S.D. dependent var:** 0.018255

**S.E. of regression: 0.012843**  **Akaike info criterion: -8.620131**

**Sum squared resid: 0.011051**  **Schwarz criterion: -8.402179**

**Log likelihood: 220.9434**  **F-statistic: 13.41550**

**Durbin-Watson stat: 1.919088**  **Prob(F-statistic): 0.000000**

### Augmented Dickey-Fuller Test Equation

**Dependent Variable is D(FF13,2)**

**Date:** 02/15/98  **Time:** 10:21

**Sample (adjusted):** 1977:3 1995:4

**Included observations:** 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF13(-1))</td>
<td>-0.545741</td>
<td>0.214408</td>
<td>-2.560406</td>
<td>0.0003</td>
</tr>
<tr>
<td>D(FF13(-1),2)</td>
<td>0.050561</td>
<td>0.226499</td>
<td>0.198260</td>
<td>0.8424</td>
</tr>
<tr>
<td>D(FF13(-2),2)</td>
<td>0.025258</td>
<td>0.191233</td>
<td>0.132078</td>
<td>0.8953</td>
</tr>
<tr>
<td>D(FF13(-3),2)</td>
<td>-0.023193</td>
<td>0.157196</td>
<td>-0.147543</td>
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<td>0.6577</td>
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</table>

**R-squared: 0.545741**  **Mean dependent var: 0.000133**

**Adjusted R-squared:** 0.505061  **S.D. dependent var:** 0.018255

**S.E. of regression: 0.012843**  **Akaike info criterion: -8.620131**

**Sum squared resid: 0.011051**  **Schwarz criterion: -8.402179**

**Log likelihood: 220.9434**  **F-statistic: 13.41550**

**Durbin-Watson stat: 1.919088**  **Prob(F-statistic): 0.000000**
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF13(-1))</td>
<td>-1.152577</td>
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R-squared 0.555191
Adjusted R-squared 0.515358
S.E. of regression 0.013486
Akaike info criterion -8.522330
Schwarz criterion -8.304378
F-statistic 13.93777
Prob(F-statistic) 0.0000

Augmented Dickey-Fuller Test
Equation
LS // Dependent Variable is D(FF14)
Date: 02/15/98 Time: 10:22
Sample (adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints

<table>
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<tr>
<td>D(FF14(-2))</td>
<td>0.526276</td>
<td>0.107159</td>
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<td>0.6147</td>
</tr>
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<td>C</td>
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<td>-4.135051</td>
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</table>

R-squared 0.517759
Adjusted R-squared 0.475208
S.E. of regression 0.004158
Sum squared resid 0.001176
Log likelihood 308.4555
Durbin-Watson stat 2.054118

Augmented Dickey-Fuller Test
Equation
LS // Dependent Variable is D(FF20)
Date: 02/15/98 Time: 10:23
Sample (adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints

<table>
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<td>FF20(-1)</td>
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<tr>
<td>D(FF20(-2))</td>
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<tr>
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<tr>
<td>C</td>
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</tr>
</tbody>
</table>

R-squared 0.517759
Adjusted R-squared 0.475208
S.E. of regression 0.004158
Sum squared resid 0.001176
Log likelihood 308.4555
Durbin-Watson stat 2.054118
Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF21,2)
Date: 02/15/98 Time: 10:26
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Std. Error</th>
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<tbody>
<tr>
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<td>-1.156634</td>
<td>0.254851</td>
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<tr>
<td>D(FF21(-1),2)</td>
<td>0.190711</td>
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<td>D(FF21(-2),2)</td>
<td>0.128992</td>
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</tr>
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R-squared 0.571288
Adjusted R-squared 0.532896
S.E. of regression 0.086180
Sum squared resid 0.497611
Log likelihood 80.07258

Durbin-Watson stat 2.047009

Augmented Dickey-Fuller Test Statistic -4.613662 1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF22,2)
Date: 02/15/98 Time: 10:27
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
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<tr>
<th>Variable</th>
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<td>D(FF22(-1),2)</td>
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<td>D(FF22(-2),2)</td>
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</tr>
<tr>
<td>$\Delta T R E N D(1976:1)$</td>
<td>0.000491</td>
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<td>1.043905</td>
<td>0.3003</td>
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</table>

R-squared 0.581390
Adjusted R-squared 0.543902
S.E. of regression 0.083866
Sum squared resid 0.465641
Log likelihood 82.52956

Durbin-Watson stat 2.061453

Augmented Dickey-Fuller Test Statistic -4.674401 1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
<tr>
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</table>

R-squared: 0.534661
Adjusted R-squared: 0.492989
S.E. of regression: 0.099056
Sum squared resid: 0.657411
Log likelihood: 69.76845
Durbin-Watson stat: 2.084

Augmented Dickey-Fuller Test Equation

LS // Dependent Variable is D(FF24,2)
Date: 02/15/98 Time: 10:28
Sample (adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF24(-1))</td>
<td>-1.316397</td>
<td>0.281734</td>
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<tr>
<td>D(FF24(-1),2)</td>
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<td>1.342841</td>
<td>0.1839</td>
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<tr>
<td>D(FF24(-2),2)</td>
<td>0.199284</td>
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<td>0.3575</td>
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<td>D(FF24(-3),2)</td>
<td>0.211878</td>
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<tr>
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R-squared: 0.528067
Adjusted R-squared: 0.485804
S.E. of regression: 0.079888
Sum squared resid: 0.427597
Log likelihood: 85.68317
Durbin-Watson stat: 1.893291

Augmented Dickey-Fuller Test Equation

LS // Dependent Variable is D(FF25,2)
Date: 02/15/98 Time: 10:29
Sample (adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
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<tr>
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</table>

R-squared: 0.496763
Adjusted R-squared: 0.451697
S.E. of regression: 0.074661
Sum squared resid: 0.373474
Log likelihood: 90.69050
Durbin-Watson stat: 1.966944

*MacKinnon critical values for rejection of hypothesis of a unit root.
ADF Test Statistic -4.225695 1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF26,2)
Date: 02/15/98 Time: 10:29
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
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<th>Prob.</th>
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<tbody>
<tr>
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R-squared 0.564347 Mean dependent var 0.001329
Adjusted R-squared 0.525333 S.D. dependent var 0.123452
S.E. of regression 0.085035 Akaike info criterion -4.839567
Sum squared resid 0.220474 Schwarz criterion -4.621615
Log likelihood -81.06252 F-statistic 14.46535
Durbin-Watson stat 2.013891 Prob(F-statistic) 0.000000

ADF Test Statistic -3.584954 1% Critical Value* -4.0909
5% Critical Value -3.4769
10% Critical Value -3.1675

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF27)
Date: 02/15/98 Time: 10:31
Sample(adjusted): 1979:2 1995:4
Included observations: 67 after adjusting endpoints

<table>
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<th>Std. Error</th>
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<th>Prob.</th>
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<tbody>
<tr>
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R-squared 0.626924 Mean dependent var 0.001329
Adjusted R-squared 0.589617 S.D. dependent var 0.123452
S.E. of regression 0.511382 Akaike info criterion -1.242667
Sum squared resid 15.69074 Schwarz criterion -1.012326
Log likelihood -46.43955 F-statistic 16.80420
Durbin-Watson stat 2.198771 Prob(F-statistic) 0.000000

ADF Test Statistic -3.696932 1% Critical Value* -4.2165
5% Critical Value -3.5312
10% Critical Value -3.1968

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF28,2)
Date: 02/15/98 Time: 10:32
Sample(adjusted): 1986:3 1995:4
Included observations: 38 after adjusting endpoints

<table>
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<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
</table>

R-squared 0.687847 Mean dependent var -0.017742
Adjusted R-squared 0.655117 S.D. dependent var 0.798272
S.E. of regression 0.511382 Akaike info criterion -1.242667
Sum squared resid 15.69074 Schwarz criterion -1.012326
Log likelihood -46.43955 F-statistic 16.80420
Durbin-Watson stat 2.198771 Prob(F-statistic) 0.000000

ADF Test Statistic -3.696932 1% Critical Value* -4.2165
5% Critical Value -3.5312
10% Critical Value -3.1968

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF29,2)
Date: 02/15/98 Time: 10:32
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF29(-1))</td>
<td>-1.181512</td>
<td>0.299978</td>
<td>-3.938669</td>
<td>0.0002</td>
</tr>
<tr>
<td>D(FF29(-1),2)</td>
<td>0.074466</td>
<td>0.273207</td>
<td>0.272563</td>
<td>0.7860</td>
</tr>
<tr>
<td>D(FF29(-2),2)</td>
<td>-0.008666</td>
<td>0.235604</td>
<td>-0.036781</td>
<td>0.9708</td>
</tr>
<tr>
<td>D(FF29(-3),2)</td>
<td>0.034983</td>
<td>0.186283</td>
<td>0.187796</td>
<td>0.8516</td>
</tr>
<tr>
<td>D(FF29(-4),2)</td>
<td>0.145426</td>
<td>0.125395</td>
<td>1.159747</td>
<td>0.2503</td>
</tr>
<tr>
<td>C</td>
<td>0.003407</td>
<td>0.021299</td>
<td>0.159980</td>
<td>0.8734</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.000863</td>
<td>0.000503</td>
<td>1.717124</td>
<td>0.0906</td>
</tr>
</tbody>
</table>

ADF Test Statistic -4.726287
1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF30,2)
Date: 02/15/98 Time: 10:33
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF30(-1))</td>
<td>-1.217940</td>
<td>0.257695</td>
<td>-4.726287</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(FF30(-1),2)</td>
<td>0.240692</td>
<td>0.235947</td>
<td>1.020113</td>
<td>0.3113</td>
</tr>
<tr>
<td>D(FF30(-2),2)</td>
<td>0.187415</td>
<td>0.206300</td>
<td>0.908458</td>
<td>0.3669</td>
</tr>
<tr>
<td>D(FF30(-3),2)</td>
<td>0.236391</td>
<td>0.166511</td>
<td>1.419670</td>
<td>0.1603</td>
</tr>
<tr>
<td>D(FF30(-4),2)</td>
<td>0.358207</td>
<td>0.121526</td>
<td>2.947562</td>
<td>0.0044</td>
</tr>
<tr>
<td>C</td>
<td>0.036687</td>
<td>0.021299</td>
<td>1.717124</td>
<td>0.0906</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.000745</td>
<td>0.000503</td>
<td>1.717124</td>
<td>0.0906</td>
</tr>
</tbody>
</table>

ADF Test Statistic -3.563920
1% Critical Value* -4.0836
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF31)
Date: 02/15/98 Time: 10:34
Sample(adjusted): 1977:2 1995:4
Included observations: 75 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF31(-1)</td>
<td>-0.259009</td>
<td>0.072675</td>
<td>-3.563920</td>
<td>0.0007</td>
</tr>
<tr>
<td>D(FF31(-1))</td>
<td>-0.003136</td>
<td>0.114185</td>
<td>-0.027466</td>
<td>0.9782</td>
</tr>
<tr>
<td>D(FF31(-2))</td>
<td>0.269670</td>
<td>0.112046</td>
<td>2.406777</td>
<td>0.0188</td>
</tr>
<tr>
<td>D(FF31(-3))</td>
<td>-0.018225</td>
<td>0.116276</td>
<td>-0.156741</td>
<td>0.8759</td>
</tr>
<tr>
<td>D(FF31(-4))</td>
<td>0.355488</td>
<td>0.121909</td>
<td>2.915998</td>
<td>0.0048</td>
</tr>
<tr>
<td>C</td>
<td>0.119493</td>
<td>0.043869</td>
<td>2.723841</td>
<td>0.0082</td>
</tr>
<tr>
<td>TREND(1976:1)</td>
<td>-0.008407</td>
<td>0.002359</td>
<td>-3.563153</td>
<td>0.0007</td>
</tr>
</tbody>
</table>

MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF32,2)
Date: 02/15/98 Time: 10:34
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF32(-1))</td>
<td>-1.062681</td>
<td>0.234430</td>
<td>-4.533051</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(FF32(-1),2)</td>
<td>0.166977</td>
<td>0.215097</td>
<td>0.776290</td>
<td>0.4403</td>
</tr>
<tr>
<td>D(FF32(-2),2)</td>
<td>0.170369</td>
<td>0.192395</td>
<td>0.885519</td>
<td>0.3790</td>
</tr>
<tr>
<td>D(FF32(-3),2)</td>
<td>0.259620</td>
<td>0.161595</td>
<td>1.606607</td>
<td>0.1128</td>
</tr>
<tr>
<td>D(FF32(-4),2)</td>
<td>0.310862</td>
<td>0.121696</td>
<td>2.554416</td>
<td>0.0129</td>
</tr>
<tr>
<td>C</td>
<td>0.013604</td>
<td>0.022877</td>
<td>0.594666</td>
<td>0.5541</td>
</tr>
<tr>
<td>TREND(1976:1)</td>
<td>0.000923</td>
<td>0.000531</td>
<td>1.737967</td>
<td>0.0868</td>
</tr>
</tbody>
</table>

MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF33,2)
Date: 02/15/98 Time: 10:35
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF33(-1))</td>
<td>-1.031854</td>
<td>0.215856</td>
<td>-4.780278</td>
<td>0.0000</td>
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</tbody>
</table>

MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation

LS // Dependent Variable is D(FF34,2)
Date: 02/15/98 Time: 10:36
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

Variable Coefficient Std. Error t-Statistic Prob.
D(FF34(-1)) 0.258201 0.192373 1.379425 0.0517
D(FF34(-2),2) 0.297071 0.245823 1.208652 0.2310
D(FF34(-3),2) 0.267365 0.156746 1.705714 0.0927
D(FF34(-4),2) 0.143188 0.118469 1.208652 0.2310
C 0.001206 0.004467 0.270017 0.7880
0 TREND(1976:1) 4.25E-05 0.000111 0.382830 0.7031
R-squared 0.565601 Mean Dependent Var 0.002492
Adjusted R-squared 0.526700 S.D. Dependent Var 0.029414
S.E. of regression 0.020236 Akaike info criterion -7.710779
Sum squared resid 0.027436 Schwarz criterion -7.492827
Log likelihood 187.2974 F-statistic 13.97063
Durbin-Watson stat 2.003510 Prob(F-statistic) 0.000000
ADF Test Statistic -3.594062 1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF35,2)
Date: 02/15/98 Time: 10:36
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

Variable Coefficient Std. Error t-Statistic Prob.
D(FF35(-1)) 0.075620 0.192373 0.388062 0.6990
D(FF35(-2),2) -0.020628 0.156746 -0.130709 0.8207
D(FF35(-3),2) 0.092097 0.159055 0.579029 0.5645
D(FF35(-4),2) 0.059688 0.122991 0.485303 0.6290
C 0.001206 0.004467 0.270017 0.7880
0 TREND(1976:1) -1.79E-05 9.38E-05 -0.189454 0.8503
R-squared 0.555773 Mean dependent var -9.30E-05
Adjusted R-squared 0.515991 S.D. dependent var 0.024747
S.E. of regression 0.017217 Akaike info criterion -8.033904
Sum squared resid 0.019860 Schwarz criterion -7.815952
Log likelihood 199.2530 F-statistic 13.97063
Durbin-Watson stat 2.003510 Prob(F-statistic) 0.000000
ADF Test Statistic -3.602737 1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF36,2)
Date: 02/15/98 Time: 10:37
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF36(-1),2)</td>
<td>-0.869131</td>
<td>0.241242</td>
<td>-3.602737</td>
<td>0.0006</td>
</tr>
<tr>
<td>D(FF36(-2),2)</td>
<td>-0.196241</td>
<td>0.200334</td>
<td>-0.979659</td>
<td>0.3308</td>
</tr>
<tr>
<td>D(FF36(-3),2)</td>
<td>0.05521</td>
<td>0.154156</td>
<td>0.364507</td>
<td>0.7160</td>
</tr>
<tr>
<td>D(FF36(-4),2)</td>
<td>0.066552</td>
<td>0.121906</td>
<td>0.549932</td>
<td>0.5829</td>
</tr>
<tr>
<td>C</td>
<td>0.001102</td>
<td>0.006527</td>
<td>0.168841</td>
<td>0.8664</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-2.81E-05</td>
<td>0.000137</td>
<td>-0.205047</td>
<td>0.8382</td>
</tr>
</tbody>
</table>

R-squared: 0.537126
Adjusted R-squared: 0.495675
S.E. of regression: 0.025188
Sum squared resid: 0.042506
Log likelihood: 171.0988
Durbin-Watson stat: 2.001046

ADF Test Statistic: -5.758196
1% Critical Value*: -4.0871
5% Critical Value: -3.4713
10% Critical Value: -3.1624

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF37,3)
Date: 02/15/98 Time: 10:38
Sample(adjusted): 1977:4 1995:4
Included observations: 73 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF37(-1),3)</td>
<td>-3.486203</td>
<td>0.605433</td>
<td>-5.758196</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(FF37(-1),3)</td>
<td>1.619117</td>
<td>0.529027</td>
<td>3.060555</td>
<td>0.0032</td>
</tr>
<tr>
<td>D(FF37(-2),3)</td>
<td>0.784753</td>
<td>0.408410</td>
<td>1.921484</td>
<td>0.0590</td>
</tr>
<tr>
<td>D(FF37(-3),3)</td>
<td>0.317094</td>
<td>0.256449</td>
<td>1.236482</td>
<td>0.2207</td>
</tr>
<tr>
<td>D(FF37(-4),3)</td>
<td>0.041520</td>
<td>0.123262</td>
<td>0.336845</td>
<td>0.7373</td>
</tr>
<tr>
<td>C</td>
<td>0.000253</td>
<td>0.003082</td>
<td>0.082132</td>
<td>0.9348</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-4.76E-06</td>
<td>6.43E-05</td>
<td>-0.074012</td>
<td>0.9412</td>
</tr>
</tbody>
</table>

R-squared: 0.817323
Adjusted R-squared: 0.800716
S.E. of regression: 0.011578
Sum squared resid: 0.008848
Log likelihood: 225.5757
Durbin-Watson stat: 2.003075

ADF Test Statistic: -5.785196
1% Critical Value*: -4.0871
5% Critical Value: -3.4713
10% Critical Value: -3.1624

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF38,2)
Date: 02/15/98 Time: 10:45
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF38(-1),2)</td>
<td>-0.967429</td>
<td>0.238627</td>
<td>-4.054139</td>
<td>0.0001</td>
</tr>
<tr>
<td>D(FF38(-1),2)</td>
<td>0.198068</td>
<td>0.216816</td>
<td>0.913530</td>
<td>0.3642</td>
</tr>
<tr>
<td>D(FF38(-2),2)</td>
<td>-0.073432</td>
<td>0.195974</td>
<td>0.374702</td>
<td>0.7091</td>
</tr>
</tbody>
</table>

R-squared: 0.537126
Adjusted R-squared: 0.495675
S.E. of regression: 0.025188
Sum squared resid: 0.042506
Log likelihood: 171.0988
Durbin-Watson stat: 2.001046

ADF Test Statistic: -5.758196
1% Critical Value*: -4.0871
5% Critical Value: -3.4713
10% Critical Value: -3.1624

*MacKinnon critical values for rejection of hypothesis of a unit root.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF38(-3),2)</td>
<td>0.189693</td>
<td>0.149749</td>
<td>1.266739</td>
<td>0.2096</td>
</tr>
<tr>
<td>D(FF38(-4),2)</td>
<td>0.156828</td>
<td>0.119553</td>
<td>1.307417</td>
<td>0.1955</td>
</tr>
<tr>
<td>C</td>
<td>0.001015</td>
<td>0.010712</td>
<td>0.094763</td>
<td>0.9248</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-0.858-05</td>
<td>0.000226</td>
<td>-0.170827</td>
<td>0.8489</td>
</tr>
</tbody>
</table>

R-squared: 0.539096  
Adjusted R-squared: 0.497821  
S.D. dependent var: 0.058341  
S.E. of regression: 0.041343  
Akaike info criterion: -6.281898  
Schwarz criterion: -6.063946  
Log likelihood: 134.4288  
F-statistic: 13.06107  
Durbin-Watson stat: 1.975724  
Prob(F-statistic): 0.000000

Augmented Dickey-Fuller Test Equation  
LS // Dependent Variable is D(FF39,2)  
Date: 02/15/98  Time: 10:46  
Sample(adjusted): 1977:3 1995:4  
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF39(-1))</td>
<td>-0.766387</td>
<td>0.216242</td>
<td>-3.544124</td>
<td>0.0007</td>
</tr>
<tr>
<td>D(FF39(-1),2)</td>
<td>0.127813</td>
<td>0.199421</td>
<td>0.640920</td>
<td>0.5238</td>
</tr>
<tr>
<td>D(FF39(-2),2)</td>
<td>-0.246400</td>
<td>0.185695</td>
<td>-1.326907</td>
<td>0.1890</td>
</tr>
<tr>
<td>D(FF39(-3),2)</td>
<td>0.179146</td>
<td>0.141414</td>
<td>1.266817</td>
<td>0.2096</td>
</tr>
<tr>
<td>D(FF39(-4),2)</td>
<td>0.028015</td>
<td>0.121012</td>
<td>0.231502</td>
<td>0.8176</td>
</tr>
<tr>
<td>C</td>
<td>-0.000686</td>
<td>0.004928</td>
<td>-0.139210</td>
<td>0.8897</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>4.17E-07</td>
<td>0.000103</td>
<td>0.004038</td>
<td>0.9968</td>
</tr>
</tbody>
</table>

R-squared: 0.552459  
Adjusted R-squared: 0.512381  
S.D. dependent var: 0.027136  
S.E. of regression: 0.018949  
Akaike info criterion: -7.842169  
Schwarz criterion: -7.624217  
Log likelihood: 192.1588  
F-statistic: 13.78448  
Durbin-Watson stat: 1.988678  
Prob(F-statistic): 0.000000

Augmented Dickey-Fuller Test Equation  
LS // Dependent Variable is D(FF40,3)  
Date: 02/15/98  Time: 10:47  
Sample(adjusted): 1977:4 1995:4  
Included observations: 73 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(FF40(-1),2)</td>
<td>-2.832990</td>
<td>0.486523</td>
<td>-5.822932</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(FF40(-1),3)</td>
<td>1.222254</td>
<td>0.425001</td>
<td>2.875887</td>
<td>0.0054</td>
</tr>
<tr>
<td>D(FF40(-2),3)</td>
<td>0.571162</td>
<td>0.336906</td>
<td>1.695313</td>
<td>0.0947</td>
</tr>
<tr>
<td>D(FF40(-3),3)</td>
<td>0.362102</td>
<td>0.215100</td>
<td>1.683412</td>
<td>0.0970</td>
</tr>
<tr>
<td>D(FF40(-4),3)</td>
<td>0.175847</td>
<td>0.115050</td>
<td>1.528438</td>
<td>0.1312</td>
</tr>
<tr>
<td>C</td>
<td>0.002556</td>
<td>0.003033</td>
<td>0.842708</td>
<td>0.4024</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-4.49E-05</td>
<td>6.32E-05</td>
<td>-0.709722</td>
<td>0.4804</td>
</tr>
</tbody>
</table>

R-squared: 0.797725  
Adjusted R-squared: 0.779336  
S.D. dependent var: 0.024161  
S.E. of regression: 0.011350  
Akaike info criterion: -8.866138  
Schwarz criterion: -8.646505  
Log likelihood: 227.0315  
F-statistic: 43.38129  
Durbin-Watson stat: 1.819489  
Prob(F-statistic): 0.000000

*MacKinnon critical values for rejection of hypothesis of a unit root.*
Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF41,2)
Date: 02/15/98 Time: 10:48
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

Variable Coefficient Std. Error t-Statistic Prob.
D(FF41(-1)) -1.032759 0.219184 -4.711829 0.0000
D(FF41(-1),2) 0.341774 0.195381 1.749272 0.0848
D(FF41(-2),2) 0.143533 0.176812 0.811782 0.4198
D(FF41(-3),2) 0.265091 0.140174 1.891157 0.0629
D(FF41(-4),2) 0.223589 0.140174 1.590903 0.0616
C -0.001788 0.005179 -0.347291 0.7295
TREND(1976:1) 4.79E-05 0.000109 0.439643 0.6616

R-squared 0.442306
Adjusted R-squared 0.392363
S.E. of regression 0.019933
Akaike info criterion -7.740971
Schwarz criterion -7.523019
F-statistic 8.856259
Prob(F-statistic) 0.000000
Log likelihood 188.4145
Durbin-Watson stat 1.857630

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF42,2)
Date: 02/15/98 Time: 10:49
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

Variable Coefficient Std. Error t-Statistic Prob.
D(FF42(-1)) -0.982297 0.234208 -4.194120 0.0001
D(FF42(-1),2) 0.069706 0.216873 0.321415 0.7489
D(FF42(-2),2) 0.063298 0.193654 0.326861 0.7448
D(FF42(-3),2) 0.177079 0.157371 1.129379 0.2628
D(FF42(-4),2) 0.268851 0.115349 2.330771 0.0228
C 0.001026 0.005895 0.173998 0.8624
TREND(1976:1) 1.29E-05 0.000124 0.104507 0.9171

R-squared 0.515763
Adjusted R-squared 0.472399
S.E. of regression 0.022740
Akaike info criterion -7.477440
Schwarz criterion -7.259487
F-statistic 11.89367
Prob(F-statistic) 0.000000
Log likelihood 178.6638
Durbin-Watson stat 1.847464

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(FF43,2)
Date: 02/15/98 Time: 10:49
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

Variable Coefficient Std. Error t-Statistic Prob.
D(FF43(-1)) -0.907474 0.226844 -4.000431 0.0002
D(FF43(-1),2) 0.213835 0.203726 1.049616 0.2977
D(FF43(-2),2) -0.079789 0.187543 -0.425444 0.6719
D(FF43(-3),2) 0.230614 0.143976 1.601727 0.1139

R-squared 0.515763
Adjusted R-squared 0.472399
S.E. of regression 0.022740
Akaike info criterion -7.477440
Schwarz criterion -7.259487
F-statistic 11.89367
Prob(F-statistic) 0.000000
Log likelihood 178.6638
Durbin-Watson stat 1.847464

*MacKinnon critical values for rejection of hypothesis of a unit root.
### 2.2.5 SURFACE TRANSPORTATION COSTS: (S)

**LS // Dependent Variable is D(D(S1))**

- **Date:** 10-08-1997 / **Time:** 17:37
- **SMPL range:** 1977.3 - 1995.4
- **Number of observations:** 74
- **Augmented Dickey-Fuller: UROOT(T, VARIABLE**
  - D(D(S1(-1)))
  - D(D(S1(-2)))
  - D(D(S1(-3)))
  - D(D(S1(-4)))
  - D(S1(-1))
  - C
- **TREND**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(S1(-1)))</td>
<td>0.2069135</td>
<td>0.2812863</td>
<td>0.7355976</td>
<td>0.4936524</td>
</tr>
<tr>
<td>D(D(S1(-2)))</td>
<td>0.2607780</td>
<td>0.2419159</td>
<td>-1.0779699</td>
<td>0.4936524</td>
</tr>
<tr>
<td>D(D(S1(-3)))</td>
<td>-0.0192615</td>
<td>0.1705237</td>
<td>-0.1129550</td>
<td>0.4936524</td>
</tr>
<tr>
<td>D(D(S1(-4)))</td>
<td>-0.0707050</td>
<td>0.1222521</td>
<td>-0.5783544</td>
<td>0.4936524</td>
</tr>
<tr>
<td>D(S1(-1))</td>
<td>-1.1715836</td>
<td>0.3186253</td>
<td>-3.6769590</td>
<td>0.4936524</td>
</tr>
<tr>
<td>C</td>
<td>-0.0074735</td>
<td>0.0003256</td>
<td>-0.235841</td>
<td>0.4936524</td>
</tr>
</tbody>
</table>

- **R-squared:** 0.639750
- **Adjusted R-squared:** 0.607489
- **S.D. of dependent var:** 0.119717
- **Log likelihood:** 128.7346
- **Durbin-Watson stat:** 1.977837

**LS // Dependent Variable is D(D(S2))**

- **Date:** 10-08-1997 / **Time:** 17:38
- **SMPL range:** 1977.3 - 1995.4
- **Number of observations:** 74
- **Augmented Dickey-Fuller: UROOT(T, VARIABLE**
  - D(D(S2(-1)))
  - D(D(S2(-2)))
  - D(D(S2(-3)))
  - D(D(S2(-4)))
  - D(S2(-1))
  - C
- **TREND**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(S2(-1)))</td>
<td>0.0613909</td>
<td>0.3359593</td>
<td>0.1827331</td>
<td>0.4213003</td>
</tr>
<tr>
<td>D(D(S2(-2)))</td>
<td>-0.1928170</td>
<td>0.2805596</td>
<td>-0.6872587</td>
<td>0.2849</td>
</tr>
<tr>
<td>D(D(S2(-3)))</td>
<td>-0.0947178</td>
<td>0.2029750</td>
<td>-0.4666477</td>
<td>0.2849</td>
</tr>
<tr>
<td>D(D(S2(-4)))</td>
<td>-0.1233245</td>
<td>0.1205320</td>
<td>-1.0231677</td>
<td>0.2849</td>
</tr>
<tr>
<td>D(S2(-1))</td>
<td>-1.4103362</td>
<td>0.3812214</td>
<td>-3.6995198</td>
<td>0.000000</td>
</tr>
<tr>
<td>C</td>
<td>-0.0112606</td>
<td>0.0233529</td>
<td>-0.4821919</td>
<td>0.2849</td>
</tr>
</tbody>
</table>

- **R-squared:** 0.688247
- **Adjusted R-squared:** 0.660329
- **S.D. of dependent var:** 0.087425
- **Log likelihood:** 55.74925
- **Durbin-Watson stat:** 1.977837

**LS // Dependent Variable is D(D(S3))**

- **Date:** 10-08-1997 / **Time:** 17:38
- **SMPL range:** 1977.3 - 1995.4
- **Number of observations:** 74
- **Augmented Dickey-Fuller: UROOT(T, VARIABLE**
  - D(D(S3(-1)))
  - D(D(S3(-2)))
  - D(D(S3(-3)))
  - D(D(S3(-4)))
  - D(S3(-1))
  - C
- **TREND**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(S3(-1)))</td>
<td>0.1252779</td>
<td>0.2520881</td>
<td>0.4969607</td>
<td>0.6208</td>
</tr>
<tr>
<td>D(D(S3(-2)))</td>
<td>-0.0601200</td>
<td>0.216874</td>
<td>-0.2881479</td>
<td>0.7741</td>
</tr>
<tr>
<td>D(D(S3(-3)))</td>
<td>0.0270655</td>
<td>0.1593708</td>
<td>0.1694508</td>
<td>0.8660</td>
</tr>
<tr>
<td>D(D(S3(-4)))</td>
<td>0.1474873</td>
<td>0.1366026</td>
<td>1.3630626</td>
<td>0.1773</td>
</tr>
<tr>
<td>D(S3(-1))</td>
<td>-1.1507763</td>
<td>0.2767984</td>
<td>-3.9948792</td>
<td>0.0002</td>
</tr>
<tr>
<td>C</td>
<td>-0.0124408</td>
<td>0.0220644</td>
<td>0.5638415</td>
<td>0.5747</td>
</tr>
</tbody>
</table>

- **R-squared:** 0.568500
- **Adjusted R-squared:** 0.529858
- **S.D. of dependent var:** 0.118866
- **Log likelihood:** 79.01102
- **Durbin-Watson stat:** 1.951349

**LS // Dependent Variable is D(D(S4))**

- **Date:** 10-08-1997 / **Time:** 17:39
- **SMPL range:** 1977.4 - 1995.4
- **Number of observations:** 73
- **Augmented Dickey-Fuller: UROOT(T, VARIABLE**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(S4(-1)))</td>
<td>0.0841820</td>
<td>0.120887</td>
<td>0.696374</td>
<td>0.4886</td>
</tr>
<tr>
<td>C</td>
<td>0.003354</td>
<td>0.011583</td>
<td>0.289570</td>
<td>0.7730</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.99E-05</td>
<td>0.00244</td>
<td>-0.368998</td>
<td>0.7133</td>
</tr>
</tbody>
</table>

- **R-squared:** 0.507732
- **Adjusted R-squared:** 0.463648
- **S.E. of regression:** 0.044550
- **Sum squared resid:** 0.33570
- **Log likelihood:** 128.7346
- **Durbin-Watson stat:** 1.980243

**LS // Dependent Variable is D(D(S4,2))**

- **Date:** 10-08-1997 / **Time:** 17:39
- **SMPL range:** 1977.4 - 1995.4
- **Number of observations:** 73
- **Augmented Dickey-Fuller: UROOT(T, VARIABLE**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(S4,2)(-1))</td>
<td>0.0841820</td>
<td>0.120887</td>
<td>0.696374</td>
<td>0.4886</td>
</tr>
<tr>
<td>C</td>
<td>0.003354</td>
<td>0.011583</td>
<td>0.289570</td>
<td>0.7730</td>
</tr>
<tr>
<td>TREND</td>
<td>-0.99E-05</td>
<td>0.00244</td>
<td>-0.368998</td>
<td>0.7133</td>
</tr>
</tbody>
</table>

- **R-squared:** 0.507732
- **Adjusted R-squared:** 0.463648
- **S.E. of regression:** 0.044550
- **Sum squared resid:** 0.33570
- **Log likelihood:** 128.7346
- **Durbin-Watson stat:** 1.980243
### LS // Dependent Variable is D(D(S5), 2)

Date: 10-08-1997 / Time: 17:40
SMPL range: 1977.4 - 1995.4
Number of observations: 73

**Augmented Dickey-Fuller: UROOT(T, 4) D(S5)**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(S5(-1), 2))</td>
<td>0.5337330</td>
<td>0.3144445</td>
<td>1.6973837</td>
<td>0.0943</td>
</tr>
<tr>
<td>D(D(S5(-2), 2))</td>
<td>0.2876131</td>
<td>0.2525798</td>
<td>1.1387015</td>
<td>0.2589</td>
</tr>
<tr>
<td>D(D(S5(-3), 2))</td>
<td>0.0724529</td>
<td>0.1870661</td>
<td>0.3873116</td>
<td>0.6998</td>
</tr>
<tr>
<td>D(D(S5(-4), 2))</td>
<td>0.2803414</td>
<td>0.1160717</td>
<td>2.4152439</td>
<td>0.0185</td>
</tr>
<tr>
<td>D(S5(-1), 2)</td>
<td>-1.7540215</td>
<td>0.3487309</td>
<td>-5.0297279</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared: 0.726061
Adjusted R-squared: 0.701530
S.D. of dependent var: 0.276182
Sum of squared resid: 1.525336
F-statistic: 29.59673
Prob(F-statistic): 0.000000

**LS // Dependent Variable is D(D(S6, 2))

Date: 10-08-1997 / Time: 17:40
SMPL range: 1977.4 - 1995.4
Number of observations: 73

**Augmented Dickey-Fuller: UROOT(T, 4) D(S6)**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(S6(-1), 2))</td>
<td>1.5732308</td>
<td>0.5926306</td>
<td>2.6556568</td>
<td>0.0099</td>
</tr>
<tr>
<td>D(D(S6(-2), 2))</td>
<td>0.6345734</td>
<td>0.4491563</td>
<td>1.4128119</td>
<td>0.1624</td>
</tr>
<tr>
<td>D(D(S6(-3), 2))</td>
<td>0.0700171</td>
<td>0.2757903</td>
<td>-0.1684073</td>
<td>0.8668</td>
</tr>
<tr>
<td>D(D(S6(-4), 2))</td>
<td>-0.0208706</td>
<td>0.6690832</td>
<td>-5.3351947</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(S6(-1), 2)</td>
<td>-3.5696891</td>
<td>0.0247346</td>
<td>-1.9161603</td>
<td>0.0596</td>
</tr>
</tbody>
</table>

R-squared: 0.849026
Adjusted R-squared: 0.835301
S.D. of dependent var: 0.090752
Sum of squared resid: 75.26947
F-statistic: 61.86001
Prob(F-statistic): 0.000000

**LS // Dependent Variable is D(D(S7))

Date: 10-08-1997 / Time: 17:40
SMPL range: 1977.3 - 1995.4
Number of observations: 74

**Augmented Dickey-Fuller: UROOT(T, 4) D(S7)**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
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<tbody>
<tr>
<td>D(D(S7(-1), 2))</td>
<td>0.2069135</td>
<td>0.2812863</td>
<td>0.7355976</td>
<td>0.4645</td>
</tr>
<tr>
<td>D(D(S7(-2), 2))</td>
<td>-0.2607779</td>
<td>0.2419159</td>
<td>-1.0779692</td>
<td>0.2849</td>
</tr>
<tr>
<td>D(D(S7(-3), 2))</td>
<td>-0.0192615</td>
<td>0.1705237</td>
<td>-0.1129548</td>
<td>0.9104</td>
</tr>
<tr>
<td>D(D(S7(-4), 2))</td>
<td>-0.0707049</td>
<td>0.1222521</td>
<td>-0.5783537</td>
<td>0.5650</td>
</tr>
<tr>
<td>D(S7(-1), 2)</td>
<td>-3.6769951</td>
<td>0.0317231</td>
<td>-1.2355840</td>
<td>0.2145</td>
</tr>
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</table>

R-squared: 0.639750
Adjusted R-squared: 0.607489
S.D. of dependent var: 0.119718
Sum of squared resid: 55.74925
F-statistic: 19.83032
Prob(F-statistic): 0.000000

**LS // Dependent Variable is D(D(S8))

Date: 10-08-1997 / Time: 17:41
SMPL range: 1977.3 - 1995.4
Number of observations: 74

**Augmented Dickey-Fuller: UROOT(T, 4) D(S8)**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(D(S8(-1), 2))</td>
<td>0.1830296</td>
<td>0.2810569</td>
<td>0.6512192</td>
<td>0.19087</td>
</tr>
</tbody>
</table>

R-squared: 0.543571
Adjusted R-squared: 0.517102
S.D. of dependent var: 0.960263
Sum of squared resid: 19.83032
F-statistic: 19.83032
Prob(F-statistic): 0.000000
LS // Dependent Variable is D(D(S9))
Date: 10-08-1997 / Time: 17:41
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(S9)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(S9(-1))</td>
<td>-0.0473448</td>
<td>0.3058367</td>
<td>-0.1534495</td>
<td>0.8785</td>
</tr>
<tr>
<td>D(S9(-2))</td>
<td>-0.1615556</td>
<td>0.2539245</td>
<td>-0.6362347</td>
<td>0.5268</td>
</tr>
<tr>
<td>D(S9(-3))</td>
<td>-0.1818777</td>
<td>0.1916483</td>
<td>-0.9490182</td>
<td>0.3460</td>
</tr>
<tr>
<td>D(S9(-4))</td>
<td>-0.0380790</td>
<td>0.1179890</td>
<td>-0.3227333</td>
<td>0.7479</td>
</tr>
<tr>
<td>C</td>
<td>-1.2163610</td>
<td>0.3438392</td>
<td>-3.5375867</td>
<td>0.0007</td>
</tr>
</tbody>
</table>

R-squared: 0.639574
Adjusted R-squared: 0.607297
S.E. of regression: 0.074944
Log likelihood: 90.40997
Durbin-Watson stat: 1.984895
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(S10))
Date: 10-08-1997 / Time: 17:41
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(S10)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(S10(-1))</td>
<td>0.1252778</td>
<td>0.2520880</td>
<td>0.4969604</td>
<td>0.6208</td>
</tr>
<tr>
<td>D(S10(-2))</td>
<td>-0.0607122</td>
<td>0.2106973</td>
<td>-0.2881490</td>
<td>0.7741</td>
</tr>
<tr>
<td>D(S10(-3))</td>
<td>0.0270055</td>
<td>0.1593708</td>
<td>0.1694505</td>
<td>0.8660</td>
</tr>
<tr>
<td>D(S10(-4))</td>
<td>0.1474871</td>
<td>0.1081600</td>
<td>1.3636010</td>
<td>0.1773</td>
</tr>
<tr>
<td>D(S10(-1))</td>
<td>-1.057760</td>
<td>0.2767984</td>
<td>-3.948783</td>
<td>0.0002</td>
</tr>
<tr>
<td>C</td>
<td>0.0124408</td>
<td>0.0220644</td>
<td>0.5638417</td>
<td>0.5747</td>
</tr>
</tbody>
</table>

R-squared: 0.568500
Adjusted R-squared: 0.543403
S.E. of regression: 0.054952
Log likelihood: 84.31433
Durbin-Watson stat: 1.90809
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(S11))
Date: 10-08-1997 / Time: 17:42
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(S11)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(S11(-1))</td>
<td>0.5337328</td>
<td>0.3144445</td>
<td>1.6973832</td>
<td>0.0943</td>
</tr>
<tr>
<td>D(S11(-2))</td>
<td>0.2907630</td>
<td>0.2525798</td>
<td>1.1387015</td>
<td>0.2589</td>
</tr>
<tr>
<td>D(S11(-3))</td>
<td>0.0724529</td>
<td>0.1593708</td>
<td>0.1694505</td>
<td>0.8660</td>
</tr>
<tr>
<td>D(S11(-4))</td>
<td>0.1474871</td>
<td>0.1081600</td>
<td>1.3636010</td>
<td>0.1773</td>
</tr>
<tr>
<td>D(S11(-1))</td>
<td>-1.7540211</td>
<td>0.3487308</td>
<td>-5.0297276</td>
<td>0.0000</td>
</tr>
<tr>
<td>C</td>
<td>-0.0795014</td>
<td>0.0419400</td>
<td>-1.9161597</td>
<td>0.0596</td>
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R-squared: 0.726062
Adjusted R-squared: 0.719005
S.E. of regression: 0.054952
Log likelihood: 29.59675
Durbin-Watson stat: 1.90809
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(S12))
Date: 10-08-1997 / Time: 17:42
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(S12)

<table>
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<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(S12(-1))</td>
<td>0.1784811</td>
<td>0.2351271</td>
<td>0.7590835</td>
<td>0.4505</td>
</tr>
<tr>
<td>D(S12(-2))</td>
<td>0.0231632</td>
<td>0.1963537</td>
<td>0.1167772</td>
<td>0.9074</td>
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</table>

R-squared: 0.758574
Adjusted R-squared: 0.758574
S.E. of regression: 0.074944
Log likelihood: 90.40997
Durbin-Watson stat: 1.984895
Prob(F-statistic): 0.000000
LS // Dependent Variable is D(D(S13))
Date: 10-08-1997 / Time: 17:43
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(S13)

<table>
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<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(S13(-1))</td>
<td>0.1830296</td>
<td>0.2810569</td>
<td>0.6512191</td>
<td>0.5171</td>
</tr>
<tr>
<td>D(S13(-2))</td>
<td>-0.2852326</td>
<td>0.2402548</td>
<td>-1.1872086</td>
<td>0.2393</td>
</tr>
<tr>
<td>D(S13(-3))</td>
<td>-0.0734449</td>
<td>0.1697190</td>
<td>-0.4327443</td>
<td>0.6666</td>
</tr>
<tr>
<td>D(S13(-4))</td>
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<td>0.1226966</td>
<td>-0.3942857</td>
<td>0.6946</td>
</tr>
<tr>
<td>D(S13(-1))</td>
<td>-1.1395160</td>
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<td>0.0006</td>
</tr>
<tr>
<td>C</td>
<td>-0.0013057</td>
<td>0.0197768</td>
<td>-0.0660193</td>
<td>0.9476</td>
</tr>
<tr>
<td>TREND</td>
<td>8.585E-05</td>
<td>0.0004084</td>
<td>0.2102062</td>
<td>0.8341</td>
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</table>

R-squared: 0.639574
Adjusted R-squared: 0.607297
S.E. of regression: 0.074944
Log likelihood: 90.40998
Durbin-Watson stat: 1.984895

LS // Dependent Variable is D(D(S14))
Date: 10-08-1997 / Time: 17:43
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(S14)

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<tr>
<th>VARIABLE</th>
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<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<td>0.2810568</td>
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<td>D(S14(-2))</td>
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<td>0.2393</td>
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<tr>
<td>D(S14(-3))</td>
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<td>0.6666</td>
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<tr>
<td>D(S14(-4))</td>
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<td>0.6946</td>
</tr>
<tr>
<td>D(S14(-1))</td>
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<tr>
<td>C</td>
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<td>0.0197768</td>
<td>-0.0660196</td>
<td>0.9476</td>
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<tr>
<td>TREND</td>
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<td>0.0004084</td>
<td>0.2102063</td>
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</table>

R-squared: 0.639574
Adjusted R-squared: 0.607297
S.E. of regression: 0.074944
Log likelihood: 90.40998
Durbin-Watson stat: 1.984895

LS // Dependent Variable is D(D(S15))
Date: 10-08-1997 / Time: 17:43
SMPL range: 1977.3 - 1995.4
Number of observations: 74
Augmented Dickey-Fuller: UROOT(T,4) D(S15)

<table>
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<tr>
<th>VARIABLE</th>
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<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tr>
<td>D(S15(-2))</td>
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<tr>
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<td>D(S15(-4))</td>
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<td>0.6946</td>
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<td>D(S15(-1))</td>
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<td>-0.0013057</td>
<td>0.0197768</td>
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<td>0.9476</td>
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<td>TREND</td>
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<td>0.2102063</td>
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</table>

R-squared: 0.639574
Adjusted R-squared: 0.607297
S.E. of regression: 0.074944
Log likelihood: 90.40998
Durbin-Watson stat: 1.984895

LS // Dependent Variable is D(D(S16,2))
Date: 10-08-1997 / Time: 17:44
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T,4) D(S16)

<table>
<thead>
<tr>
<th>VARIABLE</th>
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<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(S16(-1),2)</td>
<td>1.5732307</td>
<td>0.5926306</td>
<td>2.6546565</td>
<td>0.0099</td>
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<td>D(S16(-2),2)</td>
<td>0.6345733</td>
<td>0.4491563</td>
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<td>D(S16(-3),2)</td>
<td>0.0700170</td>
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<td>0.2538777</td>
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<tr>
<td>Dependent Variable is D(D(S17))</td>
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<td>Augmented Dickey-Fuller: UROOT(T,4) D(S17)</td>
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<tr>
<td>D(S17(-1),2))</td>
<td>0.89026</td>
<td>0.0999</td>
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<tr>
<td>D(S17(-2),2))</td>
<td>0.233620</td>
<td>0.1624</td>
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<tr>
<td>D(S17(-3),2))</td>
<td>0.543571</td>
<td>0.8004</td>
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<tr>
<td>D(S17(-4),2))</td>
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<td>Trend</td>
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<table>
<thead>
<tr>
<th>Dependent Variable is D(D(S18))</th>
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<tr>
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<tr>
<td>VARIABLE COEFFICIENT STD. ERROR T-STAT. 2-TAIL SIG.</td>
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<tr>
<td>D(S18(-1),2))</td>
<td>0.223620</td>
<td>0.503857</td>
</tr>
<tr>
<td>D(S18(-2),2))</td>
<td>0.503857</td>
<td>0.1130</td>
</tr>
<tr>
<td>D(S18(-3),2))</td>
<td>0.503857</td>
<td>0.1130</td>
</tr>
<tr>
<td>D(S18(-4),2))</td>
<td>0.503857</td>
<td>0.1130</td>
</tr>
<tr>
<td>Trend</td>
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<table>
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<tr>
<th>Dependent Variable is D(S19)</th>
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<tbody>
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<td>Augmented Dickey-Fuller: UROOT(T,4) D(S19)</td>
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<tr>
<td>VARIABLE COEFFICIENT STD. ERROR T-STAT. 2-TAIL SIG.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D(S19(-1),2))</td>
<td>0.233620</td>
<td>0.1624</td>
</tr>
<tr>
<td>D(S19(-2),2))</td>
<td>0.543571</td>
<td>0.8004</td>
</tr>
<tr>
<td>D(S19(-3),2))</td>
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<td>0.0000</td>
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<tr>
<td>Trend</td>
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<table>
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<tr>
<td>VARIABLE COEFFICIENT STD. ERROR T-STAT. 2-TAIL SIG.</td>
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</tr>
<tr>
<td>D(S20(-1),2))</td>
<td>0.223620</td>
<td>0.503857</td>
</tr>
<tr>
<td>D(S20(-2),2))</td>
<td>0.503857</td>
<td>0.1130</td>
</tr>
<tr>
<td>D(S20(-3),2))</td>
<td>0.503857</td>
<td>0.1130</td>
</tr>
<tr>
<td>Trend</td>
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</table>
### LS // Dependent Variable is D(D(S21))

Date: 10-08-1997 / Time: 17:47  
SMPL range: 1977.3 - 1995.4  
Number of observations: 74  

Augmented Dickey-Fuller: UROOT(T, 4) D(S21)

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<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(D(S21(-1)))</td>
<td>0.1784815</td>
<td>0.2351270</td>
<td>0.7590852</td>
<td>0.4505</td>
</tr>
<tr>
<td>D(D(S21(-2)))</td>
<td>0.0231635</td>
<td>0.1983537</td>
<td>0.1167789</td>
<td>0.9074</td>
</tr>
<tr>
<td>D(D(S21(-3)))</td>
<td>0.0120425</td>
<td>0.1548021</td>
<td>0.0777928</td>
<td>0.9382</td>
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<tr>
<td>D(D(S21(-4)))</td>
<td>0.1742841</td>
<td>0.1085353</td>
<td>1.6057824</td>
<td>0.1130</td>
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<tr>
<td>D(S21(-1))</td>
<td>-1.0803133</td>
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<tr>
<td>C</td>
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<td>-0.3862141</td>
<td>0.7006</td>
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</table>

R-squared: 0.529371  
Adjusted R-squared: 0.487225  
S.E. of regression: 0.079915  
Log likelihood: 85.65799  
Durbin-Watson stat: 1.919835

LS // Dependent Variable is D(D(S22))

Date: 10-08-1997 / Time: 17:48  
SMPL range: 1977.3 - 1995.4  
Number of observations: 74  

Augmented Dickey-Fuller: UROOT(T, 4) D(S22)

<table>
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<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(D(S22(-1)))</td>
<td>-0.0473447</td>
<td>0.3085367</td>
<td>-0.1534493</td>
<td>0.8785</td>
</tr>
<tr>
<td>D(D(S22(-2)))</td>
<td>-0.1615556</td>
<td>0.2539245</td>
<td>-0.6362349</td>
<td>0.5268</td>
</tr>
<tr>
<td>D(D(S22(-3)))</td>
<td>-0.1818779</td>
<td>0.1916483</td>
<td>-0.9490191</td>
<td>0.3460</td>
</tr>
<tr>
<td>D(D(S22(-4)))</td>
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<td>0.1179890</td>
<td>-0.3227345</td>
<td>0.7479</td>
</tr>
<tr>
<td>D(S22(-1))</td>
<td>-1.2163611</td>
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<tr>
<td>C</td>
<td>0.0048996</td>
<td>0.0275553</td>
<td>0.1778083</td>
<td>0.8594</td>
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</table>

R-squared: 0.630606  
Adjusted R-squared: 0.597526  
S.E. of regression: 0.103538  
Log likelihood: 66.49365  
Durbin-Watson stat: 2.002040

LS // Dependent Variable is D(D(S23))

Date: 10-08-1997 / Time: 17:48  
SMPL range: 1977.3 - 1995.4  
Number of observations: 74  

Augmented Dickey-Fuller: UROOT(T, 4) D(S23)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
<tr>
<td>D(D(S23(-1)))</td>
<td>0.2069136</td>
<td>0.2812863</td>
<td>0.7355980</td>
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<td>D(D(S23(-2)))</td>
<td>-0.2607777</td>
<td>0.2419159</td>
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<td>-0.0707048</td>
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<td>0.5650</td>
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<tr>
<td>D(S23(-1))</td>
<td>-1.1715838</td>
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<td>C</td>
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<td>0.0311231</td>
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</table>

R-squared: 0.639750  
Adjusted R-squared: 0.607489  
S.E. of regression: 0.119718  
Log likelihood: 55.74924  
Durbin-Watson stat: 1.977837

LS // Dependent Variable is D(D(S24))

Date: 10-08-1997 / Time: 17:49  
SMPL range: 1977.3 - 1995.4  
Number of observations: 74  

Augmented Dickey-Fuller: UROOT(T, 4) D(S24)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>STD. ERROR</th>
<th>T-STAT.</th>
<th>2-TAIL SIG.</th>
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<tbody>
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<td>D(D(S24(-1)))</td>
<td>0.1427269</td>
<td>0.2465641</td>
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<td>D(D(S24(-2)))</td>
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<td>-0.0283847</td>
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<td>D(S24(-1))</td>
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<td>0.2700749</td>
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<td>0.0005</td>
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</table>
R-squared: 0.582040
Adjusted R-squared: 0.544611
S.E. of regression: 0.076320
Log likelihood: 0.5853262
Durbin-Watson stat: 1.993766
Mean of dependent var: -0.000499
S.D. of dependent var: 0.113095
Sum of squared resid: 0.390254
F-statistic: 15.55043
Prob(F-statistic): 0.000000

C: 0.0119488
TREND: -0.0002381

R-squared: 0.816267
Adjusted R-squared: 0.799564
S.E. of regression: 0.120055
Log likelihood: 0.808954
Durbin-Watson stat: 1.996563
Mean of dependent var: 0.000292
S.D. of dependent var: 0.214832
Sum of squared resid: 0.634848
F-statistic: 46.57778
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(S25,2))
Date: 10-08-1997 / Time: 17:49
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T,4) D(S25,2)
VARIABLE COEFFICIENT STD. ERROR T-STAT. 2-TAIL SIG.
D(S25(-1),2) 2.1739917 0.5097344 4.2649501 0.0001
D(S25(-2),2) 1.2845724 0.3919876 3.2770742 0.0017
D(S25(-3),2) 0.6398466 0.2494606 2.5649205 0.0126
D(S25(-4),2) 0.2306626 0.119063 1.9366122 0.0571
D(S25(-1),2) -4.0560068 0.5828144 -6.9593455 0.0000
C -0.0085493 0.0325613 -0.2625599 0.7937
TREND 0.0001829 0.0006677 0.2739810 0.7850

R-squared: 0.808954
Adjusted R-squared: 0.791586
S.E. of regression: 0.098076
Log likelihood: 0.786341
Durbin-Watson stat: 2.055718
Mean of dependent var: 0.001047
S.D. of dependent var: 0.276688
Sum of squared resid: 1.177702
F-statistic: 40.48382
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(S26,2))
Date: 10-08-1997 / Time: 17:50
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T,4) D(S26,2)
VARIABLE COEFFICIENT STD. ERROR T-STAT. 2-TAIL SIG.
D(S26(-1),2) 1.8279276 0.5110104 3.6856048 0.0005
D(S26(-2),2) 0.9420845 0.3864902 2.4590734 0.0175
D(S26(-3),2) 0.3730906 0.2400395 1.5522883 0.1249
D(S26(-4),2) 0.1349011 0.1144334 1.1786008 0.2427
D(S26(-1),2) -3.6363044 0.5399315 -6.2222350 0.0000
C -0.0152494 0.0267810 -0.5694117 0.5710
TREND 0.0001829 0.0005482 0.4744820 0.6367

R-squared: 0.786341
Adjusted R-squared: 0.766917
S.E. of regression: 0.133581
Log likelihood: 0.786341
Durbin-Watson stat: 2.011592
Mean of dependent var: 0.001047
S.D. of dependent var: 0.276688
Sum of squared resid: 1.177702
F-statistic: 40.48382
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(S27,2))
Date: 10-08-1997 / Time: 17:51
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T,4) D(S27,2)
VARIABLE COEFFICIENT STD. ERROR T-STAT. 2-TAIL SIG.
D(S27(-1),2) 1.7369893 0.4712902 3.6856048 0.0005
D(S27(-2),2) 0.8963895 0.3645233 2.4590734 0.0175
D(S27(-3),2) 0.4004212 0.2298292 1.7422553 0.0861
D(S27(-4),2) 0.1349011 0.1218869 1.1786008 0.2427
D(S27(-1),2) -3.6363044 0.5399315 -6.2222350 0.0000
C -0.0163835 0.0364455 -0.4620167 0.6456
TREND 0.0003297 0.0007477 0.4409230 0.6607

R-squared: 0.786341
Adjusted R-squared: 0.766917
S.E. of regression: 0.133581
Log likelihood: 0.786341
Durbin-Watson stat: 2.011592
Mean of dependent var: 0.001047
S.D. of dependent var: 0.276688
Sum of squared resid: 1.177702
F-statistic: 40.48382
Prob(F-statistic): 0.000000

LS // Dependent Variable is D(D(S28,2))
Date: 10-08-1997 / Time: 17:51
SMPL range: 1977.4 - 1995.4
Number of observations: 73
Augmented Dickey-Fuller: UROOT(T,4) D(S28,2)
VARIABLE COEFFICIENT STD. ERROR T-STAT. 2-TAIL SIG.
D(S28(-1),2) 2.2371221 0.5650450 3.9591930 0.0002
D(S28(-2),2) 1.2727259 0.4309209 2.9538021 0.0043
D(S28(-3),2) 0.5342929 0.2727474 1.9473902 0.0557
D(S28(-4),2) 0.2089792 0.1252587 1.6638313 0.1000
D(S28(-1),2) -4.2107968 0.6368788 -6.611635 0.0000
C 0.0052498 0.0280775 0.1869752 0.8523
<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(Z1(-1))</td>
<td>-3.556279</td>
<td>0.665268</td>
<td>-5.345631</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(Z1(-1),2)</td>
<td>1.633851</td>
<td>0.586654</td>
<td>2.785036</td>
<td>0.0070</td>
</tr>
<tr>
<td>D(Z1(-2),2)</td>
<td>0.713286</td>
<td>0.429305</td>
<td>1.661490</td>
<td>0.1013</td>
</tr>
<tr>
<td>D(Z1(-3),2)</td>
<td>-0.096517</td>
<td>0.265739</td>
<td>-0.363202</td>
<td>0.7176</td>
</tr>
<tr>
<td>D(Z1(-4),2)</td>
<td>-0.068400</td>
<td>0.122223</td>
<td>-0.559633</td>
<td>0.5776</td>
</tr>
<tr>
<td>C</td>
<td>0.052770</td>
<td>0.027384</td>
<td>1.927000</td>
<td>0.0582</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-0.001181</td>
<td>0.000576</td>
<td>-2.049386</td>
<td>0.0443</td>
</tr>
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</table>

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(Z2,2)
Date: 03/21/98 Time: 14:11
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>COEFFICIENT</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(Z1(-1))</td>
<td>-3.556279</td>
<td>0.665268</td>
<td>-5.345631</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(Z1(-1),2)</td>
<td>1.633851</td>
<td>0.586654</td>
<td>2.785036</td>
<td>0.0070</td>
</tr>
<tr>
<td>D(Z1(-2),2)</td>
<td>0.713286</td>
<td>0.429305</td>
<td>1.661490</td>
<td>0.1013</td>
</tr>
<tr>
<td>D(Z1(-3),2)</td>
<td>-0.096517</td>
<td>0.265739</td>
<td>-0.363202</td>
<td>0.7176</td>
</tr>
<tr>
<td>D(Z1(-4),2)</td>
<td>-0.068400</td>
<td>0.122223</td>
<td>-0.559633</td>
<td>0.5776</td>
</tr>
<tr>
<td>C</td>
<td>0.052770</td>
<td>0.027384</td>
<td>1.927000</td>
<td>0.0582</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-0.001181</td>
<td>0.000576</td>
<td>-2.049386</td>
<td>0.0443</td>
</tr>
</tbody>
</table>

ADF Test Statistic
-3.812081
1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.
### Table 1: Coefficient Summary

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(Z2(-1))</td>
<td>-2.037229</td>
<td>0.534414</td>
<td>-3.812081</td>
<td>0.0003</td>
</tr>
<tr>
<td>D(Z2(-1),2)</td>
<td>0.278401</td>
<td>0.474664</td>
<td>0.586522</td>
<td>0.5595</td>
</tr>
<tr>
<td>D(Z2(-2),2)</td>
<td>-0.360236</td>
<td>0.362225</td>
<td>-0.994508</td>
<td>0.3236</td>
</tr>
<tr>
<td>D(Z2(-3),2)</td>
<td>-0.557736</td>
<td>0.230684</td>
<td>-2.417748</td>
<td>0.0183</td>
</tr>
<tr>
<td>D(Z2(-4),2)</td>
<td>-0.274458</td>
<td>0.112490</td>
<td>-2.439838</td>
<td>0.0173</td>
</tr>
<tr>
<td>C</td>
<td>0.077750</td>
<td>0.040658</td>
<td>1.912297</td>
<td>0.0601</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-0.001469</td>
<td>0.000834</td>
<td>-1.760268</td>
<td>0.0829</td>
</tr>
</tbody>
</table>

### R-squared: 0.836420

### Adjusted R-squared: 0.821771

### S.E. of regression: 0.143244

### Akaike info criterion: -3.796599

### Schwarz criterion: -3.578647

### Log likelihood: 42.47273

### F-statistic: 57.09744

### Durbin-Watson stat: 1.932774

### Augmented Dickey-Fuller Test Statistic: -4.344504

#### Critical Values
- 1% Critical Value: -4.0853
- 5% Critical Value: -3.4704
- 10% Critical Value: -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

---

### Table 2: Coefficient Summary

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(Z3(-1))</td>
<td>-1.936563</td>
<td>0.445750</td>
<td>-4.344504</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(Z3(-1),2)</td>
<td>0.346544</td>
<td>0.396132</td>
<td>0.874819</td>
<td>0.3848</td>
</tr>
<tr>
<td>D(Z3(-2),2)</td>
<td>-0.140571</td>
<td>0.293354</td>
<td>-0.479185</td>
<td>0.6334</td>
</tr>
<tr>
<td>D(Z3(-3),2)</td>
<td>-0.556685</td>
<td>0.193000</td>
<td>-2.884375</td>
<td>0.0053</td>
</tr>
<tr>
<td>D(Z3(-4),2)</td>
<td>-0.100715</td>
<td>0.113559</td>
<td>-0.886894</td>
<td>0.3783</td>
</tr>
<tr>
<td>C</td>
<td>0.096358</td>
<td>0.033362</td>
<td>2.888242</td>
<td>0.0052</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-0.001962</td>
<td>0.000691</td>
<td>-2.839029</td>
<td>0.0060</td>
</tr>
</tbody>
</table>

### R-squared: 0.936148

### Adjusted R-squared: 0.930430

### S.E. of regression: 0.096358

### Akaike info criterion: -4.30826

### Schwarz criterion: -4.08672

### Log likelihood: 61.34548

### F-statistic: 163.7164

### Durbin-Watson stat: 2.032041

### Augmented Dickey-Fuller Test Statistic: -4.776817

#### Critical Values
- 1% Critical Value: -4.0853
- 5% Critical Value: -3.4704
- 10% Critical Value: -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

---

### Augmented Dickey-Fuller Test Equation

**LS // Dependent Variable is D(Z2,2)**

**Date: 03/21/98 Time: 14:15**

**Sample(adjusted): 1977:3 1995:4**

**Included observations: 74 after adjusting endpoints**

### Table 3: Coefficient Summary

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(Z4(-1))</td>
<td>-2.037229</td>
<td>0.534414</td>
<td>-3.812081</td>
<td>0.0003</td>
</tr>
<tr>
<td>D(Z4(-1),2)</td>
<td>0.278401</td>
<td>0.474664</td>
<td>0.586522</td>
<td>0.5595</td>
</tr>
<tr>
<td>D(Z4(-2),2)</td>
<td>-0.360236</td>
<td>0.362225</td>
<td>-0.994508</td>
<td>0.3236</td>
</tr>
<tr>
<td>D(Z4(-3),2)</td>
<td>-0.557736</td>
<td>0.230684</td>
<td>-2.417748</td>
<td>0.0183</td>
</tr>
<tr>
<td>D(Z4(-4),2)</td>
<td>-0.274458</td>
<td>0.112490</td>
<td>-2.439838</td>
<td>0.0173</td>
</tr>
<tr>
<td>C</td>
<td>0.077750</td>
<td>0.040658</td>
<td>1.912297</td>
<td>0.0601</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-0.001469</td>
<td>0.000834</td>
<td>-1.760268</td>
<td>0.0829</td>
</tr>
</tbody>
</table>

### R-squared: 0.836420

### Adjusted R-squared: 0.821771

### S.E. of regression: 0.143244

### Akaike info criterion: -3.796599

### Schwarz criterion: -3.578647

### Log likelihood: 42.47273

### F-statistic: 57.09744

### Durbin-Watson stat: 1.932774

### Augmented Dickey-Fuller Test Statistic: -4.344504

#### Critical Values
- 1% Critical Value: -4.0853
- 5% Critical Value: -3.4704
- 10% Critical Value: -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

---

### Augmented Dickey-Fuller Test Equation

**LS // Dependent Variable is D(Z3,2)**

**Date: 03/21/98 Time: 14:15**

**Sample(adjusted): 1977:3 1995:4**

**Included observations: 74 after adjusting endpoints**

### Table 4: Coefficient Summary

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(Z3(-1))</td>
<td>-1.936563</td>
<td>0.445750</td>
<td>-4.344504</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(Z3(-1),2)</td>
<td>0.346544</td>
<td>0.396132</td>
<td>0.874819</td>
<td>0.3848</td>
</tr>
<tr>
<td>D(Z3(-2),2)</td>
<td>-0.140571</td>
<td>0.293354</td>
<td>-0.479185</td>
<td>0.6334</td>
</tr>
<tr>
<td>D(Z3(-3),2)</td>
<td>-0.556685</td>
<td>0.193000</td>
<td>-2.884375</td>
<td>0.0053</td>
</tr>
<tr>
<td>D(Z3(-4),2)</td>
<td>-0.100715</td>
<td>0.113559</td>
<td>-0.886894</td>
<td>0.3783</td>
</tr>
<tr>
<td>C</td>
<td>0.096358</td>
<td>0.033362</td>
<td>2.888242</td>
<td>0.0052</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-0.001962</td>
<td>0.000691</td>
<td>-2.839029</td>
<td>0.0060</td>
</tr>
</tbody>
</table>

### R-squared: 0.936148

### Adjusted R-squared: 0.930430

### S.E. of regression: 0.096358

### Akaike info criterion: -4.30826

### Schwarz criterion: -4.08672

### Log likelihood: 61.34548

### F-statistic: 163.7164

### Durbin-Watson stat: 2.032041

### Augmented Dickey-Fuller Test Statistic: -4.776817

#### Critical Values
- 1% Critical Value: -4.0853
- 5% Critical Value: -3.4704
- 10% Critical Value: -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.
Sample (adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(Z4(-1))</td>
<td>-1.825067</td>
<td>0.382068</td>
<td>-4.776817</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(Z4(-1),2)</td>
<td>0.535573</td>
<td>0.335774</td>
<td>1.595041</td>
<td>0.1154</td>
</tr>
<tr>
<td>D(Z4(-2),2)</td>
<td>0.336097</td>
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<td>0.2062</td>
</tr>
<tr>
<td>D(Z4(-3),2)</td>
<td>0.030136</td>
<td>0.197403</td>
<td>0.152662</td>
<td>0.8791</td>
</tr>
<tr>
<td>D(Z4(-4),2)</td>
<td>0.125725</td>
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<td>C</td>
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</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-0.000435</td>
<td>0.000719</td>
<td>-0.604944</td>
<td>0.5473</td>
</tr>
</tbody>
</table>

R-squared: 0.699154
Adjusted R-squared: 0.672212
S.E. of regression: 0.129638
Sum squared resid: 1.126011
Log likelihood: 49.85774
Durbin-Watson stat: 1.982921
ADF Test Statistic: -7.218042

MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(Z5,2)
Date: 03/21/98 Time: 14:17
Sample (adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(Z5(-1))</td>
<td>-4.997282</td>
<td>0.692332</td>
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<td>0.0000</td>
</tr>
<tr>
<td>D(Z5(-1),2)</td>
<td>2.898723</td>
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<td>4.775999</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(Z5(-2),2)</td>
<td>1.641409</td>
<td>0.436306</td>
<td>3.762057</td>
<td>0.0004</td>
</tr>
<tr>
<td>D(Z5(-3),2)</td>
<td>0.451257</td>
<td>0.267087</td>
<td>1.689554</td>
<td>0.0958</td>
</tr>
<tr>
<td>D(Z5(-4),2)</td>
<td>0.135125</td>
<td>0.112894</td>
<td>1.196915</td>
<td>0.2356</td>
</tr>
<tr>
<td>C</td>
<td>0.110412</td>
<td>0.028617</td>
<td>3.858279</td>
<td>0.0003</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-0.002368</td>
<td>0.000601</td>
<td>-3.941718</td>
<td>0.0002</td>
</tr>
</tbody>
</table>

R-squared: 0.965687
Adjusted R-squared: 0.962614
S.E. of regression: 0.089454
Sum squared resid: 0.536138
Log likelihood: 77.31339
Durbin-Watson stat: 1.869595
ADF Test Statistic: -6.199602

MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(Z6,2)
Date: 03/21/98 Time: 14:18
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(Z6(-1))</td>
<td>-2.123832</td>
<td>0.342576</td>
<td>-6.199602</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(Z6(-1),2)</td>
<td>0.992883</td>
<td>0.297490</td>
<td>3.375348</td>
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<tr>
<td>D(Z6(-2),2)</td>
<td>0.678169</td>
<td>0.236301</td>
<td>2.869932</td>
<td>0.0055</td>
</tr>
<tr>
<td>D(Z6(-3),2)</td>
<td>0.309274</td>
<td>0.172918</td>
<td>1.788559</td>
<td>0.0782</td>
</tr>
<tr>
<td>D(Z6(-4),2)</td>
<td>0.340910</td>
<td>0.115565</td>
<td>2.949937</td>
<td>0.0044</td>
</tr>
<tr>
<td>C</td>
<td>0.019026</td>
<td>0.047277</td>
<td>0.402424</td>
<td>0.6887</td>
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<tr>
<td>@TREND(1976:1)</td>
<td>-0.000449</td>
<td>0.000995</td>
<td>-0.451442</td>
<td>0.6531</td>
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R-squared | 0.645665 | Mean dependent var | -0.000132 |
Adjusted R-squared | 0.613934 | S.D. dependent var | 0.292008 |
S.E. of regression | 0.181437 | Akaike info criterion | -3.323877 |
Sum squared resid | 2.305098 | Schwarz criterion | -3.50925 |
Log likelihood | 24.98201 | F-statistic | 20.34777 |
Durbin-Watson stat | 1.935802 | Prob(F-statistic) | 0.000000 |

ADF Test Statistic | -4.575170 | 1% Critical Value* | -4.0853 |
5% Critical Value | -3.4704 |
10% Critical Value | -3.1620 |

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(Z7,2)
Date: 03/21/98 Time: 14:19
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(Z7(-1))</td>
<td>-1.657371</td>
<td>0.362253</td>
<td>-4.575170</td>
<td>0.0000</td>
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<tr>
<td>D(Z7(-1),2)</td>
<td>0.590263</td>
<td>0.321813</td>
<td>1.834179</td>
<td>0.0711</td>
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<tr>
<td>D(Z7(-2),2)</td>
<td>0.091768</td>
<td>0.261924</td>
<td>0.350362</td>
<td>0.7272</td>
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<tr>
<td>D(Z7(-3),2)</td>
<td>-0.065859</td>
<td>0.180007</td>
<td>-0.365872</td>
<td>0.7156</td>
</tr>
<tr>
<td>D(Z7(-4),2)</td>
<td>0.096296</td>
<td>0.125258</td>
<td>0.768784</td>
<td>0.4447</td>
</tr>
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<td>-0.018218</td>
<td>0.047171</td>
<td>-0.386207</td>
<td>0.7006</td>
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<td>0.000997</td>
<td>-0.075512</td>
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R-squared | 0.704312 | Mean dependent var | -0.002924 |
Adjusted R-squared | 0.677833 | S.D. dependent var | 0.320066 |
S.E. of regression | 0.181667 | Akaike info criterion | -3.321326 |
Sum squared resid | 2.312232 | Schwarz criterion | -3.103374 |
Log likelihood | 24.88762 | F-statistic | 26.59841 |
Durbin-Watson stat | 1.964097 | Prob(F-statistic) | 0.000000 |

ADF Test Statistic | -4.990839 | 1% Critical Value* | -4.0853 |
5% Critical Value | -3.4704 |
10% Critical Value | -3.1620 |
Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(W1,2)
Date: 03/21/98 Time: 14:20
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
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<tr>
<th>Variable</th>
<th>Coefficient</th>
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<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
<tr>
<td>D(W1(-1))</td>
<td>-2.509692</td>
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<td>D(W1(-1),2)</td>
<td>0.959776</td>
<td>0.440547</td>
<td>2.178602</td>
<td>0.0329</td>
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<td>D(W1(-2),2)</td>
<td>0.322554</td>
<td>0.336946</td>
<td>0.957287</td>
<td>0.3419</td>
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<tr>
<td>D(W1(-3),2)</td>
<td>0.081541</td>
<td>0.217154</td>
<td>0.375497</td>
<td>0.7085</td>
</tr>
<tr>
<td>D(W1(-4),2)</td>
<td>-0.022250</td>
<td>0.104117</td>
<td>-0.213704</td>
<td>0.8314</td>
</tr>
<tr>
<td>C</td>
<td>0.058159</td>
<td>0.082196</td>
<td>0.707569</td>
<td>0.4817</td>
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<td>@TREND(1976:1)</td>
<td>0.000241</td>
<td>0.001709</td>
<td>0.141201</td>
<td>0.8881</td>
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R-squared          | 0.753520   | Mean dependent var | -0.009849 |
Adjusted R-squared | 0.731447   | S.D. dependent var  | 0.602199 |
S.E. of regression  | 0.312072   | Akaike info criterion | -2.239277 |
Sum squared resid    | 6.525051   | Schwarz criterion   | -2.021275 |
Log likelihood       | -15.15005  | F-statistic         | 34.13794  |
Durbin-Watson stat   | 2.009740   | Prob(F-statistic)   | 0.000000  |

ADF Test Statistic  | -3.715108  | 1% Critical Value*  | -4.0853  |
                      |           | 5% Critical Value    | -3.4704  |
                      |           | 10% Critical Value   | -3.1620  |

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(W2,2)
Date: 03/21/98 Time: 14:20
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(W2(-1))</td>
<td>-1.324001</td>
<td>0.356383</td>
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<td>0.0004</td>
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<tr>
<td>D(W2(-1),2)</td>
<td>0.078092</td>
<td>0.316237</td>
<td>0.246943</td>
<td>0.8057</td>
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<tr>
<td>D(W2(-2),2)</td>
<td>-0.157171</td>
<td>0.248809</td>
<td>-0.631694</td>
<td>0.5297</td>
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<tr>
<td>D(W2(-3),2)</td>
<td>-0.225976</td>
<td>0.171031</td>
<td>-1.321259</td>
<td>0.1909</td>
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<tr>
<td>D(W2(-4),2)</td>
<td>-0.107357</td>
<td>0.103252</td>
<td>-1.039752</td>
<td>0.3022</td>
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<tr>
<td>C</td>
<td>0.123249</td>
<td>0.061769</td>
<td>1.995324</td>
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<tr>
<td>@TREND(1976:1)</td>
<td>-0.002198</td>
<td>0.001242</td>
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<td>0.0812</td>
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</table>

R-squared          | 0.651501   | Mean dependent var | 0.004544 |
Adjusted R-squared | 0.620292   | S.D. dependent var  | 0.340958 |
S.E. of regression  | 0.210100   | Akaike info criterion | -3.030528 |
Sum squared resid    | 2.957511   | Schwarz criterion   | -2.812576 |
Log likelihood       | 14.12808   | F-statistic         | 20.87550 |
Durbin-Watson stat   | 1.943509   | Prob(F-statistic)   | 0.000000 |

ADF Test Statistic  | -3.952692  | 1% Critical Value*  | -4.0853  |
*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(W3,2)
Date: 03/21/98 Time: 14:21
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
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<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
<tr>
<td>D(W3(-1))</td>
<td>-1.933650</td>
<td>0.489198</td>
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<tr>
<td>D(W3(-1),2)</td>
<td>0.463035</td>
<td>0.431211</td>
<td>1.073800</td>
<td>0.2868</td>
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<tr>
<td>D(W3(-2),2)</td>
<td>-0.167584</td>
<td>0.334019</td>
<td>-0.501721</td>
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<tr>
<td>D(W3(-3),2)</td>
<td>-0.306987</td>
<td>0.213018</td>
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<td>0.1542</td>
</tr>
<tr>
<td>D(W3(-4),2)</td>
<td>-0.193328</td>
<td>0.119478</td>
<td>0.1103</td>
<td>0.9920</td>
</tr>
<tr>
<td>C</td>
<td>0.044816</td>
<td>0.046583</td>
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<tr>
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<td>0.000303</td>
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</table>

R-squared 0.780474 Mean dependent var -0.000899
Adjusted R-squared 0.760815 S.D. dependent var 0.358148
S.E. of regression 0.195158 Akaike info criterion -3.394318
Sum squared resid 2.055579 Schwarz criterion -3.176366
Log likelihood 27.58833 F-statistic 39.70058
Durbin-Watson stat 1.952779 Prob(F-statistic) 0.000000

ADF Test Statistic -5.194690 1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(W4,2)
Date: 03/21/98 Time: 14:21
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(W4(-1))</td>
<td>-2.851409</td>
<td>0.488908</td>
<td>-5.194690</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(W4(-1),2)</td>
<td>1.112705</td>
<td>0.483371</td>
<td>2.301968</td>
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<tr>
<td>D(W4(-2),2)</td>
<td>0.520449</td>
<td>0.376868</td>
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<td>0.1719</td>
</tr>
<tr>
<td>D(W4(-3),2)</td>
<td>0.121367</td>
<td>0.250652</td>
<td>0.484205</td>
<td>0.6298</td>
</tr>
<tr>
<td>D(W4(-4),2)</td>
<td>0.009797</td>
<td>0.122961</td>
<td>0.079678</td>
<td>0.9367</td>
</tr>
<tr>
<td>C</td>
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<td>0.042370</td>
<td>0.010012</td>
<td>0.9920</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.001091</td>
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</table>

R-squared 0.789663 Mean dependent var -0.002023
Adjusted R-squared 0.770827 S.D. dependent var 0.341529
S.E. of regression 0.163497 Akaike info criterion -3.532109
Sum squared resid 1.790987 Schwarz criterion -3.314157
Log likelihood 32.68659 F-statistic 41.92280
Durbin-Watson stat 2.010814  Prob(F-statistic) 0.000000

ADF Test Statistic  -4.976083  1% Critical Value* -4.0853
  5% Critical Value -3.4704
  10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(W5,2)
Date: 03/21/98  Time: 14:22
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(W5(-1))</td>
<td>-1.931284</td>
<td>0.388113</td>
<td>-4.976083</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(W5(-1),2)</td>
<td>0.698342</td>
<td>0.345436</td>
<td>2.021624</td>
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<tr>
<td>D(W5(-2),2)</td>
<td>0.256401</td>
<td>0.273609</td>
<td>0.937106</td>
<td>0.3521</td>
</tr>
<tr>
<td>D(W5(-3),2)</td>
<td>0.038412</td>
<td>0.188820</td>
<td>0.203430</td>
<td>0.8394</td>
</tr>
<tr>
<td>D(W5(-4),2)</td>
<td>0.222391</td>
<td>0.117454</td>
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</tr>
<tr>
<td>C</td>
<td>0.082325</td>
<td>0.089257</td>
<td>0.922337</td>
<td>0.3597</td>
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<tr>
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<td>-0.001268</td>
<td>0.001867</td>
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</table>

R-squared 0.727392  Mean dependent var -0.009750
Adjusted R-squared 0.702979  S.D. dependent var 0.628484
S.E. of regression 0.342521  Akaake info criterion -2.053027
Sum squared resid 7.860493  Schwarz criterion -1.835075
Log likelihood -22.03946  F-statistic 29.79567
Durbin-Watson stat 2.049813  Prob(F-statistic) 0.000000

ADF Test Statistic  -4.192510  1% Critical Value* -4.0853
  5% Critical Value -3.4704
  10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(W6,2)
Date: 03/21/98  Time: 14:23
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
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<th>t-Statistic</th>
<th>Prob.</th>
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<tr>
<td>D(W6(-1))</td>
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<tr>
<td>D(W6(-1),2)</td>
<td>0.393780</td>
<td>0.388646</td>
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<td>0.3146</td>
</tr>
<tr>
<td>D(W6(-2),2)</td>
<td>0.029942</td>
<td>0.309079</td>
<td>0.96875</td>
<td>0.9231</td>
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<tr>
<td>D(W6(-3),2)</td>
<td>-0.126374</td>
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<tr>
<td>D(W6(-4),2)</td>
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<td>0.122537</td>
<td>-0.446797</td>
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<tr>
<td>C</td>
<td>0.066286</td>
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<td>0.2667</td>
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<td>-0.001157</td>
<td>0.001233</td>
<td>-0.938711</td>
<td>0.3513</td>
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</table>

R-squared 0.698729  Mean dependent var 0.001609
Adjusted R-squared 0.671749  S.D. dependent var 0.391986
Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(W7,2)
Date: 03/21/98 Time: 14:24
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
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<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
<tr>
<td>D(W7(-1))</td>
<td>-1.506687</td>
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<td>D(W7(-1),2)</td>
<td>0.255861</td>
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<td>0.4273</td>
</tr>
<tr>
<td>D(W7(-2),2)</td>
<td>-0.012741</td>
<td>0.250920</td>
<td>0.050776</td>
<td>0.9597</td>
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<tr>
<td>D(W7(-3),2)</td>
<td>-0.217708</td>
<td>0.180430</td>
<td>-1.206608</td>
<td>0.2318</td>
</tr>
<tr>
<td>D(W7(-4),2)</td>
<td>0.043005</td>
<td>0.114353</td>
<td>0.376076</td>
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</tr>
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<td>1.223551</td>
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</table>

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(P1,3)
Date: 03/21/98 Time: 14:25
Sample(adjusted): 1984:4 1995:4
Included observations: 45 after adjusting endpoints

<table>
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<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(P1(-1),2)</td>
<td>-4.278917</td>
<td>0.961631</td>
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<tr>
<td>D(P1(-1),3)</td>
<td>2.039426</td>
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<td>D(P1(-2),3)</td>
<td>0.906982</td>
<td>0.637480</td>
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<tr>
<td>D(P1(-3),3)</td>
<td>0.219326</td>
<td>0.376744</td>
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<td>0.5639</td>
</tr>
<tr>
<td>D(P1(-4),3)</td>
<td>0.009933</td>
<td>0.153362</td>
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</tr>
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<td>C</td>
<td>-0.017810</td>
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<tr>
<td>@TREND(1976:1)</td>
<td>0.000446</td>
<td>0.003315</td>
<td>0.134559</td>
<td>0.8937</td>
</tr>
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</table>
R-squared        0.889789    Mean dependent var       -0.004715
Adjusted R-squared 0.872387    S.D. dependent var       0.806200
S.E. of regression 0.287998    Akaike info criterion -2.347569
Sum squared resid  3.151828    Schwarz criterion       -2.066532
Log likelihood    -4.031937    F-statistic           51.13229
Durbin-Watson stat 1.986562    Prob(F-statistic)     0.000000

ADF Test Statistic  -3.924258     1% Critical Value*  -4.1678
                                  5% Critical Value    -3.5088
                                  10% Critical Value    -3.1840
*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(P2,2)
Date: 03/21/98 Time: 14:26
Sample(adjusted): 1984:3 1995:4
Included observations: 46 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
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<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(P2(-1))</td>
<td>-2.111762</td>
<td>0.538130</td>
<td>-3.924258</td>
<td>0.0003</td>
</tr>
<tr>
<td>D(P2(-1),2)</td>
<td>0.715319</td>
<td>0.474594</td>
<td>1.507224</td>
<td>0.1398</td>
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<td>D(P2(-2),2)</td>
<td>0.421396</td>
<td>0.368666</td>
<td>1.143029</td>
<td>0.2600</td>
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<tr>
<td>D(P2(-3),2)</td>
<td>0.088031</td>
<td>0.266104</td>
<td>0.330815</td>
<td>0.7426</td>
</tr>
<tr>
<td>D(P2(-4),2)</td>
<td>0.170222</td>
<td>0.157034</td>
<td>1.028276</td>
<td>0.3102</td>
</tr>
<tr>
<td>C</td>
<td>0.161475</td>
<td>0.157034</td>
<td>1.028276</td>
<td>0.3102</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-0.001401</td>
<td>0.002667</td>
<td>-0.525196</td>
<td>0.6024</td>
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R-squared        0.747728    Mean dependent var       0.000572
Adjusted R-squared 0.708917    S.D. dependent var       0.444010
S.E. of regression 0.239553    Akaike info criterion -2.718693
Sum squared resid  2.238041    Schwarz criterion       -2.440421
Log likelihood    4.258757     F-statistic           19.26581
Durbin-Watson stat 2.011011    Prob(F-statistic)     0.000000

ADF Test Statistic  -4.515066     1% Critical Value*  -4.1728
                                  5% Critical Value    -3.5112
                                  10% Critical Value    -3.1854
*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(P3,3)
Date: 03/21/98 Time: 14:27
Sample(adjusted): 1984:4 1995:4
Included observations: 45 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(P3(-1),2)</td>
<td>-3.912262</td>
<td>0.866491</td>
<td>-4.515066</td>
<td>0.0001</td>
</tr>
<tr>
<td>D(P3(-1),3)</td>
<td>1.788606</td>
<td>0.759876</td>
<td>2.353813</td>
<td>0.0239</td>
</tr>
<tr>
<td>D(P3(-2),3)</td>
<td>0.933246</td>
<td>0.565241</td>
<td>1.651059</td>
<td>0.1070</td>
</tr>
<tr>
<td>D(P3(-3),3)</td>
<td>0.244914</td>
<td>0.350756</td>
<td>0.698246</td>
<td>0.4893</td>
</tr>
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Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(P4,3)
Date: 03/21/98 Time: 14:29
Sample(adjusted): 1984:4 1995:4
 Included observations: 45 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
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<tbody>
<tr>
<td>D(P4(-1),2)</td>
<td>-4.754912</td>
<td>0.935472</td>
<td>-5.082899</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(P4(-1),3)</td>
<td>2.465380</td>
<td>0.809155</td>
<td>3.046858</td>
<td>0.0042</td>
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<tr>
<td>D(P4(-2),3)</td>
<td>1.396062</td>
<td>0.581338</td>
<td>2.401464</td>
<td>0.0213</td>
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<tr>
<td>D(P4(-3),3)</td>
<td>0.506692</td>
<td>0.343989</td>
<td>1.472989</td>
<td>0.1490</td>
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<tr>
<td>D(P4(-4),3)</td>
<td>0.056132</td>
<td>0.306333</td>
<td>0.184582</td>
<td>0.8545</td>
</tr>
<tr>
<td>C</td>
<td>0.056544</td>
<td>0.306333</td>
<td>0.184582</td>
<td>0.8545</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-0.001029</td>
<td>0.005241</td>
<td>-0.196308</td>
<td>0.8454</td>
</tr>
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R-squared: 0.912551  Mean dependent var: 0.022975
Adjusted R-squared: 0.898743  S.D. dependent var: 1.406240
S.E. of regression: 0.947478  Akaike info criterion: -1.466221
Sum squared resid: 7.608990  Schwarz criterion: -1.185184
Log likelihood: -23.86226  F-statistic: 66.08969
Durbin-Watson stat: 1.941132  Prob(F-statistic): 0.000000

ADF Test Statistic: -3.901364  1% Critical Value*: -4.1678
5% Critical Value: -3.5088
10% Critical Value: -3.1840

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(P5,2)
Date: 03/21/98 Time: 14:30
Sample(adjusted): 1984:3 1995:4
 Included observations: 46 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(P5(-1))</td>
<td>-2.296413</td>
<td>0.588618</td>
<td>-3.901364</td>
<td>0.0004</td>
</tr>
</tbody>
</table>

R-squared: Mean dependent var: 0.022975
Adjusted R-squared: 0.898743  S.D. dependent var: 1.406240
S.E. of regression: 0.947478  Akaike info criterion: -1.466221
Sum squared resid: 7.608990  Schwarz criterion: -1.185184
Log likelihood: -23.86226  F-statistic: 66.08969
Durbin-Watson stat: 1.941132  Prob(F-statistic): 0.000000

ADF Test Statistic: -3.901364  1% Critical Value*: -4.1678
5% Critical Value: -3.5088
10% Critical Value: -3.1840

*MacKinnon critical values for rejection of hypothesis of a unit root.
### Augmented Dickey-Fuller Test Equation

**LS // Dependent Variable is D(P5,2)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(P5(-1),2)</td>
<td>0.801001</td>
<td>0.514697</td>
<td>1.556257</td>
<td>0.1277</td>
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<tr>
<td>D(P5(-2),2)</td>
<td>0.453574</td>
<td>0.418942</td>
<td>1.082665</td>
<td>0.2856</td>
</tr>
<tr>
<td>D(P5(-3),2)</td>
<td>0.265355</td>
<td>0.303000</td>
<td>0.875759</td>
<td>0.3865</td>
</tr>
<tr>
<td>D(P5(-4),2)</td>
<td>0.087438</td>
<td>0.177000</td>
<td>0.494003</td>
<td>0.6241</td>
</tr>
<tr>
<td>C</td>
<td>0.101123</td>
<td>0.510636</td>
<td>0.198034</td>
<td>0.8440</td>
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<tr>
<td>@TREND(1976:1)</td>
<td>-0.001102</td>
<td>0.008793</td>
<td>-0.125349</td>
<td>0.9009</td>
</tr>
</tbody>
</table>

- **R-squared**: 0.704038  - Mean dependent var: -0.037692
- **Adjusted R-squared**: 0.658505  - S.D. dependent var: 1.349693
- **S.E. of regression**: 0.453574  - Akaike info criterion: -0.335400
- **Sum squared resid**: 24.26157  - Schwarz criterion: -0.057128
- **Log likelihood**: -50.55697  - F-statistic: 15.46226
- **Durbin-Watson stat**: 2.040582  - Prob(F-statistic): 0.000000
- **ADF Test Statistic**: -4.230376  - 1% Critical Value*: -4.0853
  - 5% Critical Value: -3.4704
  - 10% Critical Value: -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

### Augmented Dickey-Fuller Test Equation

**LS // Dependent Variable is D(P6,2)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(P6(-1),2)</td>
<td>-1.752833</td>
<td>0.414344</td>
<td>-4.230376</td>
<td>0.0001</td>
</tr>
<tr>
<td>D(P6(-1),2)</td>
<td>0.320916</td>
<td>0.367893</td>
<td>0.872307</td>
<td>0.3862</td>
</tr>
<tr>
<td>D(P6(-2),2)</td>
<td>0.092412</td>
<td>0.291344</td>
<td>0.317190</td>
<td>0.7521</td>
</tr>
<tr>
<td>D(P6(-3),2)</td>
<td>-0.134724</td>
<td>0.210389</td>
<td>-0.640355</td>
<td>0.5241</td>
</tr>
<tr>
<td>D(P6(-4),2)</td>
<td>0.010252</td>
<td>0.119488</td>
<td>0.085802</td>
<td>0.9319</td>
</tr>
<tr>
<td>C</td>
<td>-0.012660</td>
<td>0.047996</td>
<td>-0.263765</td>
<td>0.7928</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.000871</td>
<td>0.001030</td>
<td>0.845483</td>
<td>0.4009</td>
</tr>
</tbody>
</table>

- **R-squared**: 0.738656  - Mean dependent var: 0.005017
- **Adjusted R-squared**: 0.715252  - S.D. dependent var: 0.344649
- **S.E. of regression**: 0.183911  - Akaike info criterion: -3.296790
- **Sum squared resid**: 2.266158  - Schwarz criterion: -3.078838
- **Log likelihood**: 23.97978  - F-statistic: 31.56123
- **Durbin-Watson stat**: 1.920401  - Prob(F-statistic): 0.000000
- **ADF Test Statistic**: -4.080491  - 1% Critical Value*: -4.0853
  - 5% Critical Value: -3.4704
  - 10% Critical Value: -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

### Augmented Dickey-Fuller Test Equation

**LS // Dependent Variable is D(X1,2)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(X1(-1))</td>
<td>-1.752833</td>
<td>0.414344</td>
<td>-4.230376</td>
<td>0.0001</td>
</tr>
<tr>
<td>D(X1(-1),2)</td>
<td>0.320916</td>
<td>0.367893</td>
<td>0.872307</td>
<td>0.3862</td>
</tr>
<tr>
<td>D(X1(-2),2)</td>
<td>0.092412</td>
<td>0.291344</td>
<td>0.317190</td>
<td>0.7521</td>
</tr>
<tr>
<td>D(X1(-3),2)</td>
<td>-0.134724</td>
<td>0.210389</td>
<td>-0.640355</td>
<td>0.5241</td>
</tr>
<tr>
<td>D(X1(-4),2)</td>
<td>0.010252</td>
<td>0.119488</td>
<td>0.085802</td>
<td>0.9319</td>
</tr>
<tr>
<td>C</td>
<td>-0.012660</td>
<td>0.047996</td>
<td>-0.263765</td>
<td>0.7928</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.000871</td>
<td>0.001030</td>
<td>0.845483</td>
<td>0.4009</td>
</tr>
</tbody>
</table>

- **R-squared**: 0.738656  - Mean dependent var: 0.005017
- **Adjusted R-squared**: 0.715252  - S.D. dependent var: 0.344649
- **S.E. of regression**: 0.183911  - Akaike info criterion: -3.296790
- **Sum squared resid**: 2.266158  - Schwarz criterion: -3.078838
- **Log likelihood**: 23.97978  - F-statistic: 31.56123
- **Durbin-Watson stat**: 1.920401  - Prob(F-statistic): 0.000000
- **ADF Test Statistic**: -4.080491  - 1% Critical Value*: -4.0853
  - 5% Critical Value: -3.4704
  - 10% Critical Value: -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.
<table>
<thead>
<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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</thead>
<tbody>
<tr>
<td>D(X1(-1))</td>
<td>-1.858502</td>
<td>0.455460</td>
<td>-4.080491</td>
<td>0.0001</td>
</tr>
<tr>
<td>D(X1(-1),2)</td>
<td>0.343148</td>
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<tr>
<td>D(X1(-2),2)</td>
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<td>-0.171379</td>
<td>0.8644</td>
</tr>
<tr>
<td>D(X1(-3),2)</td>
<td>-0.172509</td>
<td>0.221032</td>
<td>-0.780470</td>
<td>0.4379</td>
</tr>
<tr>
<td>D(X1(-4),2)</td>
<td>0.004192</td>
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<td>0.034056</td>
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</tr>
<tr>
<td>C</td>
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<td>0.4898</td>
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<tr>
<td>@TREND(1976:1)</td>
<td>0.002000</td>
<td>0.001318</td>
<td>1.517370</td>
<td>0.1339</td>
</tr>
</tbody>
</table>

R-squared: 0.735955  Mean dependent var: 0.006414
Adjusted R-squared: 0.712309  S.D. dependent var: 0.438490
S.E. of regression: 0.235192  Akaike info criterion: -2.804888
Sum squared resid: 3.706128  Schwarz criterion: -2.586936
Log likelihood: 5.779414  F-statistic: 31.12410
Durbin-Watson stat: 1.973498  Prob(F-statistic): 0.000000

ADF Test Statistic: -4.771216  1% Critical Value*: -4.0853
                      5% Critical Value: -3.4704
                      10% Critical Value: -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(X2,2)
Date: 03/21/98  Time: 14:34
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(X2(-1))</td>
<td>-1.748795</td>
<td>0.366530</td>
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<tr>
<td>D(X2(-1),2)</td>
<td>0.395385</td>
<td>0.324084</td>
<td>1.220006</td>
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</tr>
<tr>
<td>D(X2(-2),2)</td>
<td>0.003020</td>
<td>0.258783</td>
<td>0.011670</td>
<td>0.9907</td>
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<tr>
<td>D(X2(-3),2)</td>
<td>-0.098876</td>
<td>0.181193</td>
<td>-0.545695</td>
<td>0.5871</td>
</tr>
<tr>
<td>D(X2(-4),2)</td>
<td>0.093860</td>
<td>0.108861</td>
<td>0.862199</td>
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<tr>
<td>C</td>
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<td>-0.368086</td>
<td>0.7140</td>
</tr>
<tr>
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<td>0.001086</td>
<td>0.001699</td>
<td>0.639363</td>
<td>0.5248</td>
</tr>
</tbody>
</table>

R-squared: 0.730079  Mean dependent var: 0.001884
Adjusted R-squared: 0.705907  S.D. dependent var: 0.570813
S.E. of regression: 0.235192  Akaike info criterion: -2.255430
Sum squared resid: 6.420178  Schwarz criterion: -2.037478
Log likelihood: -14.55054  F-statistic: 30.20348
Durbin-Watson stat: 1.989372  Prob(F-statistic): 0.000000

ADF Test Statistic: -4.526865  1% Critical Value*: -4.0853
                      5% Critical Value: -3.4704
                      10% Critical Value: -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(X3,2)
Date: 03/21/98  Time: 14:34
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(X3(-1))</td>
<td>-1.753353</td>
<td>0.387322</td>
<td>-4.526865</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(X3(-1),2)</td>
<td>0.464399</td>
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<td>1.340561</td>
<td>0.1846</td>
</tr>
<tr>
<td>D(X3(-2),2)</td>
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<td>0.275688</td>
<td>0.348736</td>
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</tr>
<tr>
<td>D(X3(-3),2)</td>
<td>-0.063836</td>
<td>0.195476</td>
<td>-0.326569</td>
<td>0.7450</td>
</tr>
<tr>
<td>D(X3(-4),2)</td>
<td>0.173128</td>
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<td>0.5567</td>
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<td>0.001241</td>
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<td>0.727648</td>
<td>0.4694</td>
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</table>

R-squared 0.726863
Adjusted R-squared 0.702403
S.E. of regression 0.310708
Sum squared resid 6.468131
Log likelihood -14.82587
Durbin-Watson stat 2.018287

ADF Test Statistic -3.680891
1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(X4,2)
Date: 03/21/98 Time: 14:35
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
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<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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</thead>
<tbody>
<tr>
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<td>-1.542439</td>
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<td>0.209044</td>
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<td>0.552124</td>
<td>0.5827</td>
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<tr>
<td>D(X4(-2),2)</td>
<td>-0.201373</td>
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<td>-0.695108</td>
<td>0.4894</td>
</tr>
<tr>
<td>D(X4(-3),2)</td>
<td>-0.482705</td>
<td>0.196892</td>
<td>-2.451621</td>
<td>0.0168</td>
</tr>
<tr>
<td>D(X4(-4),2)</td>
<td>-0.026608</td>
<td>0.126557</td>
<td>-0.210243</td>
<td>0.8341</td>
</tr>
<tr>
<td>C</td>
<td>-0.043229</td>
<td>0.067732</td>
<td>-0.638241</td>
<td>0.5255</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.001624</td>
<td>0.001460</td>
<td>1.112295</td>
<td>0.2700</td>
</tr>
</tbody>
</table>

R-squared 0.842675
Adjusted R-squared 0.828587
S.E. of regression 0.258193
Sum squared resid 4.464477
Log likelihood -1.125241
Durbin-Watson stat 1.989354

ADF Test Statistic -5.148948
1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(X5,2)
Date: 03/21/98 Time: 14:36
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(X5(-1))</td>
<td>-1.770407</td>
<td>0.343839</td>
<td>-5.148948</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(X5(-1),2)</td>
<td>0.521678</td>
<td>0.298979</td>
<td>1.744861</td>
<td>0.0856</td>
</tr>
<tr>
<td>D(X5(-2),2)</td>
<td>0.374968</td>
<td>0.250362</td>
<td>1.497700</td>
<td>0.1389</td>
</tr>
<tr>
<td>D(X5(-3),2)</td>
<td>0.345819</td>
<td>0.192406</td>
<td>1.797337</td>
<td>0.0768</td>
</tr>
<tr>
<td>D(X5(-4),2)</td>
<td>0.192987</td>
<td>0.121355</td>
<td>1.590268</td>
<td>0.1165</td>
</tr>
<tr>
<td>C</td>
<td>-0.014954</td>
<td>0.063057</td>
<td>-0.237156</td>
<td>0.8133</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.000362</td>
<td>0.001326</td>
<td>0.272687</td>
<td>0.7859</td>
</tr>
</tbody>
</table>

R-squared | 0.622560   | Mean dependent var | 0.006277   |
Adjusted R-squared | 0.588759   | S.D. dependent var | 0.379564   |
S.E. of regression | 0.243407   | Akaike info criterion | -2.736226 |
Sum squared resid | 3.969541   | Schwarz criterion | -2.518273 |
Log likelihood | 3.238896   | F-statistic | 18.41860 |
Durbin-Watson stat | 2.054965   | Prob(F-statistic) | 0.000000   |

ADF Test Statistic | -4.478909 | 1% Critical Value* | -4.0853 |
5% Critical Value | -3.4704  |
10% Critical Value | -3.1620  |

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(X6,2)
Date: 03/21/98 Time: 14:37
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(X6(-1))</td>
<td>-1.365386</td>
<td>0.304848</td>
<td>-4.478909</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(X6(-1),2)</td>
<td>0.271301</td>
<td>0.271596</td>
<td>0.998914</td>
<td>0.3214</td>
</tr>
<tr>
<td>D(X6(-2),2)</td>
<td>0.211619</td>
<td>0.222856</td>
<td>0.949579</td>
<td>0.3457</td>
</tr>
<tr>
<td>D(X6(-3),2)</td>
<td>0.043317</td>
<td>0.177246</td>
<td>0.244388</td>
<td>0.8077</td>
</tr>
<tr>
<td>D(X6(-4),2)</td>
<td>0.174412</td>
<td>0.119792</td>
<td>1.455962</td>
<td>0.1501</td>
</tr>
<tr>
<td>C</td>
<td>-0.030698</td>
<td>0.066453</td>
<td>-0.461954</td>
<td>0.6456</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.000822</td>
<td>0.001401</td>
<td>0.587161</td>
<td>0.5591</td>
</tr>
</tbody>
</table>

R-squared | 0.608744   | Mean dependent var | -0.000282 |
Adjusted R-squared | 0.573706   | S.D. dependent var | 0.392214 |
S.E. of regression | 0.256081   | Akaike info criterion | -2.634706 |
Sum squared resid | 4.393690   | Schwarz criterion | -2.416754 |
Log likelihood | -0.517310  | F-statistic | 17.37389 |
Durbin-Watson stat | 2.021729   | Prob(F-statistic) | 0.000000 |

ADF Test Statistic | -5.495897 | 1% Critical Value* | -4.2505 |
5% Critical Value | -3.5468  |
10% Critical Value | -3.2056  |
Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(X7,3)
Date: 03/21/98 Time: 14:38
Sample(adjusted): 1987:3 1995:4
Included observations: 34 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(X7(-1),2)</td>
<td>-4.108415</td>
<td>0.747542</td>
<td>-5.495897</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(X7(-1),3)</td>
<td>1.903104</td>
<td>0.621802</td>
<td>3.060629</td>
<td>0.0048</td>
</tr>
<tr>
<td>D(X7(-2),3)</td>
<td>0.863722</td>
<td>0.405452</td>
<td>2.130269</td>
<td>0.0421</td>
</tr>
<tr>
<td>D(X7(-3),3)</td>
<td>0.233859</td>
<td>0.176875</td>
<td>1.322175</td>
<td>0.1968</td>
</tr>
<tr>
<td>C</td>
<td>-0.135944</td>
<td>0.156239</td>
<td>-0.870107</td>
<td>0.3916</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.002138</td>
<td>0.002473</td>
<td>0.864690</td>
<td>0.3946</td>
</tr>
</tbody>
</table>

R-squared 0.888801
Adjusted R-squared 0.868944
S.E. of regression 0.002138
Sum squared resid 0.552343
Log likelihood 21.78520
Durbin-Watson stat 1.944805

ADF Test Statistic -4.124230 1% Critical Value* -4.2412

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(X8,2)
Date: 03/21/98 Time: 14:39
Sample(adjusted): 1987:2 1995:4
Included observations: 35 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(X8(-1))</td>
<td>-2.263247</td>
<td>0.548768</td>
<td>-4.124230</td>
<td>0.0003</td>
</tr>
<tr>
<td>D(X8(-1),2)</td>
<td>0.810523</td>
<td>0.457080</td>
<td>1.773264</td>
<td>0.0867</td>
</tr>
<tr>
<td>D(X8(-2),2)</td>
<td>0.424122</td>
<td>0.331615</td>
<td>1.278958</td>
<td>0.2111</td>
</tr>
<tr>
<td>D(X8(-3),2)</td>
<td>0.195568</td>
<td>0.190028</td>
<td>1.029158</td>
<td>0.3119</td>
</tr>
<tr>
<td>C</td>
<td>0.137200</td>
<td>0.530213</td>
<td>0.258765</td>
<td>0.7976</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.001384</td>
<td>0.008525</td>
<td>0.162299</td>
<td>0.8722</td>
</tr>
</tbody>
</table>

R-squared 0.697647
Adjusted R-squared 0.645517
S.E. of regression 0.502868
Sum squared resid 7.333411
Log likelihood -22.31197
Durbin-Watson stat 1.813273

ADF Test Statistic -5.341827 1% Critical Value* -4.0853

*MacKinnon critical values for rejection of hypothesis of a unit root.
**MacKinnon critical values for rejection of hypothesis of a unit root.**

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(X9,2)
Date: 03/21/98 Time: 14:40
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(X9(-1))</td>
<td>-2.446792</td>
<td>0.458044</td>
<td>-5.341827</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(X9(-1),2)</td>
<td>0.994828</td>
<td>0.404341</td>
<td>2.460369</td>
<td>0.0165</td>
</tr>
<tr>
<td>D(X9(-2),2)</td>
<td>0.435753</td>
<td>0.308865</td>
<td>1.410821</td>
<td>0.1529</td>
</tr>
<tr>
<td>D(X9(-3),2)</td>
<td>0.025331</td>
<td>0.205340</td>
<td>0.123461</td>
<td>0.9021</td>
</tr>
<tr>
<td>D(X9(-4),2)</td>
<td>0.157264</td>
<td>0.117440</td>
<td>1.339102</td>
<td>0.1851</td>
</tr>
<tr>
<td>C</td>
<td>-0.042007</td>
<td>0.093232</td>
<td>-0.450559</td>
<td>0.6538</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.002531</td>
<td>0.001986</td>
<td>1.274605</td>
<td>0.2069</td>
</tr>
</tbody>
</table>

R-squared: 0.786646  Mean dependent var: 0.004604
Adjusted R-squared: 0.767540  S.D. dependent var: 0.744799
S.E. of regression: 0.359185  Akaike info criterion: -1.958019
Sum squared resid: 8.643928  Schwarz criterion: -1.740067
Log likelihood: -25.55475  F-statistic: 41.17211
Durbin-Watson stat: 2.028132  Prob(F-statistic): 0.000000

ADF Test Statistic: -4.711372  1% Critical Value*: -4.0853
5% Critical Value: -3.4704
10% Critical Value: -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(X10,2)
Date: 03/21/98 Time: 14:41
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(X10(-1))</td>
<td>-1.468616</td>
<td>0.311717</td>
<td>-4.711372</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(X10(-1),2)</td>
<td>0.214749</td>
<td>0.273645</td>
<td>0.784770</td>
<td>0.4354</td>
</tr>
<tr>
<td>D(X10(-2),2)</td>
<td>-0.110653</td>
<td>0.227605</td>
<td>-0.486163</td>
<td>0.6284</td>
</tr>
<tr>
<td>D(X10(-3),2)</td>
<td>-0.051768</td>
<td>0.165024</td>
<td>-0.313699</td>
<td>0.7547</td>
</tr>
<tr>
<td>D(X10(-4),2)</td>
<td>0.081059</td>
<td>0.106770</td>
<td>0.759191</td>
<td>0.4504</td>
</tr>
<tr>
<td>C</td>
<td>-0.045321</td>
<td>0.076969</td>
<td>-0.588817</td>
<td>0.5580</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.000982</td>
<td>0.001613</td>
<td>0.608641</td>
<td>0.5448</td>
</tr>
</tbody>
</table>

R-squared: 0.692685  Mean dependent var: 0.000721
Adjusted R-squared: 0.665164  S.D. dependent var: 0.505763
S.E. of regression: 0.391859  Akaike info criterion: -2.367671
Sum squared resid: 5.738538  Schwarz criterion: -2.149179
Log likelihood: -10.39761  F-statistic: 25.16953
Durbin-Watson stat: 2.035194  Prob(F-statistic): 0.000000
Augmented Dickey-Fuller Test Equation

**LS // Dependent Variable is D(X11,2)**

Date: 03/21/98  Time: 14:42

Sample(adjusted): 1977:3 1995:4

Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(X11(-1))</td>
<td>-1.489167</td>
<td>0.367370</td>
<td>-4.053592</td>
<td>0.0001</td>
</tr>
<tr>
<td>D(X11(-1),2)</td>
<td>0.249656</td>
<td>0.324722</td>
<td>0.768829</td>
<td>0.4447</td>
</tr>
<tr>
<td>D(X11(-2),2)</td>
<td>0.090334</td>
<td>0.258727</td>
<td>0.349146</td>
<td>0.7281</td>
</tr>
<tr>
<td>D(X11(-3),2)</td>
<td>-0.111154</td>
<td>0.192459</td>
<td>-0.577548</td>
<td>0.5655</td>
</tr>
<tr>
<td>D(X11(-4),2)</td>
<td>-0.011202</td>
<td>0.120624</td>
<td>-0.092871</td>
<td>0.9263</td>
</tr>
<tr>
<td>C</td>
<td>0.083896</td>
<td>0.069684</td>
<td>1.203951</td>
<td>0.2328</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-0.001607</td>
<td>0.001453</td>
<td>-1.106266</td>
<td>0.2726</td>
</tr>
</tbody>
</table>

R-squared 0.637507  Mean dependent var 0.002355
Adjusted R-squared 0.605045  S.D. dependent var 0.405953
S.E. of regression 0.255123  Akaike info criterion -2.642201
Sum squared resid 4.360883  Schwarz criterion -2.424249
Log likelihood -0.240003  F-statistic 19.63854
Durbin-Watson stat 2.010891

**Augmented Dickey-Fuller Test Statistic**

-4.593647  1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

**LS // Dependent Variable is D(X12,2)**

Date: 03/21/98  Time: 14:43

Sample(adjusted): 1977:3 1995:4

Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(X12(-1))</td>
<td>-1.611444</td>
<td>0.350798</td>
<td>-4.593647</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(X12(-1),2)</td>
<td>0.199639</td>
<td>0.308130</td>
<td>0.647904</td>
<td>0.5193</td>
</tr>
<tr>
<td>D(X12(-2),2)</td>
<td>-0.033231</td>
<td>0.262559</td>
<td>-0.126565</td>
<td>0.8997</td>
</tr>
<tr>
<td>D(X12(-3),2)</td>
<td>0.068309</td>
<td>0.190886</td>
<td>0.357849</td>
<td>0.7216</td>
</tr>
<tr>
<td>D(X12(-4),2)</td>
<td>0.100833</td>
<td>0.110694</td>
<td>0.910913</td>
<td>0.3656</td>
</tr>
<tr>
<td>C</td>
<td>-0.042612</td>
<td>0.075731</td>
<td>-0.562678</td>
<td>0.5755</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.001692</td>
<td>0.001600</td>
<td>1.057147</td>
<td>0.2942</td>
</tr>
</tbody>
</table>

R-squared 0.715660  Mean dependent var 0.007408
Adjusted R-squared 0.690197  S.D. dependent var 0.522264
S.E. of regression 0.290692  Akaike info criterion -2.381168
Sum squared resid 5.661607  Schwarz criterion -2.163216

*MacKinnon critical values for rejection of hypothesis of a unit root.
Log likelihood -9.898230  F-statistic 28.10562
Durbin-Watson stat 2.020604  Prob(F-statistic) 0.000000

ADF Test Statistic -4.849271
1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(X13,-2)
Date: 03/21/98 Time: 14:44
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

Variable Coefficient Std. Error t-Statistic Prob.
D(X13(-1)) -2.130443 0.439333 -4.849271 0.0000
D(X13(-1),2) 0.574353 0.385101 1.491437 0.1405
D(X13(-2),2) 0.084847 0.295081 0.287539 0.7746
D(X13(-3),2) -0.215259 0.195079 -1.103446 0.2746
D(X13(-4),2) -0.002356 0.108409 -0.021736 0.9827
C -0.015697 0.075902 -0.206811 0.8368
@TREND(1976:1) 0.001433 0.001589 0.902060 0.3703

R-squared 0.804975  Mean dependent var 0.001255
Adjusted R-squared 0.787510  S.D. dependent var 0.630029
S.E. of regression 0.290422  Akaike info criterion -2.383023
Sum squared resid 5.651115  Schwarz criterion -2.165071
Log likelihood -9.829596  F-statistic 46.09103
Durbin-Watson stat 2.012998  Prob(F-statistic) 0.000000

ADF Test Statistic -4.574008
1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(G1,2)
Date: 03/21/98 Time: 14:45
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

Variable Coefficient Std. Error t-Statistic Prob.
D(G1(-1)) -1.803570 0.394308 -4.574008 0.0000
D(G1(-1),2) 0.558351 0.346923 1.609435 0.1122
D(G1(-2),2) 0.205775 0.274841 0.748708 0.4567
D(G1(-3),2) -0.025482 0.198259 -0.128527 0.8981
D(G1(-4),2) 0.060879 0.125621 0.484619 0.6295
C 0.020248 0.034431 0.588081 0.5585
@TREND(1976:1) -8.77E-05 0.000714 -0.122811 0.9026

R-squared 0.645947  Mean dependent var -0.000241
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(G2(-1))</td>
<td>-2.906613</td>
<td>0.542887</td>
<td>-5.353994</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(G2(-1),2)</td>
<td>0.974366</td>
<td>0.485066</td>
<td>2.008731</td>
<td>0.0486</td>
</tr>
<tr>
<td>D(G2(-2),2)</td>
<td>0.336593</td>
<td>0.377565</td>
<td>0.891482</td>
<td>0.3759</td>
</tr>
<tr>
<td>D(G2(-3),2)</td>
<td>-0.020947</td>
<td>0.246839</td>
<td>-0.084861</td>
<td>0.9326</td>
</tr>
<tr>
<td>D(G2(-4),2)</td>
<td>0.025323</td>
<td>0.120099</td>
<td>0.210850</td>
<td>0.8336</td>
</tr>
<tr>
<td>C</td>
<td>0.011186</td>
<td>0.025485</td>
<td>0.438927</td>
<td>0.6621</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.000383</td>
<td>0.000524</td>
<td>0.731059</td>
<td>0.4673</td>
</tr>
</tbody>
</table>

Augmented Dickey-Fuller Test Equation

LS // Dependent Variable is D(G2,2)
Date: 03/21/98 Time: 14:46
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(G3(-1))</td>
<td>-3.383620</td>
<td>0.665362</td>
<td>-5.085378</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(G3(-1),2)</td>
<td>1.449399</td>
<td>0.580261</td>
<td>2.497839</td>
<td>0.0151</td>
</tr>
<tr>
<td>D(G3(-2),2)</td>
<td>0.670757</td>
<td>0.441350</td>
<td>1.519783</td>
<td>0.1336</td>
</tr>
<tr>
<td>D(G3(-3),2)</td>
<td>0.061877</td>
<td>0.283373</td>
<td>0.218358</td>
<td>0.8279</td>
</tr>
<tr>
<td>D(G3(-4),2)</td>
<td>-0.139921</td>
<td>0.129169</td>
<td>-1.083238</td>
<td>0.2828</td>
</tr>
<tr>
<td>C</td>
<td>-0.039496</td>
<td>0.052668</td>
<td>-0.749896</td>
<td>0.4561</td>
</tr>
</tbody>
</table>

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(G3,2)
Date: 03/21/98 Time: 14:47
Sample(adjusted): 1978:3 1995:4
Included observations: 70 after adjusting endpoints
Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(G4,2)
Date: 03/21/98 Time: 14:48
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(G4(-1))</td>
<td>-4.363774</td>
<td>0.702177</td>
<td>-6.214635</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(G4(-1),2)</td>
<td>2.290151</td>
<td>0.616400</td>
<td>3.715362</td>
<td>0.0040</td>
</tr>
<tr>
<td>D(G4(-2),2)</td>
<td>1.165256</td>
<td>0.456213</td>
<td>2.554193</td>
<td>0.0129</td>
</tr>
<tr>
<td>D(G4(-3),2)</td>
<td>0.253514</td>
<td>0.275133</td>
<td>0.921426</td>
<td>0.3601</td>
</tr>
<tr>
<td>D(G4(-4),2)</td>
<td>0.044382</td>
<td>0.122079</td>
<td>0.363549</td>
<td>0.7173</td>
</tr>
<tr>
<td>C</td>
<td>0.020532</td>
<td>0.037507</td>
<td>0.547402</td>
<td>0.5859</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.000803</td>
<td>0.000775</td>
<td>1.036455</td>
<td>0.3037</td>
</tr>
</tbody>
</table>

R-squared 0.878139 Mean dependent var 0.006806
Adjusted R-squared 0.867226 S.D. dependent var 0.389695
S.E. of regression 0.141998 Akaike info criterion -3.814074
Sum squared resid 1.350941 Schwarz criterion -3.596122
Log likelihood 43.11930 F-statistic 80.46780
Durbin-Watson stat 1.965928 Prob(F-statistic) 0.000000

ADF Test Statistic -4.938687 1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(G5,2)
Date: 03/21/98 Time: 14:49
Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(G5(-1))</td>
<td>-2.279843</td>
<td>0.461629</td>
<td>-4.938687</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(G5(-1),2)</td>
<td>0.846673</td>
<td>0.397996</td>
<td>2.127341</td>
<td>0.0371</td>
</tr>
<tr>
<td>D(G5(-2),2)</td>
<td>0.360161</td>
<td>0.309737</td>
<td>1.162642</td>
<td>0.2491</td>
</tr>
</tbody>
</table>

R-squared 0.887219 Mean dependent var 0.006129
Adjusted R-squared 0.877269 S.D. dependent var 0.389695
S.E. of regression 0.141998 Akaike info criterion -3.814074
Sum squared resid 1.350941 Schwarz criterion -3.596122
Log likelihood 43.11930 F-statistic 80.46780
Durbin-Watson stat 1.965928 Prob(F-statistic) 0.000000

ADF Test Statistic -4.938687 1% Critical Value* -4.0853
5% Critical Value -3.4704
10% Critical Value -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.
### Augmented Dickey-Fuller Test Equation

**LS // Dependent Variable is D(G6,2)**

- **Date:** 03/21/98  
- **Time:** 14:49
- **Sample(adjusted):** 1978:3 1995:4
- **Included observations:** 70 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(G6(-1))</td>
<td>-2.882728</td>
<td>0.524167</td>
<td>-5.499633</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(G6(-1),2)</td>
<td>1.196715</td>
<td>0.463369</td>
<td>2.582640</td>
<td>0.0121</td>
</tr>
<tr>
<td>D(G6(-2),2)</td>
<td>0.706213</td>
<td>0.359338</td>
<td>1.965319</td>
<td>0.0538</td>
</tr>
<tr>
<td>D(G6(-3),2)</td>
<td>0.264631</td>
<td>0.246623</td>
<td>1.073018</td>
<td>0.2874</td>
</tr>
<tr>
<td>D(G6(-4),2)</td>
<td>0.189542</td>
<td>0.126922</td>
<td>1.493366</td>
<td>0.1403</td>
</tr>
<tr>
<td>C</td>
<td>0.020698</td>
<td>0.079982</td>
<td>0.258786</td>
<td>0.7966</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.000305</td>
<td>0.001630</td>
<td>0.186939</td>
<td>0.8523</td>
</tr>
</tbody>
</table>

- **R-squared:** 0.807154  
- **Mean dependent var:** -0.001863
- **Adjusted R-squared:** 0.788788  
- **S.D. dependent var:** 0.302533
- **S.E. of regression:** 0.174211  
- **Akaike info criterion:** -2.484997
- **Sum squared resid:** 4.775499  
- **Schwarz criterion:** -2.260147
- **Log likelihood:** -5.350810  
- **F-statistic:** 43.94754
- **Durbin-Watson stat:** 1.994395  
- **Prob(F-statistic):** 0.000000

- **ADF Test Statistic:** -4.355510  
  - **1% Critical Value:** -4.0853
  - **5% Critical Value:** -3.4704
  - **10% Critical Value:** -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.

---

### Augmented Dickey-Fuller Test Equation

**LS // Dependent Variable is D(G7,2)**

- **Date:** 03/21/98  
- **Time:** 14:50
- **Sample(adjusted):** 1977:3 1995:4
- **Included observations:** 74 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(G7(-1))</td>
<td>-2.882728</td>
<td>0.524167</td>
<td>-5.499633</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(G7(-1),2)</td>
<td>1.196715</td>
<td>0.463369</td>
<td>2.582640</td>
<td>0.0121</td>
</tr>
<tr>
<td>D(G7(-2),2)</td>
<td>0.706213</td>
<td>0.359338</td>
<td>1.965319</td>
<td>0.0538</td>
</tr>
<tr>
<td>D(G7(-3),2)</td>
<td>0.264631</td>
<td>0.246623</td>
<td>1.073018</td>
<td>0.2874</td>
</tr>
<tr>
<td>D(G7(-4),2)</td>
<td>0.189542</td>
<td>0.126922</td>
<td>1.493366</td>
<td>0.1403</td>
</tr>
<tr>
<td>C</td>
<td>0.020698</td>
<td>0.079982</td>
<td>0.258786</td>
<td>0.7966</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.000305</td>
<td>0.001630</td>
<td>0.186939</td>
<td>0.8523</td>
</tr>
</tbody>
</table>

- **R-squared:** 0.807154  
- **Mean dependent var:** -0.001863
- **Adjusted R-squared:** 0.788788  
- **S.D. dependent var:** 0.302533
- **S.E. of regression:** 0.174211  
- **Akaike info criterion:** -2.484997
- **Sum squared resid:** 4.775499  
- **Schwarz criterion:** -2.260147
- **Log likelihood:** -5.350810  
- **F-statistic:** 43.94754
- **Durbin-Watson stat:** 1.994395  
- **Prob(F-statistic):** 0.000000

- **ADF Test Statistic:** -4.355510  
  - **1% Critical Value:** -4.0853
  - **5% Critical Value:** -3.4704
  - **10% Critical Value:** -3.1620

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(G8,3)
Date: 03/21/98 Time: 14:51
Included observations: 37 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(G8(-1),2)</td>
<td>-5.805078</td>
<td>1.078878</td>
<td>-5.380663</td>
<td>0.0000</td>
</tr>
<tr>
<td>D(G8(-1),3)</td>
<td>3.420170</td>
<td>0.955478</td>
<td>3.579537</td>
<td>0.0012</td>
</tr>
<tr>
<td>D(G8(-2),3)</td>
<td>1.951326</td>
<td>0.725026</td>
<td>2.691389</td>
<td>0.0115</td>
</tr>
<tr>
<td>D(G8(-3),3)</td>
<td>0.905797</td>
<td>0.426088</td>
<td>2.125843</td>
<td>0.0419</td>
</tr>
<tr>
<td>D(G8(-4),3)</td>
<td>0.253292</td>
<td>0.173458</td>
<td>1.460251</td>
<td>0.1546</td>
</tr>
<tr>
<td>C</td>
<td>0.014380</td>
<td>0.133109</td>
<td>0.108034</td>
<td>0.9147</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>-0.000164</td>
<td>0.002149</td>
<td>-0.076358</td>
<td>0.9396</td>
</tr>
</tbody>
</table>

R-squared 0.751075  Mean dependent var 0.000554
Adjusted R-squared 0.728783  S.D. dependent var 0.239588
S.E. of regression 0.124274  Akaike info criterion -4.072687
Sum squared resid 1.043091  Schwarz criterion -3.854735
Log likelihood 52.68798  F-statistic 33.69294
Durbin-Watson stat 1.942599  Prob(F-statistic) 0.000000

ADF Test Statistic -5.380663  1% Critical Value* -4.2242
5% Critical Value -3.5348
10% Critical Value -3.1988

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
LS // Dependent Variable is D(J1,3)
Date: 03/21/98 Time: 14:52
Included observations: 37 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(J1(-1),2)</td>
<td>0.528452</td>
<td>0.436852</td>
<td>1.209682</td>
<td>0.2307</td>
</tr>
<tr>
<td>D(J1(-2),2)</td>
<td>0.050571</td>
<td>0.346219</td>
<td>0.146068</td>
<td>0.8843</td>
</tr>
<tr>
<td>D(J1(-3),2)</td>
<td>-0.137734</td>
<td>0.238126</td>
<td>-0.578408</td>
<td>0.5649</td>
</tr>
<tr>
<td>D(J1(-4),2)</td>
<td>-0.058098</td>
<td>0.130324</td>
<td>-0.445793</td>
<td>0.6572</td>
</tr>
<tr>
<td>C</td>
<td>0.000788</td>
<td>0.032587</td>
<td>0.024168</td>
<td>0.9808</td>
</tr>
<tr>
<td>@TREND(1976:1)</td>
<td>0.000678</td>
<td>0.000683</td>
<td>0.992906</td>
<td>0.3243</td>
</tr>
</tbody>
</table>

R-squared 0.751075  Mean dependent var 0.000554
Adjusted R-squared 0.728783  S.D. dependent var 0.239588
S.E. of regression 0.124274  Akaike info criterion -4.072687
Sum squared resid 1.043091  Schwarz criterion -3.854735
Log likelihood 52.68798  F-statistic 33.69294
Durbin-Watson stat 1.942599  Prob(F-statistic) 0.000000

ADF Test Statistic -4.918318  1% Critical Value* -4.2242
5% Critical Value -3.5348
10% Critical Value -3.1988

*MacKinnon critical values for rejection of hypothesis of a unit root.
### Augmented Dickey-Fuller Test Equation

**Dependent Variable is** \( D(J_2,2) \)

**Date:** 03/21/98  **Time:** 14:53  
**Sample (adjusted):** 1986:3 1995:4  
**Included observations: 38 after adjusting endpoints**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( D(J_2(-1)) )</td>
<td>-5.984550</td>
<td>1.075912</td>
<td>-5.562305</td>
<td>0.0000</td>
</tr>
<tr>
<td>( D(J_2(-1),2) )</td>
<td>3.677857</td>
<td>0.940115</td>
<td>3.912136</td>
<td>0.0005</td>
</tr>
<tr>
<td>( D(J_2(-2),2) )</td>
<td>2.100351</td>
<td>0.684973</td>
<td>3.066326</td>
<td>0.0045</td>
</tr>
<tr>
<td>( D(J_2(-3),2) )</td>
<td>0.772210</td>
<td>0.399787</td>
<td>1.931551</td>
<td>0.0626</td>
</tr>
<tr>
<td>( D(J_2(-4),2) )</td>
<td>0.186929</td>
<td>0.166032</td>
<td>1.125862</td>
<td>0.2689</td>
</tr>
<tr>
<td>( C )</td>
<td>0.058916</td>
<td>0.729672</td>
<td>0.080744</td>
<td>0.9362</td>
</tr>
<tr>
<td>( @TREND(1976:1) )</td>
<td>-0.002571</td>
<td>0.011856</td>
<td>-0.216855</td>
<td>0.8297</td>
</tr>
</tbody>
</table>

**R-squared** 0.932470  
**Mean dependent var** -0.037378  
**Adjusted R-squared** 0.919400  
**S.D. dependent var** 2.808668  
**Akaike info criterion** -0.797384  
**S.E. of regression** 2.016801  
**Schwarz criterion** 0.197104  
**Log likelihood** -41.44736  
**F-statistic** 71.34300  
**Prob(F-statistic)** 0.000000  
**Durbin-Watson stat** 2.054535  

---

### Augmented Dickey-Fuller Test Equation

**Dependent Variable is** \( D(J_1(-1),2) \)

**Date:** 03/21/98  **Time:** 14:53  
**Sample (adjusted):** 1986:3 1995:4  
**Included observations: 38 after adjusting endpoints**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( D(J_1(-1),2) )</td>
<td>-6.004347</td>
<td>1.220813</td>
<td>-4.918318</td>
<td>0.0000</td>
</tr>
<tr>
<td>( D(J_1(-1),3) )</td>
<td>3.520064</td>
<td>1.085045</td>
<td>3.244165</td>
<td>0.0029</td>
</tr>
<tr>
<td>( D(J_1(-2),3) )</td>
<td>1.908280</td>
<td>0.812371</td>
<td>2.349025</td>
<td>0.0256</td>
</tr>
<tr>
<td>( D(J_1(-3),3) )</td>
<td>0.723261</td>
<td>0.470568</td>
<td>1.536996</td>
<td>0.1348</td>
</tr>
<tr>
<td>( D(J_1(-4),3) )</td>
<td>0.138197</td>
<td>0.181037</td>
<td>0.763364</td>
<td>0.4512</td>
</tr>
<tr>
<td>( C )</td>
<td>-0.060208</td>
<td>0.623129</td>
<td>-0.096622</td>
<td>0.9237</td>
</tr>
<tr>
<td>( @TREND(1976:1) )</td>
<td>0.001112</td>
<td>0.010062</td>
<td>0.110526</td>
<td>0.9127</td>
</tr>
</tbody>
</table>

**R-squared** 0.916372  
**Mean dependent var** 0.013541  
**Adjusted R-squared** 0.899647  
**S.D. dependent var** 2.062690  
**Akaike info criterion** -0.653431  
**S.E. of regression** 0.763364  
**Schwarz criterion** 0.812371  
**Log likelihood** -32.87673  
**F-statistic** 54.78873  
**Prob(F-statistic)** 0.000000  
**Durbin-Watson stat** 2.092296  

---

*MacKinnon critical values for rejection of hypothesis of a unit root.*
### 3. JOHANSEN COINTEGRATION TESTS

#### 3.1 AUSTRIA INBOUNDS

1. Denmark to Austria

Date: 03/22/98  Time: 14:47
Sample: 1976:1 1995:4
Included observations: 75

Test assumption: Linear deterministic trend in the data
Series: Z1 IN2 CL1 EX1 FF1
Lags interval: 1 to 4

<table>
<thead>
<tr>
<th>Eigenvalue Ratio</th>
<th>Likelihood 5 Percent</th>
<th>1 Percent</th>
<th>Hypothesized</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.422936 80.45140</td>
<td>68.52 76.07</td>
<td>None **</td>
<td></td>
</tr>
<tr>
<td>0.236861 39.21625</td>
<td>47.21 54.46</td>
<td>At most 1</td>
<td></td>
</tr>
<tr>
<td>0.155697 18.94263</td>
<td>29.68 35.65</td>
<td>At most 2</td>
<td></td>
</tr>
<tr>
<td>0.076198 6.249375</td>
<td>15.41 20.04</td>
<td>At most 3</td>
<td></td>
</tr>
<tr>
<td>0.004060 0.305093</td>
<td>3.76 6.65</td>
<td>At most 4</td>
<td></td>
</tr>
</tbody>
</table>

**(** denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 1 cointegrating equation(s) at 5% significance level

**Unnormalized Cointegrating Coefficients:**

<table>
<thead>
<tr>
<th>Z1</th>
<th>IN2</th>
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**Normalized Cointegrating Coefficients:**

1 Cointegrating Equation(s)

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Log likelihood 955.0439

2 Cointegrating Equation(s)

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Log likelihood 965.1807

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Log likelihood 971.5274
Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 974.4995

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Jaque-Bera 5.485287 5.810174 2.525812 11.31776 5.295503
Probability 0.064400 0.054744 0.282831 0.003486 0.070810

Observations 80 80 80 80 80

Series: Z2 IN3 CL2 EX2 FF2
Lags interval: 1 to 4

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<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
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**(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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<tr>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood 967.8029
Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 981.6629

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 989.5961

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 992.7569

3. UK to France
Date: 03/22/98  Time: 17:11
Sample: 1976:1 1995:4
Included observations: 75

Test assumption: Linear deterministic trend in the data
Series: Z3 IN2 CL3 EX3 FF3
Lags interval: 1 to 4

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<th>Eigenvalue</th>
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<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
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*(**) denotes rejection of the hypothesis at 5%/1% significance level

L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood 1115.252

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 1125.230

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 1130.541

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 1134.040

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4. Canada to Austria  
Date: 03/22/98  
Time: 17:13  
Sample: 1976:1 1995:4  
Included observations: 75  
Test assumption: Linear deterministic trend in the data  
Series: Z4 IN15 CL4 EX4 FF4  
Lags interval: 1 to 4

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<th>1 Percent Critical Value</th>
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*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 5 cointegrating equation(s) at 5% significance level

#### Unnormalized Cointegrating Coefficients:

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#### Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood 1077.189

#### Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 1089.329

#### Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 1097.634
Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 1104.028

Mean -6.205503 4.289555
Median -6.201164 4.283758
Maximum -5.782620 4.462710
Minimum -6.795850 4.158042
Skewness -0.204450 0.429734
Kurtosis 2.034879 1.906511
Jarque-Bera 3.662192 6.448007
Probability 0.160238 0.039795
Observations 80 80 80 80 80

Specification error was found. We tried again with lower lag values.

Date: 03/24/98 Time: 09:15
Sample: 1976:1 1995:4
Included observations: 78
Test assumption: Linear deterministic trend in the data
Series: Z4 IN 15 CL4 EX4 FF4
Lags interval: 1 to 1

L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood 1043.070
Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood: 1055.489

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood: 1067.134

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood: 1068.919

5. Netherlands to Austria

Date: 03/22/98 Time: 17:17

Sample: 1976:1 1995:4

Included observations: 75

Test assumption: Linear deterministic trend in the data

Series: Z5 IN9 CL5 EX5 FF5

Lags interval: 1 to 4

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<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
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<tr>
<td>0.594713</td>
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<td>76.07</td>
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<td>54.46</td>
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</tr>
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<td>At most 2</td>
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*(***) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood 1076.503

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 1089.723

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 1098.971

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 1101.782

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Maximum -3.097589 6.140285 0.814462 -1.818121 0.349681
Minimum -4.435246 4.078229 -1.119761 -1.922438 0.072686
Std. Dev. 0.248497 0.576771 0.542387 0.028808 0.076790
Skewness -1.381512 0.008055 0.052127 -1.222372 0.367236
Kurtosis 5.606216 1.779490 1.772961 3.048189 1.986864
Jarque-Bera 48.08890 4.966351 5.054891 19.93032 5.219643
Probability 0.000000 0.083478 0.079859 0.000047 0.073548

Observations 80 80 80 80 80

6. USA to Austria
Date: 03/22/98 Time: 17:19
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: Z6 IN20 CL6 EX6 FF6
<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.406901</td>
<td>105.0929</td>
<td>68.52</td>
<td>76.07</td>
<td>None **</td>
</tr>
<tr>
<td>0.333932</td>
<td>65.91328</td>
<td>47.21</td>
<td>54.46</td>
<td>At most 1 **</td>
</tr>
<tr>
<td>0.246702</td>
<td>35.43606</td>
<td>29.68</td>
<td>35.65</td>
<td>At most 2 *</td>
</tr>
<tr>
<td>0.146413</td>
<td>14.18899</td>
<td>15.41</td>
<td>20.04</td>
<td>At most 3</td>
</tr>
<tr>
<td>0.030407</td>
<td>2.315914</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 4</td>
</tr>
</tbody>
</table>

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 3 cointegrating equation(s) at 5% significance level

**Unnormalized Cointegrating Coefficients:**

\[
\begin{align*}
\text{Z6} & \quad \text{IN20} & \quad \text{CL6} & \quad \text{EX6} & \quad \text{FF6} \\
1.190823 & -2.325875 & -2.792421 & -0.391520 & 32.57804 \\
0.556113 & 3.501521 & 1.124229 & -1.299557 & 11.70980 \\
0.184218 & -2.630203 & 4.041867 & 2.385207 & -20.63914 \\
0.025420 & 0.966528 & 2.176964 & 1.413679 & -21.17668 \\
0.165055 & -2.245412 & 1.741889 & 1.607591 & -24.14834 \\
\end{align*}
\]

**Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)**

\[
\begin{align*}
\text{Z6} & \quad \text{IN20} & \quad \text{CL6} & \quad \text{EX6} & \quad \text{FF6} & \quad \text{C} \\
1.000000 & -1.953167 & -2.344952 & -0.328781 & 27.35760 & 6.552296 \\
\quad & (0.65110) & (0.69699) & (0.40576) & (5.19829) & \\
\end{align*}
\]

Log likelihood 1234.605

**Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)**

\[
\begin{align*}
\text{Z6} & \quad \text{IN20} & \quad \text{CL6} & \quad \text{EX6} & \quad \text{FF6} & \quad \text{C} \\
1.000000 & 0.000000 & -1.311134 & -0.804212 & 25.86576 & -2.810854 \\
\quad & (0.75907) & (0.31594) & (5.19099) & \\
0.000000 & 1.000000 & 0.529304 & -0.243416 & -0.76306 & -4.793830 \\
\quad & (0.25676) & (0.10687) & (1.75586) & \\
\end{align*}
\]

Log likelihood 1249.843

**Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)**

\[
\begin{align*}
\text{Z6} & \quad \text{IN20} & \quad \text{CL6} & \quad \text{EX6} & \quad \text{FF6} & \quad \text{C} \\
1.000000 & 0.000000 & 0.000000 & -0.366875 & 19.53298 & -0.239447 \\
\quad & (0.13999) & (2.48347) & \\
0.000000 & 1.000000 & 0.000000 & -0.419968 & 1.792729 & -5.831905 \\
\quad & (0.03890) & (0.69003) & \\
0.000000 & 0.000000 & 1.000000 & 0.333556 & -4.829998 & 1.961208 \\
\quad & (0.04387) & (0.77816) & \\
\end{align*}
\]

Log likelihood 1260.467

**Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)**

\[
\begin{align*}
\text{Z6} & \quad \text{IN20} & \quad \text{CL6} & \quad \text{EX6} & \quad \text{FF6} & \quad \text{C} \\
1.000000 & 0.000000 & 0.000000 & 0.000000 & 15.24409 & 1.462256 \\
\quad & (1.93568) & (2.48347) & \\
0.000000 & 1.000000 & 0.000000 & 0.000000 & -3.116842 & -3.883936 \\
\quad & (1.51359) & (1.51359) & \\
0.000000 & 0.000000 & 1.000000 & 0.000000 & -0.930609 & 0.414049 \\
\quad & (1.41331) & (1.41331) & \\
0.000000 & 0.000000 & 0.000000 & 1.000000 & -11.69034 & 4.638372 \\
\quad & (1.41331) & (1.41331) & \\
\end{align*}
\]
Log likelihood 1266.403

<table>
<thead>
<tr>
<th></th>
<th>Z6</th>
<th>IN20</th>
<th>CL6</th>
<th>EX6</th>
<th>FF6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>-0.4191202</td>
<td>4.416806</td>
<td>-0.242652</td>
<td>-2.637277</td>
<td>0.172562</td>
</tr>
<tr>
<td>Median</td>
<td>-4.114552</td>
<td>4.414366</td>
<td>-0.265689</td>
<td>-2.602662</td>
<td>0.174310</td>
</tr>
<tr>
<td>Maximum</td>
<td>-3.502582</td>
<td>4.572115</td>
<td>0.004984</td>
<td>-2.275214</td>
<td>0.195611</td>
</tr>
<tr>
<td>Minimum</td>
<td>-4.591491</td>
<td>4.286090</td>
<td>-0.359042</td>
<td>-3.095577</td>
<td>0.144091</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.259691</td>
<td>0.080608</td>
<td>0.104682</td>
<td>0.212879</td>
<td>0.012192</td>
</tr>
<tr>
<td>Skewness</td>
<td>0.353432</td>
<td>0.219007</td>
<td>1.034836</td>
<td>-0.299216</td>
<td>-0.481568</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>2.417588</td>
<td>1.966127</td>
<td>2.899209</td>
<td>2.103850</td>
<td>2.484059</td>
</tr>
</tbody>
</table>


Probability 0.247066 0.122303 0.000780 0.144374 0.136735

Observations 80 80 80 80 80

7. Turkey to Austria
Date: 03/22/98 Time: 17:21
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: Z7 IN12 CL7 EX7 FF7
Lags interval: 1 to 4

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.356912</td>
<td>79.65399</td>
<td>68.52</td>
<td>76.07</td>
<td>None **</td>
</tr>
<tr>
<td>0.242650</td>
<td>46.54341</td>
<td>47.21</td>
<td>54.46</td>
<td>At most 1</td>
</tr>
<tr>
<td>0.181847</td>
<td>25.69872</td>
<td>29.68</td>
<td>35.65</td>
<td>At most 2</td>
</tr>
<tr>
<td>0.114297</td>
<td>10.64581</td>
<td>15.41</td>
<td>20.04</td>
<td>At most 3</td>
</tr>
<tr>
<td>0.020361</td>
<td>1.542801</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 4</td>
</tr>
</tbody>
</table>

**(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>Z7</th>
<th>IN12</th>
<th>CL7</th>
<th>EX7</th>
<th>FF7</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.115805</td>
<td>0.856483</td>
<td>-0.890485</td>
<td>-0.620340</td>
<td>5.865037</td>
</tr>
<tr>
<td>-0.465309</td>
<td>0.846552</td>
<td>-0.081448</td>
<td>0.456284</td>
<td>4.759426</td>
</tr>
<tr>
<td>-0.094615</td>
<td>-0.036228</td>
<td>-0.283147</td>
<td>-0.855171</td>
<td>-0.902567</td>
</tr>
<tr>
<td>-0.118757</td>
<td>0.737661</td>
<td>-0.919086</td>
<td>-1.227251</td>
<td>-3.961118</td>
</tr>
<tr>
<td>-0.345624</td>
<td>-0.456123</td>
<td>0.184831</td>
<td>0.285363</td>
<td>9.673505</td>
</tr>
</tbody>
</table>

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>Z7</th>
<th>IN12</th>
<th>CL7</th>
<th>EX7</th>
<th>FF7</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>7.395903</td>
<td>-7.689512</td>
<td>-5.356757</td>
<td>50.67165</td>
<td>-37.11744</td>
</tr>
</tbody>
</table>

Log likelihood 869.1106

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>Z7</th>
<th>IN12</th>
<th>CL7</th>
<th>EX7</th>
<th>FF7</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>-1.377634</td>
<td>-1.844574</td>
<td>18.21309</td>
<td>1.877517</td>
</tr>
<tr>
<td>0.000000</td>
<td>1.000000</td>
<td>-0.853429</td>
<td>-0.474882</td>
<td>4.388722</td>
<td>-5.272508</td>
</tr>
</tbody>
</table>

Log likelihood 879.5329
Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>Z7</th>
<th>IN12</th>
<th>CL7</th>
<th>EXT</th>
<th>FF7</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>1.400732</td>
<td>40.35725</td>
<td>4.873405</td>
</tr>
<tr>
<td>0.000000</td>
<td>1.000000</td>
<td>0.000000</td>
<td>1.535550</td>
<td>18.10679</td>
<td>-3.416588</td>
</tr>
<tr>
<td>0.000000</td>
<td>0.000000</td>
<td>1.000000</td>
<td>2.355710</td>
<td>16.07406</td>
<td>2.174662</td>
</tr>
</tbody>
</table>

Log likelihood 887.0594

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>Z7</th>
<th>IN12</th>
<th>CL7</th>
<th>EXT</th>
<th>FF7</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>150.7817</td>
<td>19.07438</td>
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<tr>
<td>0.000000</td>
<td>1.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>139.1594</td>
<td>12.15121</td>
</tr>
<tr>
<td>0.000000</td>
<td>0.000000</td>
<td>1.000000</td>
<td>0.000000</td>
<td>201.7828</td>
<td>26.05746</td>
</tr>
<tr>
<td>0.000000</td>
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<td>0.000000</td>
<td>1.000000</td>
<td>-78.83343</td>
<td>-10.13826</td>
</tr>
</tbody>
</table>

Log likelihood 891.6109

3.2 MALTA INBOUNDS

8. Austria to Malta
Date: 03/22/98 Time: 17:23
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: W1 IN 14 CL8 EX8 FF8
Lags interval: 1 to 4

Eigenvalue Likelihood 5 Percent 1 Percent Hypothesized
Ratio Ratio Critical Value Critical Value No. of CE(s)

0.192885 46.38104 68.52 76.07 None
0.162571 30.30938 47.21 54.46 At most 1
0.123194 17.00298 29.68 35.65 At most 2
0.077622 7.142779 15.41 20.04 At most 3
0.014333 1.082775 3.76 6.65 At most 4

(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. rejects any cointegration at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>W1</th>
<th>IN14</th>
<th>CL8</th>
<th>EX8</th>
<th>FF8</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.334651</td>
<td>1.162497</td>
<td>-2.469340</td>
<td>-1.414985</td>
<td>9.874400</td>
</tr>
<tr>
<td>-0.148303</td>
<td>1.244483</td>
<td>-1.851261</td>
<td>0.314785</td>
<td>-3.400543</td>
</tr>
<tr>
<td>0.511990</td>
<td>-2.015219</td>
<td>-2.917059</td>
<td>-3.328396</td>
<td>12.49053</td>
</tr>
<tr>
<td>0.115830</td>
<td>-0.653150</td>
<td>-0.392427</td>
<td>-0.653536</td>
<td>-5.384340</td>
</tr>
<tr>
<td>-0.088900</td>
<td>1.450383</td>
<td>0.187676</td>
<td>1.141296</td>
<td>0.165452</td>
</tr>
</tbody>
</table>

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>W1</th>
<th>IN14</th>
<th>CL8</th>
<th>EX8</th>
<th>FF8</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>-3.473754</td>
<td>7.378843</td>
<td>4.228237</td>
<td>-29.50653</td>
<td>43.57935</td>
</tr>
</tbody>
</table>

Log likelihood 958.7845
Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

\[
\begin{array}{cccccc}
W1 & IN14 & CL8 & EX8 & FF8 & C \\
1.000000 & 0.000000 & 3.773431 & 8.714279 & -66.54604 & 24.80601 \\
0.000000 & 1.000000 & -1.037901 & 1.291410 & -10.66267 & -5.404338 \\
\end{array}
\]

Log likelihood 965.4377

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

\[
\begin{array}{cccccc}
W1 & IN14 & CL8 & EX8 & FF8 & C \\
1.000000 & 0.000000 & 0.000000 & 0.000000 & 0.000000 & 14.85197 \\
0.000000 & 1.000000 & 0.000000 & 0.000000 & 0.000000 & -2.666431 \\
0.000000 & 0.000000 & 1.000000 & 0.747418 & 0.009200 & 2.637928 \\
\end{array}
\]

Log likelihood 970.3678

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

\[
\begin{array}{cccccc}
W1 & IN14 & CL8 & EX8 & FF8 & C \\
1.000000 & 0.000000 & 0.000000 & 0.000000 & 140.5780 & -44.98274 \\
0.000000 & 1.000000 & 0.000000 & 0.000000 & 53.45032 & -23.65197 \\
0.000000 & 0.000000 & 1.000000 & 0.000000 & 20.92433 & -4.949779 \\
0.000000 & 0.000000 & 0.000000 & 1.000000 & -32.82894 & 10.15189 \\
\end{array}
\]

Log likelihood 973.3978

\[
\begin{array}{cccccc}
\text{Mean} & -5.581966 & 4.426868 & -2.582430 & 1.659759 & 0.359753 \\
\text{Median} & -5.765584 & 4.456766 & -2.544094 & 1.582500 & 0.363524 \\
\text{Maximum} & -3.696491 & 4.994993 & -2.252832 & 2.385918 & 0.404124 \\
\text{Minimum} & -7.431770 & 3.811808 & -3.018224 & 1.098289 & 0.317731 \\
\text{Std. Dev.} & 0.764238 & 0.325199 & 0.193063 & 0.324706 & 0.020349 \\
\text{Skewness} & 0.198967 & 0.029289 & -0.556442 & 0.397361 & -0.486561 \\
\text{Kurtosis} & 2.739767 & 1.762336 & 2.490755 & 2.147467 & 2.461985 \\
\text{Jarque-Bera} & 0.753573 & 5.117481 & 4.992809 & 4.527980 & 4.121423 \\
\text{Probability} & 0.686063 & 0.077402 & 0.082381 & 0.103935 & 0.127363 \\
\text{Observations} & 80 & 80 & 80 & 80 & 80 \\
\end{array}
\]

9. Denmark to Malta

Date: 03/22/98 Time: 17:25
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: W2 IN2 CL9 EX9 FF9
Lags interval: 1 to 4

\[
\begin{array}{cccccc}
\text{Eigenvalue} & \text{Likelihood} & 5 \text{ Percent} & 1 \text{ Percent} & \text{Hypothesized} \\
\text{Ratio} & \text{Critical Value} & \text{Critical Value} & \text{No. of CE(s)} \\
0.307190 & 77.24855 & 68.52 & 76.07 & \text{None **} \\
0.261975 & 49.72358 & 47.21 & 54.46 & \text{At most 1 *} \\
0.163516 & 26.94024 & 29.68 & 35.65 & \text{At most 2} \\
0.115073 & 13.54897 & 15.41 & 20.04 & \text{At most 3} \\
0.056730 & 4.380209 & 3.76 & 6.65 & \text{At most 4 *} \\
\end{array}
\]
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th></th>
<th>W2</th>
<th>IN2</th>
<th>CL9</th>
<th>EX9</th>
<th>FF9</th>
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</thead>
<tbody>
<tr>
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<td>-0.629476</td>
<td>-1.445419</td>
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<tr>
<td></td>
<td>-0.380874</td>
<td>0.069617</td>
<td>5.128297</td>
<td>4.375900</td>
<td>-18.32891</td>
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<tr>
<td></td>
<td>-0.108247</td>
<td>-0.042302</td>
<td>-2.158723</td>
<td>-1.297597</td>
<td>6.675969</td>
</tr>
<tr>
<td></td>
<td>-0.005493</td>
<td>1.638874</td>
<td>0.606018</td>
<td>1.273019</td>
<td>-0.989644</td>
</tr>
<tr>
<td></td>
<td>-0.322422</td>
<td>-1.146873</td>
<td>-0.452961</td>
<td>-1.111544</td>
<td>-0.088838</td>
</tr>
</tbody>
</table>

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th></th>
<th>W2</th>
<th>IN2</th>
<th>CL9</th>
<th>EX9</th>
<th>FF9</th>
<th>C</th>
</tr>
</thead>
</table>

Log likelihood 886.7415

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th></th>
<th>W2</th>
<th>IN2</th>
<th>CL9</th>
<th>EX9</th>
<th>FF9</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.000000</td>
<td>0.000000</td>
<td>-13.58505</td>
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</tr>
<tr>
<td></td>
<td>0.000000</td>
<td>1.000000</td>
<td>-0.659352</td>
<td>0.214371</td>
<td>-0.050382</td>
<td>-5.954773</td>
</tr>
</tbody>
</table>

Log likelihood 898.1332

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th></th>
<th>W2</th>
<th>IN2</th>
<th>CL9</th>
<th>EX9</th>
<th>FF9</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.000000</td>
<td>0.000000</td>
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Log likelihood 904.8288

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

<table>
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<tr>
<th></th>
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<th>CL9</th>
<th>EX9</th>
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Log likelihood 909.4132

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<th>FF9</th>
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<tr>
<td>Mean</td>
<td>-4.770726</td>
<td>4.297727</td>
<td>-2.219948</td>
<td>0.943263</td>
<td>0.327531</td>
</tr>
<tr>
<td>Median</td>
<td>-4.548055</td>
<td>4.386585</td>
<td>-2.288609</td>
<td>0.898849</td>
<td>0.320275</td>
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<tr>
<td>Maximum</td>
<td>-4.219759</td>
<td>4.705138</td>
<td>-1.768931</td>
<td>1.715143</td>
<td>0.473514</td>
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<tr>
<td>Minimum</td>
<td>-6.910392</td>
<td>3.758088</td>
<td>-2.745776</td>
<td>0.504024</td>
<td>0.242150</td>
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<tr>
<td>Std. Dev.</td>
<td>0.614159</td>
<td>0.236119</td>
<td>0.266830</td>
<td>0.299352</td>
<td>0.063576</td>
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<tr>
<td>Skewness</td>
<td>-1.843432</td>
<td>-0.608858</td>
<td>0.171751</td>
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<td>0.490231</td>
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Kurtosis  
Jarque-Bera Probability  
Observations 80

<table>
<thead>
<tr>
<th>Test</th>
<th>Kurtosis</th>
<th>Jarque-Bera</th>
<th>Probability</th>
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<td>5.316225</td>
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<td></td>
<td>2.489880</td>
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<td>2.139772</td>
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<td>0.239314</td>
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<td></td>
<td>3.021690</td>
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<td>2.375453</td>
<td>4.504542</td>
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<table>
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<tr>
<th>10. Germany to Malta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date: 03/22/98 Time: 17:28</td>
</tr>
<tr>
<td>Sample: 1976:1 1995:4</td>
</tr>
<tr>
<td>Included observations: 75</td>
</tr>
<tr>
<td>Test assumption: Linear deterministic trend in the data</td>
</tr>
<tr>
<td>Series: W3 IN4 CL10 EX10 FF10</td>
</tr>
<tr>
<td>Lags interval: 1 to 4</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.448624</td>
<td>75.59059</td>
<td>68.52</td>
<td>76.07</td>
<td>None *</td>
</tr>
<tr>
<td>0.212375</td>
<td>30.94023</td>
<td>47.21</td>
<td>54.46</td>
<td>At most 1</td>
</tr>
<tr>
<td>0.102586</td>
<td>13.03526</td>
<td>29.68</td>
<td>35.65</td>
<td>At most 2</td>
</tr>
<tr>
<td>0.050956</td>
<td>4.917431</td>
<td>15.41</td>
<td>20.04</td>
<td>At most 3</td>
</tr>
<tr>
<td>0.013178</td>
<td>0.994919</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 4</td>
</tr>
</tbody>
</table>

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>W3</th>
<th>IN4</th>
<th>CL10</th>
<th>EX10</th>
<th>FF10</th>
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</thead>
<tbody>
<tr>
<td>-0.605877</td>
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<td>-0.272403</td>
<td>0.691809</td>
<td>1.251005</td>
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<td>-0.181946</td>
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<tr>
<td>-0.051037</td>
<td>-0.583446</td>
<td>-2.385355</td>
<td>-2.153390</td>
<td>7.791428</td>
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<tr>
<td>-0.022511</td>
<td>1.125971</td>
<td>-1.472579</td>
<td>-0.191051</td>
<td>-2.724438</td>
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<tr>
<td>0.032565</td>
<td>0.126029</td>
<td>0.094982</td>
<td>-0.048442</td>
<td>5.697230</td>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
<thead>
<tr>
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<th>IN4</th>
<th>CL10</th>
<th>EX10</th>
<th>FF10</th>
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</thead>
<tbody>
<tr>
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<td>-3.517979</td>
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<tr>
<td>(0.51922)</td>
<td>(0.67308)</td>
<td>(0.56492)</td>
<td>(2.12210)</td>
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Log likelihood 938.5600

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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<th>CL10</th>
<th>EX10</th>
<th>FF10</th>
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</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>-6.734686</td>
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<td>2.143332</td>
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<tr>
<td>(3.67141)</td>
<td>(2.30691)</td>
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<tr>
<td>0.000000</td>
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<td>(0.38828)</td>
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Log likelihood 947.5125

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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<tbody>
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<td>(0.54301)</td>
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<tr>
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<td>0.000000</td>
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<tr>
<td>(0.06029)</td>
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<td>(1.02675)</td>
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<tr>
<td>(0.05524)</td>
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Log likelihood 951.5714
### Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

<table>
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<th>EX10</th>
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Log likelihood 953.5326

### Summary Statistics for Cointegration

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<tbody>
<tr>
<td>Mean</td>
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<td>4.687447</td>
<td>-0.535216</td>
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<td>Median</td>
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<td>-0.475074</td>
<td>-0.397364</td>
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<td>Maximum</td>
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<td>-0.167933</td>
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<tr>
<td>Minimum</td>
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<td>Std. Dev.</td>
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<td>Kurtosis</td>
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<td>Jarque-Bera</td>
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<td>Probability</td>
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Observations 80

11. Italy to Malta
Date: 03/22/98 Time: 17:30
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: W4 IN18 CL11 EX11 FF11
Lags interval: 1 to 4

**Eigenvalue Likelihood 5 Percent 1 Percent Hypothesized**

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<tr>
<th>Eigenvalue</th>
<th>Ratio</th>
<th>5 Percent</th>
<th>1 Percent</th>
<th>Critical Value</th>
<th>Critical Value</th>
<th>No. of CE(s)</th>
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<tbody>
<tr>
<td>0.453543</td>
<td>111.3602</td>
<td>68.52</td>
<td>76.07</td>
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<tr>
<td>0.374187</td>
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<td>54.46</td>
<td>At most 1 **</td>
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<td></td>
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<tr>
<td>0.172990</td>
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<td>29.68</td>
<td>35.65</td>
<td>At most 2 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.157657</td>
<td>16.63958</td>
<td>15.41</td>
<td>20.04</td>
<td>At most 3 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.049049</td>
<td>3.771954</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 4 *</td>
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</table>

**(***) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 5 cointegrating equation(s) at 5% significance level

### Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>W4</th>
<th>IN18</th>
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<th>EX11</th>
<th>FF11</th>
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<tr>
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<td>-0.046132</td>
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<tr>
<td>-0.522723</td>
<td>0.615543</td>
<td>-0.545078</td>
<td>-0.097653</td>
<td>0.131439</td>
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<tr>
<td>-0.498254</td>
<td>1.924084</td>
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<tr>
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### Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
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<tr>
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<th>CL11</th>
<th>EX11</th>
<th>FF11</th>
<th>C</th>
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<tbody>
<tr>
<td>1.000000</td>
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<td>-4.765231</td>
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</table>

Log likelihood 992.7638
### Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

<table>
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<th>CL11</th>
<th>EX11</th>
<th>FF11</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>-43.82325 (273.380)</td>
<td>121.7187 (49.3726)</td>
<td>1491.392 (606.274)</td>
<td>-1081.472</td>
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<tr>
<td>0.000000</td>
<td>1.000000</td>
<td>-2.679620 (18.0406)</td>
<td>8.648003 (54.5766)</td>
<td>96.18952 (606.274)</td>
<td>-77.07321</td>
</tr>
</tbody>
</table>

Log likelihood 1010.340

### Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

<table>
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<tr>
<th>W4</th>
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<th>CL11</th>
<th>EX11</th>
<th>FF11</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>4.730564 (1.70439)</td>
<td>43.20272 (1.71907)</td>
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</tr>
<tr>
<td>0.000000</td>
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<td>0.000000</td>
<td>1.494637 (0.20990)</td>
<td>7.638450 (1.71907)</td>
<td>-12.48282</td>
</tr>
<tr>
<td>0.000000</td>
<td>0.000000</td>
<td>1.000000</td>
<td>-2.669545 (0.54766)</td>
<td>-33.04613 (4.48521)</td>
<td>24.10431</td>
</tr>
</tbody>
</table>

Log likelihood 1017.463

### Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

<table>
<thead>
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<th>W4</th>
<th>IN18</th>
<th>CL11</th>
<th>EX11</th>
<th>FF11</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>9.212897 (2.54095)</td>
<td>3.742482</td>
</tr>
<tr>
<td>0.000000</td>
<td>1.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>-3.107743 (0.89402)</td>
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<tr>
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<td>0.000000</td>
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<td>0.000000</td>
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<td>7.803483</td>
</tr>
<tr>
<td>0.000000</td>
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<td>0.000000</td>
<td>1.000000</td>
<td>-24.10431 (0.65872)</td>
<td>-6.106218</td>
</tr>
</tbody>
</table>

Log likelihood 1023.897

### Summary Statistics

- **Mean**: -3.676367, 3.331906, -7.881633, 6.159504, -0.003716
- **Median**: -3.781117, 3.383749, -8.129671, 6.143287, -0.009833
- **Maximum**: -2.588873, 3.694353, -6.751862, 6.862032, 0.08356
- **Minimum**: -4.351397, 2.734264, -8.577067, 5.622065, -0.101020
- **Std. Dev.**: 0.449909, 0.228364, 0.582071, 0.314607, 0.124284
- **Skewness**: 0.510161, -0.827989, 0.682802, 0.295258, 0.091786
- **Kurtosis**: 2.236836, 2.912429, 1.900385, 2.309883, 2.489782
- **Jarque-Bera**: 5.411589, 9.166444, 10.24676, 2.749898, 0.980069
- **Probability**: 0.066817, 0.010222, 0.005956, 0.252852, 0.612605

Observations: 80

### Specification Test

- **Likelihood Ratio Test**: 0.408646, 0.328668, 0.219437, 0.087753, 0.056203
- **Critical Value at 5%**: 103.0583, 68.52, 54.46, 35.65, 20.04
- **Critical Value at 1%**: 103.0583, 43.20272, 29.68, 15.41, 6.65
- **Hypothesized No. of CE(s)**: None, At most 1, At most 2, At most 3, At most 4

Date: 03/24/98
Time: 09:18
Sample: 1976:1 1995:4
Included observations: 78
Test assumption: Linear deterministic trend in the data
Series: W4 IN18 CL11 EX11 FF11
Lags interval: 1 to 1
Eigenvalue | Likelihood Ratio | 5 Percent Critical Value | 1 Percent Critical Value | Hypothesized No. of CE(s)
--- | --- | --- | --- | ---
0.408646 | 103.0583 | 68.52 | 54.46 | None
0.328668 | 62.08174 | 47.21 | 35.65 | At most 1
0.219437 | 30.99938 | 29.68 | 20.04 | At most 2
0.087753 | 11.67572 | 15.41 | 6.65 | At most 3
0.056203 | 4.511819 | 3.76 | 1.72083 | At most 4

Specification error was found. We tried again with lower lag values.
*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 3 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>W4</th>
<th>IN18</th>
<th>CL11</th>
<th>EX11</th>
<th>FF11</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.366381</td>
<td>-2.188593</td>
<td>-0.587827</td>
<td>-0.853778</td>
<td>11.60272</td>
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<tr>
<td>-0.060903</td>
<td>-0.842777</td>
<td>0.187353</td>
<td>1.076102</td>
<td>-7.404515</td>
</tr>
<tr>
<td>0.261473</td>
<td>1.404741</td>
<td>0.121229</td>
<td>1.992992</td>
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<td>0.418661</td>
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<td>0.611302</td>
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<td>0.728245</td>
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<td>0.045632</td>
<td>-4.429532</td>
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</table>

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>W4</th>
<th>IN18</th>
<th>CL11</th>
<th>EX11</th>
<th>FF11</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>-5.966213</td>
<td>-1.602445</td>
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<td>31.62959</td>
<td>25.45562</td>
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Log likelihood 951.5001

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

<table>
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<th>IN18</th>
<th>CL11</th>
<th>EX11</th>
<th>FF11</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>-2.054673</td>
<td>3.711579</td>
<td>58.96385</td>
<td>-35.01236</td>
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<tr>
<td>0.000000</td>
<td>1.000000</td>
<td>0.000000</td>
<td>1.012204</td>
<td>4.581509</td>
<td>-10.13507</td>
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</table>

Log likelihood 967.0413

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

<table>
<thead>
<tr>
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<th>IN18</th>
<th>CL11</th>
<th>EX11</th>
<th>FF11</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>-6.521363</td>
<td>44.91458</td>
<td>43.57005</td>
</tr>
<tr>
<td>0.000000</td>
<td>1.000000</td>
<td>0.000000</td>
<td>0.634704</td>
<td>0.749373</td>
<td>-7.236118</td>
</tr>
<tr>
<td>0.000000</td>
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<td>1.000000</td>
<td>-4.980327</td>
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<td>38.24571</td>
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</table>

Log likelihood 976.7031

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

<table>
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<th>IN18</th>
<th>CL11</th>
<th>EX11</th>
<th>FF11</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
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<td>3.712425</td>
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<tr>
<td>0.000000</td>
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<td>0.000000</td>
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<td>-3.356897</td>
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<tr>
<td>0.000000</td>
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</tr>
<tr>
<td>0.000000</td>
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<td>0.000000</td>
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<td>7.623229</td>
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</table>

Log likelihood 980.2851

12. Libya to Malta
Date: 03/22/98 Time: 17:31
Sample: 1976.1 1995.4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: W5 IN7 CL12 EX12
Lags interval: 1 to 4
Likelihood 5 Percent 1 Percent Hypothesized
Eigenvalue Ratio 54.46 54.46 None *

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Likelihood</th>
<th>5 Percent</th>
<th>1 Percent</th>
<th>Hypothesized</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.255073</td>
<td>54.14404</td>
<td>47.21</td>
<td>54.46</td>
<td>None</td>
</tr>
<tr>
<td>0.226122</td>
<td>32.05883</td>
<td>29.68</td>
<td>35.65</td>
<td>At most 1</td>
</tr>
<tr>
<td>0.147379</td>
<td>12.83323</td>
<td>15.41</td>
<td>20.04</td>
<td>At most 2</td>
</tr>
<tr>
<td>0.011602</td>
<td>0.875230</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 3</td>
</tr>
</tbody>
</table>

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>W5</th>
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<th>CL12</th>
<th>EX12</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.208060</td>
<td>-0.556289</td>
<td>-0.273724</td>
<td>0.987109</td>
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<tr>
<td>-0.314887</td>
<td>-0.493439</td>
<td>-0.113796</td>
<td>-1.135373</td>
</tr>
<tr>
<td>0.276309</td>
<td>-0.038140</td>
<td>-1.066255</td>
<td>-0.408941</td>
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<tr>
<td>-0.042269</td>
<td>-0.409037</td>
<td>0.257907</td>
<td>-0.928118</td>
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</tbody>
</table>

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>W5</th>
<th>IN7</th>
<th>CL12</th>
<th>EX12</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>-2.673699</td>
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<td>4.744357</td>
<td>32.16836</td>
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Log likelihood 569.0662

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

<table>
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<tr>
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<th>EX12</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
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<td>4.167613</td>
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Log likelihood 578.6790

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

<table>
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<th>CL12</th>
<th>EX12</th>
<th>C</th>
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</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>4.430214</td>
<td>3.071420</td>
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<tr>
<td>0.000000</td>
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<td>-0.886717</td>
<td>-8.794393</td>
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<tr>
<td>0.000000</td>
<td>0.000000</td>
<td>1.000000</td>
<td>1.563291</td>
<td>-4.243968</td>
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</tbody>
</table>

Log likelihood 584.6580

Mean -4.103694 8.979877 3.870519 0.230701
Median -4.087475 8.932111 3.909952 0.192748
Maximum -3.073526 9.450492 4.321748 0.507565
Minimum -5.213132 8.284081 3.389736 -0.002223
Std. Dev. 0.570925 0.232824 0.219508 0.121931
Skewness -0.106314 0.026200 -0.492900 0.376581
Kurtosis 1.959102 2.806595 3.006538 2.307975

13. UK to Malta
Date: 03/22/98 Time: 17:33
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: W6 IN21 CL13 EX13 FF13
Lags interval: 1 to 4

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.374976</td>
<td>81.44368</td>
<td>68.52</td>
<td>76.07</td>
<td>None **</td>
</tr>
<tr>
<td>0.237894</td>
<td>46.19633</td>
<td>47.21</td>
<td>54.46</td>
<td>At most 1</td>
</tr>
<tr>
<td>0.151444</td>
<td>25.82111</td>
<td>29.68</td>
<td>35.65</td>
<td>At most 2</td>
</tr>
<tr>
<td>0.092064</td>
<td>13.50463</td>
<td>15.41</td>
<td>20.04</td>
<td>At most 3</td>
</tr>
<tr>
<td>0.080091</td>
<td>6.261038</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 4 *</td>
</tr>
</tbody>
</table>

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>W6</th>
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<th>EX13</th>
<th>FF13</th>
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</thead>
<tbody>
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<td>-1.801755</td>
<td>-0.373734</td>
<td>0.052809</td>
<td>-4.701297</td>
</tr>
<tr>
<td>-0.391634</td>
<td>-1.577215</td>
<td>-2.965347</td>
<td>1.884563</td>
<td>3.955551</td>
</tr>
<tr>
<td>0.275186</td>
<td>-1.398910</td>
<td>-0.053821</td>
<td>-0.679577</td>
<td>-5.594407</td>
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<td>-0.357643</td>
<td>0.989775</td>
<td>0.331675</td>
<td>-1.052123</td>
<td>1.898471</td>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>W6</th>
<th>IN21</th>
<th>CL13</th>
<th>EX13</th>
<th>FF13</th>
<th>C</th>
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</thead>
<tbody>
<tr>
<td>1.000000</td>
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<td>8.637837</td>
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</table>

Log likelihood 1006.874

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

<table>
<thead>
<tr>
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<th>IN21</th>
<th>CL13</th>
<th>EX13</th>
<th>FF13</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
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<td>0.275118</td>
<td>0.171147</td>
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<td>1.742838</td>
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Log likelihood 1017.062

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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<th>CL13</th>
<th>EX13</th>
<th>FF13</th>
<th>C</th>
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</thead>
<tbody>
<tr>
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<td>0.372023</td>
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<tr>
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</table>

Log likelihood 1023.220

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

<table>
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<th>CL13</th>
<th>EX13</th>
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<th>C</th>
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</thead>
<tbody>
<tr>
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<td>0.000000</td>
<td>0.000000</td>
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<tr>
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<tr>
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### Log likelihood 1026.842

<table>
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<th>CL13</th>
<th>EX13</th>
<th>FF13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>-1.364762</td>
<td>3.770214</td>
<td>-0.932519</td>
<td>-0.451397</td>
<td>-0.014574</td>
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<tr>
<td>Median</td>
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<td>-0.510032</td>
<td>-0.025396</td>
</tr>
<tr>
<td>Maximum</td>
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<td>-0.168849</td>
<td>0.108559</td>
</tr>
<tr>
<td>Minimum</td>
<td>-2.028443</td>
<td>3.341498</td>
<td>-1.327517</td>
<td>-0.617126</td>
<td>-0.064626</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.331872</td>
<td>0.331872</td>
<td>0.206268</td>
<td>0.556498</td>
<td>1.240161</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.377531</td>
<td>-0.502361</td>
<td>0.098092</td>
<td>0.556498</td>
<td>1.240161</td>
</tr>
<tr>
<td>Kurtosis</td>
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<td>2.438020</td>
<td>1.905282</td>
<td>4.004733</td>
<td>4.004733</td>
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<tr>
<td>Probability</td>
<td>0.138579</td>
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<td>0.127264</td>
<td>0.011013</td>
<td>0.000007</td>
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</tbody>
</table>

Observations: 80 80 80 80 80

14. USA to Malta

Date: 03/22/98 Time: 17:35

Sample: 1976:1 1995:4

Included observations: 75

Test assumption: Linear deterministic trend in the data

Series: W7 IN20 CL14 FF14

Lags interval: 1 to 4

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.299842</td>
<td>47.36855</td>
<td>47.21</td>
<td>54.46</td>
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</tr>
<tr>
<td>0.164516</td>
<td>20.63488</td>
<td>29.68</td>
<td>35.65</td>
<td>At most 1</td>
</tr>
<tr>
<td>0.053244</td>
<td>7.154068</td>
<td>15.41</td>
<td>20.04</td>
<td>At most 2</td>
</tr>
<tr>
<td>0.039858</td>
<td>3.090551</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 3</td>
</tr>
</tbody>
</table>

*(**) denotes rejection of the hypothesis at 5%/1% significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>W7</th>
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<th>FF14</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>0.396557</td>
<td>1.280688</td>
<td>1.607355</td>
<td>-6.460149</td>
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<tr>
<td>-0.355063</td>
<td>1.754068</td>
<td>3.090551</td>
<td>-3.0272</td>
</tr>
<tr>
<td>0.332785</td>
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<td>0.000000</td>
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</tbody>
</table>

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>W7</th>
<th>IN20</th>
<th>CL14</th>
<th>FF14</th>
<th>C</th>
</tr>
</thead>
<tbody>
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<td>-0.710367</td>
<td>20.38384</td>
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</tr>
<tr>
<td>(2.36144)</td>
<td>(1.24520)</td>
<td>(10.6260)</td>
<td>(10.6260)</td>
<td></td>
</tr>
</tbody>
</table>

Log likelihood 986.6709

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>W7</th>
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<th>Cl14</th>
<th>FF14</th>
<th>C</th>
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</thead>
<tbody>
<tr>
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Log likelihood 993.4113

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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<td>1 Percent Critical Value</td>
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<td>At most 4</td>
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*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 3 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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<th>EX15</th>
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<th>C</th>
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</thead>
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Log likelihood 597.1586

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 622.2110

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 627.5695

16. UK to N. Cyprus
Date: 03/22/98 Time: 17:39
Sample: 1976:1 1995:4
Included observations: 47
Test assumption: Linear deterministic trend in the data
Series: P2 IN21 CL16 EX16
Lags interval: 1 to 4

Unnormalized Cointegrating Coefficients:

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## Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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<th>EX16</th>
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Log likelihood 247.2050

## Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 252.8726

## Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 256.1879

## Summary Statistics

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<th>Minimum</th>
<th>Std. Dev.</th>
<th>Skewness</th>
<th>Kurtosis</th>
<th>Jarque-Bera</th>
<th>Probability</th>
<th>Observations</th>
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17. Germany to N. Cyprus

Date: 03/22/98 Time: 18:00
Sample: 1976:1 1995:4
Included observations: 47
Test assumption: Linear deterministic trend in the data
Series: P3 IN4 CL17 EX17
Lags interval: 1 to 4

**Eigenvalue Likelihood Ratio 5 Percent Critical Value 1 Percent Critical Value Hypothesized No. of CE(s)**

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<td>At most 3</td>
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**(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

## Unnormalized Cointegrating Coefficients:

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## Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood 225.4307

## Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 231.5790

## Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 235.8486

### Descriptive Statistics

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<td>-0.804010</td>
<td>-0.199741</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>2.254606</td>
<td>1.694946</td>
<td>5.065459</td>
<td>1.983982</td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>2.653908</td>
<td>5.931506</td>
<td>20.55554</td>
<td>3.972928</td>
</tr>
<tr>
<td>Probability</td>
<td>0.265284</td>
<td>0.051522</td>
<td>0.000034</td>
<td>0.137180</td>
</tr>
</tbody>
</table>

Observations 52  80  72  80

18. USA to N. Cyprus
Date: 03/22/98  Time: 18:09
Sample: 1976:1 1995:4
Included observations: 47

Test assumption: Linear deterministic trend in the data
Series: P4 IN20 CL18 EX26
Lags interval: 1 to 4
Eigenvalue |
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>0.560845</td>
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<td>47.21</td>
<td>54.46</td>
</tr>
<tr>
<td>0.344690</td>
<td>38.25193</td>
<td>29.68</td>
<td>35.65</td>
</tr>
<tr>
<td>0.205513</td>
<td>18.38750</td>
<td>15.41</td>
<td>20.04</td>
</tr>
<tr>
<td>0.148848</td>
<td>7.574743</td>
<td>3.76</td>
<td>6.65</td>
</tr>
</tbody>
</table>

**(***) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 4 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th></th>
<th>P4</th>
<th>IN20</th>
<th>CL18</th>
<th>EX26</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.476185</td>
<td>2.797435</td>
<td>1.037157</td>
<td>0.237129</td>
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<tr>
<td></td>
<td>0.374728</td>
<td>-7.163627</td>
<td>0.252652</td>
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<tr>
<td></td>
<td>-0.265480</td>
<td>6.674767</td>
<td>-0.355754</td>
<td>0.308303</td>
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<tr>
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<td>-0.359033</td>
<td>-2.298894</td>
<td>-0.099380</td>
<td>-0.121694</td>
</tr>
</tbody>
</table>
Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>Equation</th>
<th>P4</th>
<th>IN20</th>
<th>CL18</th>
<th>EX26</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.000000</td>
<td>-5.874677</td>
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<td>-0.497976</td>
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<tr>
<td></td>
<td></td>
<td>(2.27139)</td>
<td>(0.45288)</td>
<td>(0.09679)</td>
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</tr>
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<td>Log likelihood</td>
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Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>Equation</th>
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<th>IN20</th>
<th>CL18</th>
<th>EX26</th>
<th>C</th>
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<tbody>
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<td>-0.591289</td>
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<tr>
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<td></td>
<td>(0.84215)</td>
<td>(0.20663)</td>
<td>(0.08348)</td>
<td></td>
</tr>
<tr>
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<td>0.000000</td>
<td>1.000000</td>
<td>0.000000</td>
<td>0.314483</td>
<td>-1.963411</td>
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<tr>
<td></td>
<td></td>
<td>(17.3834)</td>
<td>(1.05388)</td>
<td>(0.56324)</td>
<td></td>
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<tr>
<td>Log likelihood</td>
<td>331.7101</td>
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<td></td>
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Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>Equation</th>
<th>P4</th>
<th>IN20</th>
<th>CL18</th>
<th>EX26</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>0.000000</td>
<td>4.690172</td>
<td>44.09594</td>
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<td></td>
<td>(17.3834)</td>
<td>(1.05388)</td>
<td>(5.16324)</td>
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</tr>
<tr>
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<td>1.533784</td>
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<td></td>
<td>(17.3834)</td>
<td>(1.05388)</td>
<td>(5.16324)</td>
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<tr>
<td>Log likelihood</td>
<td>337.1165</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>P4</th>
<th>IN20</th>
<th>CL18</th>
<th>EX26</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>-6.765617</td>
<td>4.416806</td>
<td>1.288193</td>
<td>-6.418490</td>
</tr>
<tr>
<td>Median</td>
<td>-6.734409</td>
<td>4.414366</td>
<td>1.323628</td>
<td>-6.428573</td>
</tr>
</tbody>
</table>
| Minimum | -8.313285 | 4.286090 | -1.910548 | -10.99625 *
| Std. Dev. | 0.480825 | 0.080608 | 0.793725 | 2.381954 |
| Skewness | -0.616138 | 0.219007 | -0.762741 | -0.124714 |
| Kurtosis | 3.837187 | 1.966127 | 5.379382 | 2.005496 |
| Jarque-Bera | 4.808674 | 4.202503 | 23.96568 | 3.504176 |
| Probability | 0.090325 | 0.122303 | 0.000006 | 0.173411 |
| Observations | 52 | 80 | 72 | 80 |

Specification error was found. We tried again with lower lag values.

Date: 03/24/98 Time: 09:21
Sample: 1976:1 1995:4
Included observations: 50
Test assumption: Linear deterministic trend in the data
Series: P4 IN20 CL18 EX26
Lags interval: 1 to 1

<table>
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<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.561461</td>
<td>73.07634</td>
<td>47.21</td>
<td>54.46</td>
<td>None **</td>
</tr>
<tr>
<td>0.360599</td>
<td>31.86099</td>
<td>29.68</td>
<td>35.65</td>
<td>At most 1 *</td>
</tr>
<tr>
<td>0.101521</td>
<td>9.499806</td>
<td>15.41</td>
<td>20.04</td>
<td>At most 2</td>
</tr>
<tr>
<td>0.079598</td>
<td>4.147218</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 3 *</td>
</tr>
</tbody>
</table>

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>Equation</th>
<th>P4</th>
<th>IN20</th>
<th>CL18</th>
<th>EX26</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.098384</td>
<td>-0.030653</td>
<td>0.344087</td>
<td>0.040722</td>
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<tr>
<td></td>
<td>0.314749</td>
<td>-3.168573</td>
<td>0.033764</td>
<td>-0.083306</td>
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</tbody>
</table>
19. Australia to N. Cyprus
Date: 03/22/98 Time: 18:11
Sample: 1976:1 1995:4
Included observations: 47
Test assumption: Linear deterministic trend in the data
Series: P5 IN13 CL19 EX19
Lags interval: 1 to 4

<table>
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<tr>
<th>Eigenvalue Ratio</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.358255</td>
<td>43.99429</td>
<td>47.21</td>
<td>54.46</td>
<td>None</td>
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<tr>
<td>0.248721</td>
<td>23.14676</td>
<td>29.68</td>
<td>35.65</td>
<td>At most 1</td>
</tr>
<tr>
<td>0.130335</td>
<td>9.705776</td>
<td>15.41</td>
<td>20.04</td>
<td>At most 2</td>
</tr>
<tr>
<td>0.064672</td>
<td>3.142344</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 3</td>
</tr>
</tbody>
</table>

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. rejects any cointegration at 5% significance level

Unnormalized Cointegrating Coefficients:
P5 IN13 CL19 EX19
-0.409759 -0.167840 0.406430 0.072368
0.095749 0.715849 -0.600935 0.022237
0.010573 1.707182 0.710221 0.122811
0.112457 -1.430253 -0.103387 0.065079

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)
P5 IN13 CL19 EX19 C
1.000000 0.409608 -0.991876 -0.176611 7.183713
(1.12111) (0.41956) (0.07426)

Log likelihood 199.6635
### Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

<p>| | | | | | |</p>
<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>P5</td>
<td>IN13</td>
<td>CL19</td>
<td>EX19</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>-0.685583</td>
<td>-0.200310</td>
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<tr>
<td>(1.19886)</td>
<td>(0.09081)</td>
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<tr>
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<tr>
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<td>(0.86617)</td>
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</tbody>
</table>

Log likelihood 206.3840

### Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

<p>| | | | | | |</p>
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</tr>
</thead>
<tbody>
<tr>
<td>P5</td>
<td>IN13</td>
<td>CL19</td>
<td>EX19</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>-0.191317</td>
<td>7.303977</td>
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<tr>
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<td>(0.12383)</td>
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<td>(0.03648)</td>
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<tr>
<td>0.000000</td>
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<td>(0.06939)</td>
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Log likelihood 209.6657

### Unnormalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

### Unnormalized Cointegrating Coefficients:

<p>| | | | | | |</p>
<table>
<thead>
<tr>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>P6</td>
<td>IN12</td>
<td>CL20</td>
<td>EX15</td>
<td>FF20</td>
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</tr>
<tr>
<td>0.980149</td>
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<tr>
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<td></td>
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</tr>
<tr>
<td>-0.509703</td>
<td>0.083959</td>
<td>-0.345967</td>
<td>-0.513299</td>
<td>-13.88002</td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.455816</td>
<td>3.054306</td>
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</tr>
<tr>
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<tr>
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<td>0.063736</td>
<td>3.034286</td>
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### Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<p>| | | | | | |</p>
<table>
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</thead>
<tbody>
<tr>
<td>P6</td>
<td>IN12</td>
<td>CL20</td>
<td>EX15</td>
<td>FF20</td>
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</table>

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20. Turkey to N. Cyprus

Date: 03/22/98 Time: 18:22

Sample: 1976:1 1995:4

Included observations: 67

Test assumption: Linear deterministic trend in the data

Series: P6 IN12 CL20 EX15 FF20

Lags interval: 1 to 4

### Test Results

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.460380</td>
<td>71.57614</td>
<td>68.52</td>
<td>76.07</td>
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</tr>
<tr>
<td>0.199939</td>
<td>30.24447</td>
<td>47.21</td>
<td>54.46</td>
<td>At most 1</td>
</tr>
<tr>
<td>0.124560</td>
<td>15.38269</td>
<td>29.68</td>
<td>35.65</td>
<td>At most 2</td>
</tr>
<tr>
<td>0.058121</td>
<td>6.469801</td>
<td>15.41</td>
<td>20.04</td>
<td>At most 3</td>
</tr>
<tr>
<td>0.036021</td>
<td>2.457962</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 4</td>
</tr>
</tbody>
</table>

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 1 cointegrating equation(s) at 5% significance level
1.000000 0.715896 -0.204850 0.087136 22.17080 1.599352

Log likelihood 688.1776

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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<thead>
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<th>EX15</th>
<th>FF20</th>
<th>C</th>
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</thead>
<tbody>
<tr>
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Log likelihood 695.6085

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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<th>EX15</th>
<th>FF20</th>
<th>C</th>
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<td>-3.874506</td>
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</tbody>
</table>

Log likelihood 700.0649

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

<table>
<thead>
<tr>
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<th>IN12</th>
<th>CL20</th>
<th>EX15</th>
<th>FF20</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>6.238550</td>
<td>1.971566</td>
</tr>
<tr>
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<tr>
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<td>0.000000</td>
<td>1.000000</td>
<td>-74.58218</td>
<td>-11.47713</td>
</tr>
</tbody>
</table>

Log likelihood 702.0708

Mean -1.608720 -1.050857 -9.104859 6.418490 -0.055020
Median -1.663771 -1.030285 -8.974972 6.428573 -0.059265
Maximum -0.799434 2.716432 -1.903936 10.99625 0.008944
Minimum -2.512501 -5.533273 -17.10583 2.750790 -0.093492
Std. Dev. 0.467029 2.294698 4.204715 2.381954 0.018749
Skewness 0.010305 -0.127529 -0.065741 0.124714 1.667479
Kurtosis 1.925297 2.078545 2.069562 2.005496 6.307923

Log likelihood 703.0708

Jarque-Bera 3.851371 3.047116 2.649008 3.504176 73.54768
Probability 0.145776 0.217935 0.265935 0.173411 0.000000

Observations 80 80 72 80 80

3.5 Turkey Inbound

21. Germany to Turkey
Date: 03/22/98 Time: 18:25
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: XI IN4 CL21 EX21 FF21
Lags interval: 1 to 4

Likelihood 5 Percent 1 Percent Hypothesized
Eigenvalue Ratio Critical Value Critical Value No. of CE(s)
0.324476 88.09213 68.52 76.07 None **
0.280143 58.67216 47.21 54.46 At most 1 **
0.236776 34.01949 29.68 35.65 At most 2 *
0.122227 13.75416 15.41 20.04 At most 3
0.051641 3.976634 3.76 6.65 At most 4 *

(*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 3 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>X1</th>
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<th>EX21</th>
<th>FF21</th>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood 666.6493

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 678.9757

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 689.1083

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 693.9971
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22. Austria to Turkey
Date: 03/22/98 Time: 18:27
Sample: 1976:1 1995:4
Included observations: 75

Test assumption: Linear deterministic trend in the data
Series: X2 IN 14 CL22 EX22 FF22
Lags interval: 1 to 4

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<th>Eigenvalue</th>
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L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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<th>X2</th>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood 697.1395

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 708.7164

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 715.1764

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 717.2873

<table>
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Jarque-Bera: X2: 2.586216, IN14: 1.013400

Unnormalized Cointegrating Coefficients:

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<th>IN3</th>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)
### Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 622.6579

### Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 631.8550

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Log likelihood 642.4318
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*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 5 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood 700.9832

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 715.2129

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 724.9602

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 729.4563
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<th>Minimum</th>
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<th>Skewness</th>
<th>Kurtosis</th>
<th>Jarque-Bera</th>
<th>Probability</th>
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<td>2.430820</td>
<td>2.044595</td>
<td>1.989210</td>
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<td>3.604904</td>
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Observations 80

Specification error was found. We tried again with lower lag values.

Date: 03/24/98 Time: 09:27

Sample: 1976:1 1995:4

Included observations: 78

Test assumption: Linear deterministic trend in the data

Series: X4 IN21 CL24 EX24 FF24

Lags interval: 1 to 1

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<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent</th>
<th>1 Percent</th>
<th>Hypothesized</th>
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<tbody>
<tr>
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<td>87.50414</td>
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<td>0.270650</td>
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<td>0.195281</td>
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<td>3.76</td>
<td>6.65</td>
<td>At most 4</td>
</tr>
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</table>

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>X4</th>
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<th>CL24</th>
<th>EX24</th>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
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<tr>
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<th>IN21</th>
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Log likelihood 634.2381

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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<th>C</th>
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Log likelihood 646.5465

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)
Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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<th>IN21</th>
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Log likelihood 657.9353

25. Italy to Turkey
Date: 03/22/98 Time: 19:06
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: X5 IN18 CL25 EX25 FF25
Lags interval: 1 to 4

Eigenvalue Likelihood 5 Percent 1 Percent Hypothesized
Ratio Critical Value Critical Value No. of CE(s)
0.460054 112.3933 68.52 76.07 None **
0.416086 66.17179 47.21 54.46 At most 1 **
0.210594 25.82172 29.68 35.65 At most 2
0.061414 8.086170 20.04 At most 3
0.043462 3.332603 6.65 At most 4

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>X5</th>
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<th>EX25</th>
<th>FF25</th>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
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<th>EX25</th>
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Log likelihood 723.6055

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 743.7805

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 752.6483

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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<th>EX25</th>
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Log likelihood 755.0251

X5 IN18 CL25 EX25 FF25
Mean -8.003771 3.331906 -4.463337 0.718532
Median -7.981740 3.383749 -5.125128 0.967098
Maximum -7.352570 3.694353 -0.492058 3.982945
Minimum -8.726748 2.734264 -6.850223 -3.628099
Std. Dev. 0.330124 0.228364 1.843675 2.210297
Skewness -0.279552 -0.827989 0.571100 -0.241382
Kurtosis 2.479901 2.912429 2.040704 1.946925
Jarque-Bera 1.943670 9.166444 7.416232 4.473428
Probability 0.378388 0.010222 0.024524 0.106809
Observations 80 80 80 80

26 USA to Turkey
Date: 03/22/98 Time: 19:08
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: X6 IN20 CL26 EX26 FF26
Lags interval: 1 to 4

Eigenvalue Likelihood Ratio 5 Percent 1 Percent Hipothesized
No. of CE(s)

| 0.369618 | 82.56503 | 68.52 | 76.07 | None ** |
| 0.261045 | 47.95789 | 47.21 | 54.46 | At most 1 * |
| 0.187007 | 25.26906 | 29.68 | 35.65 | At most 2 |
| 0.089970 | 9.741619 | 15.41 | 20.04 | At most 3 |
| 0.034984 | 2.670782 | 3.76 | 6.65 | At most 4 |

**(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
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<th>EX26</th>
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</tbody>
</table>
Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
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<tr>
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<th>X6</th>
<th>IN20</th>
<th>CL26</th>
<th>EX26</th>
<th>FF26</th>
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Log likelihood 796.0034

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 807.3478

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 815.1116

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 818.6470

Mean    X6 -7.294316 4.416806 3.230489 -6.418490 3.070494
Median -7.216644 4.414366 2.941536 -6.428573 3.000101
Maximum -6.784368 4.572115 7.722650 -2.750790 5.014950
Minimum -8.322928 4.286090 0.010910 -10.99625 1.549603
Std. Dev. 0.350193 0.080608 2.208062 2.381954 1.003701
Skewness -1.011633 0.219007 0.328991 -0.124714 0.161894
Kurtosis 3.454595 1.966127 2.029592 2.005496 2.091215

Probability 0.000772 0.122303 0.10160 0.173411 0.211990

Observations 80 80 80 80 80

27. N. Cyprus to Turkey
Date: 03/22/98 Time: 19:10
Sample: 1976:1 1995:4  
Included observations: 35  
Test assumption: Linear deterministic trend in the data  
Series: X7 IN23 CL27 EX15 FF27  
Lags interval: 1 to 4

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<th>1 Percent</th>
<th>Critical Value</th>
<th>Critical Value</th>
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H.R. test indicates 4 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood 346.4639

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 365.0967

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 377.3517

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood: 384.7782

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Observations: 40, 72, 72, 80, 72

28. Israel to Turkey

Date: 03/22/98 Time: 19:12
Sample: 1976:1 1995:4
Included observations: 35
Test assumption: Linear deterministic trend in the data
Series: X8 IN 17 CL28 EX28 FF28
Lags interval: 1 to 4

Eigenvalue Ratio 5 Percent 1 Percent Hypothesized No. of CE(s)
0.885178 194.5351 68.52 76.07 None **
0.806503 118.7228 47.21 54.46 At most 1 **
0.709870 61.29493 29.68 35.65 At most 2 **
0.388061 17.98500 15.41 20.04 At most 3 *
0.022477 0.795683 3.76 6.65 At most 4

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 4 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood: 433.3161

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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207

Log likelihood 462.0598

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 483.7147

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 492.3094

Mean -8.692301 -1.685835 -0.251617 -8.191115 -5.150005
Maximum -6.425839 3.523465 7.193099 -5.901900 -3.166419
Skewness 0.505973 0.594653 0.557500 0.238340 -0.307522
Kurtosis 2.203082 1.631355 1.634335 1.609910 1.934715

Observations: 40 80 80 80 44

29. Denmark to Turkey
Date: 03/22/98 Time: 19:13
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: X9 IN2 CL29 EX29 FF29
Lags interval: 1 to 4

Eigenvalue Likelihood 5 Percent 1 Percent Hypothesized
Ratio 5 Percent Critical Value Critical Value No. of CE(s)
0.342651 71.19800 68.52 76.07 None *
0.229172 39.73246 47.21 54.46 At most 1
0.128249 20.21072 29.68 35.65 At most 2
0.099963 9.916786 15.41 20.04 At most 3
0.026547 2.017962 3.76 6.65 At most 4

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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Log likelihood 642.6023

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 652.3632

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 657.5101

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 661.4595

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Median -9.748655 4.386585 0.631828 -4.251696 1.783169
Maximum -7.860868 4.705138 5.915542 -0.947432 3.626323
Minimum -10.87289 3.758088 -1.817261 -9.282452 1.088745
Std. Dev. 0.789977 0.236119 2.221273 2.391480 0.687296
Skewness 0.564789 -0.608858 0.510881 -0.285084 0.763340
Kurtosis 2.228961 2.489880 2.073225 2.008005 2.641509
Jarque-Bera 6.234831 5.810174 6.343035 4.363822 8.197554
Probability 0.044271 0.054744 0.041940 0.112826 0.016593

Observations 80 80 80 80 80

30. Switzerland to Turkey
Date: 03/22/98 Time: 19:15
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: X10 IN1 CL30 EX30 FF30
Lags interval: 1 to 4

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*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood 659.6556

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 672.4928

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 679.2474

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 682.1687

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31. Greece to Turkey

Date: 03/22/98  Time: 19:17
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: X11 IN5 CL31 EX31 FF31
Lags interval: 1 to 4

Eigenvalue | Likelihood Ratio | 5 Percent Critical Value | 1 Percent Critical Value | Hypothesized No. of CE(s)
--- | --- | --- | --- | ---
0.420849 | 82.31686 | 68.52 | 76.07 | None **
0.223487 | 41.35245 | 47.21 | 54.46 | At most 1
0.130897 | 22.38178 | 29.68 | 35.65 | At most 2
0.111179 | 11.85980 | 15.41 | 20.04 | At most 3
0.039471 | 3.020364 | 3.76 | 6.65 | At most 4

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

X11  IN5  CL31  EX31  FF31
-0.342736 -0.829935 -0.371642 -0.474152 1.321429
-0.647008 3.505729 -3.620436 -3.251355 -0.043551
-0.446964 0.384969 -0.656020 -0.368609 -0.465972
0.047738 -0.026291 0.316518 0.097551 -0.032156
-0.031860 0.320428 -0.677574 -0.492099 -0.007823

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

X11  IN5  CL31  EX31  FF31  C
1.000000 2.421501 1.084341 1.383432 -3.855532 3.549006
(2.09360) (1.18920) (0.95321) (1.32709)

Log likelihood 573.4930

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

X11  IN5  CL31  EX31  FF31  C
1.000000 0.000000 2.479470 2.508270 -2.643884 15.60157
(0.23694) (0.28270) (0.42576)
0.000000 1.000000 -0.576142 -0.464521 -0.500371 -4.977309
(0.05350) (0.06383) (0.09613)

Log likelihood 582.9783
Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 588.2393

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 592.6590

32. Belgium to Turkey
Date: 03/22/98 Time: 19:22
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: X12 IN1 CL32 EX32 FF32
Lags interval: 1 to 4

Eigenvalue | Likelihood | 5 Percent | 1 Percent | Hypothesized No. of CE(s)
-----------|------------|-----------|-----------|-------------------|
0.304841 | 68.56260 | 68.52 | 76.07 | None *
0.241187 | 41.29147 | 47.21 | 54.46 | At most 1
0.145508 | 20.59152 | 29.68 | 35.65 | At most 2
0.074449 | 8.797942 | 15.41 | 20.04 | At most 3
0.039152 | 2.995463 | 3.76 | 6.65 | At most 4

*(***) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood 641.8925

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 652.2425

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 658.1393

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 661.0405

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33. Netherlands to Turkey
Date: 03/22/98 Time: 19:23
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: X13 IN9 CL33 EX33 FF33
Lags interval: 1 to 4

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<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
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<td>14.64332</td>
<td>29.68</td>
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(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. rejects any cointegration at 5% significance level

Unnormalized Cointegrating Coefficients:

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<th>CL33</th>
<th>EX33</th>
<th>FF33</th>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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<th>EX33</th>
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Log likelihood 554.7802

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 564.1846

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 568.1886

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 568.1886
Log likelihood 570.9259

X13 IN9 CL33 EX33 FF33
Mean -8.514780 5.079501 3.296417 -5.632941 4.129418
Median -8.683905 5.054037 2.645893 -5.438539 3.078447
Maximum -6.968096 6.140285 8.827023 -1.762551 9.907949
Minimum -9.885086 4.078229 -0.973651 -10.52350 1.062492
Std. Dev. 0.742186 0.576771 2.770018 2.503746 2.462087
Skewness 0.388196 0.008055 0.336223 -0.214642 0.698684
Kurtosis 2.022742 1.779490 1.944778 1.986778 2.342411
Jarque-Bera 5.192722 4.966351 5.218925 4.036341 7.950204
Probability 0.074544 0.083478 0.073574 0.132898 0.018777

Observations 80 80 80 80 80

3.6 UK INBOUND

34. USA to UK
Date: 03/22/98 Time: 19:25
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: G1 IN20 CL34 EX34 FF34
Lags interval: 1 to 4

Eigenvalue Ratio 5 Percent 1 Percent Hypothesized
Likelihood Critical Value Critical Value No. of CE(s)

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*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 3 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood 1165.529

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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215

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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<th>EX34</th>
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Log likelihood 1191.340

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 1197.375

Observations 80

35. Germany to UK

Date: 03/22/98 Time: 19:27
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: G2 IN4 CL35 EX35 FF35
Lags interval: 1 to 4

Eigenvalue | Likelihood Ratio | 5 Percent Critical Value | 1 Percent Critical Value | Hypothesized No. of CE(s) |
---|---|---|---|---|
0.385588 | 85.51422 | 68.52 | 76.07 | None ** |
0.235387 | 48.98249 | 47.21 | 54.46 | At most 1 * |
0.212072 | 28.85356 | 29.68 | 35.65 | At most 2 |
0.121026 | 10.97744 | 15.41 | 20.04 | At most 3 |
0.017217 | 1.302482 | 3.76 | 6.65 | At most 4 |

**(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

G2 IN4 CL35 EX35 FF35
<table>
<thead>
<tr>
<th></th>
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<th>EX35</th>
<th>FF35</th>
<th>C</th>
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</tr>
<tr>
<td></td>
<td>(0.67636)</td>
<td>(0.42527)</td>
<td>(0.54745)</td>
<td>(4.86286)</td>
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<td></td>
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Log likelihood 981.3643

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<th>CL35</th>
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<th>FF35</th>
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<tr>
<td></td>
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<td>(0.38638)</td>
<td>(3.11831)</td>
<td>(2.33645)</td>
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<td></td>
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<tr>
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Log likelihood 991.4288

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<tr>
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<tr>
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<tr>
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<td>(243.309)</td>
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Log likelihood 1000.367

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<th>EX35</th>
<th>FF35</th>
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<tbody>
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<tr>
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Log likelihood 1005.204

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<th>CL35</th>
<th>EX35</th>
<th>FF35</th>
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</thead>
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<td>Mean</td>
<td>-4.932605</td>
<td>4.687447</td>
<td>-0.128816</td>
<td>0.154176</td>
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<tr>
<td>Median</td>
<td>-4.955261</td>
<td>4.721710</td>
<td>-0.181474</td>
<td>0.110830</td>
<td>0.104149</td>
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<td>Maximum</td>
<td>-4.336480</td>
<td>5.212806</td>
<td>0.473994</td>
<td>1.002004</td>
<td>0.184044</td>
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<tr>
<td>Minimum</td>
<td>-5.497047</td>
<td>4.147323</td>
<td>-0.925091</td>
<td>-0.294195</td>
<td>0.013933</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.238168</td>
<td>0.296816</td>
<td>0.390628</td>
<td>0.301019</td>
<td>0.039305</td>
</tr>
<tr>
<td>Skewness</td>
<td>0.335279</td>
<td>-0.138100</td>
<td>-0.096667</td>
<td>0.790940</td>
<td>-0.117956</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>2.664062</td>
<td>1.694946</td>
<td>1.785046</td>
<td>3.160047</td>
<td>2.522078</td>
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</table>

Austria to UK
Test assumption: Linear deterministic trend in the data

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.338089</td>
<td>79.11641</td>
<td>68.52</td>
<td>76.07</td>
<td>None **</td>
</tr>
<tr>
<td>0.251320</td>
<td>49.82007</td>
<td>47.21</td>
<td>54.46</td>
<td>At most 1 *</td>
</tr>
<tr>
<td>0.202155</td>
<td>29.26958</td>
<td>29.68</td>
<td>35.65</td>
<td>At most 2</td>
</tr>
<tr>
<td>0.165907</td>
<td>12.23485</td>
<td>15.41</td>
<td>20.04</td>
<td>At most 3</td>
</tr>
<tr>
<td>0.004983</td>
<td>0.354704</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 4</td>
</tr>
</tbody>
</table>

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>G3</th>
<th>IN14</th>
<th>CL36</th>
<th>EX36</th>
<th>FF36</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.166988</td>
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<td>-2.206600</td>
<td>5.981469</td>
<td>22.41498</td>
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<tr>
<td>0.622625</td>
<td>-5.552312</td>
<td>3.163155</td>
<td>-2.304482</td>
<td>-3.959592</td>
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<tr>
<td>-0.572650</td>
<td>0.462044</td>
<td>-0.978805</td>
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<tr>
<td>0.457913</td>
<td>0.829985</td>
<td>0.108044</td>
<td>0.848228</td>
<td>1.017100</td>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>G3</th>
<th>IN14</th>
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<th>EX36</th>
<th>FF36</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>30.09539</td>
<td>-13.21412</td>
<td>35.81974</td>
<td>134.2310</td>
<td>-254.9241</td>
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</table>

Log likelihood 940.6884

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

<table>
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<tr>
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<th>EX36</th>
<th>FF36</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>0.898601</td>
<td>5.332468</td>
<td>25.77667</td>
<td>-6.523069</td>
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<tr>
<td>0.000000</td>
<td>1.000000</td>
<td>-0.468933</td>
<td>1.013022</td>
<td>3.603687</td>
<td>-8.253792</td>
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</table>

Log likelihood 950.9637

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

<table>
<thead>
<tr>
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<th>IN14</th>
<th>CL36</th>
<th>EX36</th>
<th>FF36</th>
<th>C</th>
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</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>7.922737</td>
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<td>0.000000</td>
<td>1.000000</td>
<td>0.000000</td>
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<td>-1.948665</td>
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<tr>
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<td>0.000000</td>
<td>1.000000</td>
<td>-2.882556</td>
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<td>13.44569</td>
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Log likelihood 958.9810

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

<table>
<thead>
<tr>
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<th>CL36</th>
<th>EX36</th>
<th>FF36</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.000000</td>
<td>-8.446875</td>
<td>9.132444</td>
</tr>
</tbody>
</table>

Log likelihood 964.9137
0.000000 1.000000 0.000000 0.000000 -7.141590 (2.39684)
0.000000 0.000000 1.000000 0.000000 -6.634565 (2.56526)
0.000000 0.000000 0.000000 1.000000 7.535980 (1.24486)

Log likelihood 965.4211

G3 IN14 CL36 EX36 FF36
Mean -7.559188 4.426868 -2.176031 2.111157 0.185256
Median -7.615919 4.456766 -2.197693 2.065692 0.176561
Maximum -6.627395 4.994993 -1.611948 2.950179 0.329854
Minimum -8.125562 3.811808 -2.900171 1.666220 0.038349
Std. Dev. 0.352704 0.325199 0.095299 0.792884 0.206387
Skewness 0.704402 0.029289 0.185256 0.091560 0.713823
Kurtosis 2.853235 1.762336 1.817576 3.162447 3.178577
Jarque-Bera 6.353189 5.117481 4.781514 8.470165 0.674242
Probability 0.041728 0.077402 0.091560 0.014479 0.713823

Observations 76 80 80 80 80

37. France to UK
Date: 03/22/98 Time: 19:29
Sample: 1976:1 1995:4
Included observations: 75

Test assumption: Linear deterministic trend in the data
Series: G4 IN3 CL37 EX37 FF37
Lags interval: 1 to 4

Eigenvalue Likelihood 5 Percent 1 Percent Hypothesized
Ratio Critical Value Critical Value No. of CE(s)
0.312524 62.60664 68.52 76.07 None
0.209724 34.50197 47.21 54.46 At most 1
0.128894 16.84903 29.68 35.65 At most 2
0.082684 6.499682 15.41 20.04 At most 3
0.000359 0.026920 3.76 6.65 At most 4

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. rejects any cointegration at 5% significance level

Unnormalized Cointegrating Coefficients:
G4 IN3 CL37 EX37 FF37
-1.770673 5.285101 -1.601626 -2.291648 0.978773
-0.298911 0.470371 1.935611 1.173783 -12.17060
-0.257216 0.405020 1.935611 -0.011903 -10.79315
-0.148507 0.331347 -0.011903 -0.331347 1.661626
0.103676 0.638654 1.661626 2.033294

Normalized Cointegrating Coefficients:

G4 IN3 CL37 EX37 FF37 C
1.000000 -2.984798 0.904530 -1.294224 0.331347 1.661626
(0.24981) (0.34831) (0.11258) (1.61445) 20.28752

Log likelihood 944.8117

Normalized Cointegrating Coefficients:

G4 IN3 CL37 EX37 FF37 C
1.000000 -14.70516 -6.862559 86.73635 -12.89938
(17.3615) (7.32540) (120.3500)
0.000000 -5.229730 -1.865565 29.24457 -11.11864
(5.85131) (2.46887) (40.5613)

Normalized Cointegrating Coefficients:

G4 IN3 CL37 EX37 FF37 C
1.000000 -14.70516 -6.862559 86.73635 -12.89938
(17.3615) (7.32540) (120.3500)
0.000000 -5.229730 -1.865565 29.24457 -11.11864
(5.85131) (2.46887) (40.5613)
Log likelihood 953.6382

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

<table>
<thead>
<tr>
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<th>EX37</th>
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<td>(165.031)</td>
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Log likelihood 958.8129

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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<th>EX37</th>
<th>FF37</th>
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<td>-6.997007</td>
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<td>(5.16080)</td>
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<tr>
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<td>(1.53008)</td>
</tr>
<tr>
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<td>0.00000</td>
<td>1.00000</td>
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<tr>
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Log likelihood 962.0493

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<th>EX37</th>
<th>FF37</th>
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</thead>
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<td>1.649275</td>
<td>1.221384</td>
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<tr>
<td>Median</td>
<td>-4.909077</td>
<td>4.197203</td>
<td>1.574277</td>
<td>1.209332</td>
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<tr>
<td>Maximum</td>
<td>-3.957339</td>
<td>4.484399</td>
<td>-1.267117</td>
<td>2.115323</td>
</tr>
<tr>
<td>Minimum</td>
<td>-5.605860</td>
<td>3.495898</td>
<td>-2.250467</td>
<td>0.549036</td>
</tr>
<tr>
<td>Skewness</td>
<td>0.244093</td>
<td>-0.837401</td>
<td>-0.726479</td>
<td>0.324261</td>
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<tr>
<td>Kurtosis</td>
<td>2.756579</td>
<td>2.927661</td>
<td>2.646265</td>
<td>2.994620</td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>0.991935</td>
<td>9.367325</td>
<td>7.447232</td>
<td>1.402031</td>
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<tr>
<td>Probability</td>
<td>0.608981</td>
<td>0.009245</td>
<td>0.024147</td>
<td>0.496081</td>
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Observations 80

38. Japan to UK
Date: 03/22/98 Time: 19:34
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: G5 IN19 CL38 EX38 FF38
Lags interval: 1 to 4

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.342159</td>
<td>84.09605</td>
<td>68.52</td>
<td>76.07</td>
<td>None **</td>
</tr>
<tr>
<td>0.274404</td>
<td>52.68667</td>
<td>47.21</td>
<td>54.46</td>
<td>At most 1 *</td>
</tr>
<tr>
<td>0.204135</td>
<td>28.62956</td>
<td>29.68</td>
<td>35.65</td>
<td>At most 2</td>
</tr>
<tr>
<td>0.083388</td>
<td>11.50509</td>
<td>15.41</td>
<td>20.04</td>
<td>At most 3</td>
</tr>
<tr>
<td>0.064179</td>
<td>4.974804</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 4 *</td>
</tr>
</tbody>
</table>

**(** denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>G5</th>
<th>IN19</th>
<th>CL38</th>
<th>EX38</th>
<th>FF38</th>
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<tbody>
<tr>
<td>-1.177748</td>
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<td>3.095505</td>
<td>4.604722</td>
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<tr>
<td>0.16664</td>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>G5</th>
<th>IN19</th>
<th>CL38</th>
<th>EX38</th>
<th>FF38</th>
<th>C</th>
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Log likelihood 1003.844

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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<tr>
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Log likelihood 1015.872

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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<th>EX38</th>
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<tbody>
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<td>1.333896</td>
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Log likelihood 1024.435

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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<th>EX38</th>
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</thead>
<tbody>
<tr>
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<tr>
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<td>0.000000</td>
<td>9.554411</td>
<td>1.165528</td>
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<tr>
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</table>

Log likelihood 1027.700

Mean -6.783560 4.646861 -4.647154 4.627254 0.356276
Median -6.962154 4.529658 -4.719053 4.560906 0.345227
Minimum -5.839988 5.568419 -3.596845 5.380453 0.589433
Maximum -7.883631 3.858990 -5.698042 3.971688 0.090738
Std. Dev. 0.599197 0.500100 0.577070 0.359516 0.101878
Skewness 0.144201 0.175279 0.024198 0.257705 0.040331
Kurtosis 1.565942 1.580262 1.752072 1.921050 3.145048
Jarque-Bera 7.132326 7.128490 5.198884 4.765937 0.091817
Probability 0.028264 0.028318 0.074315 0.092276 0.955129

Observations 80 80 80 80 80

39. Finland to UK
Date: 03/22/98 Time: 19:36
Sample: 1976:1 1995:4
Included observations: 71  
Test assumption: Linear deterministic trend in the data
Series: G6 IN16 CL39 EX39 FF39  
Lags interval: 1 to 4

<table>
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<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.349586</td>
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<tr>
<td>0.274544</td>
<td>36.94768</td>
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<td>At most 1</td>
</tr>
<tr>
<td>0.118363</td>
<td>14.15986</td>
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<td>At most 2</td>
</tr>
<tr>
<td>0.069801</td>
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<td>At most 3</td>
</tr>
<tr>
<td>0.001102</td>
<td>0.078289</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 4</td>
</tr>
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</table>

**(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. rejects any cointegration at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th></th>
<th>G6</th>
<th>IN16</th>
<th>CL39</th>
<th>EX39</th>
<th>FF39</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2.058130</td>
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<td>-0.083335</td>
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<td>-2.036307</td>
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<tr>
<td>0.320621</td>
<td>-0.290094</td>
<td>-3.235955</td>
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</tr>
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</table>

Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th></th>
<th>G6</th>
<th>IN16</th>
<th>CL39</th>
<th>EX39</th>
<th>FF39</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.000000</td>
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<td>-3.221223</td>
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Log likelihood 892.7416

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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<th>EX39</th>
<th>FF39</th>
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</thead>
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<tr>
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Log likelihood 904.135

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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<thead>
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<th>EX39</th>
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<tr>
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Log likelihood 908.6076

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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<th>EX39</th>
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</tr>
</thead>
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<tr>
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Log likelihood 911.1763

-8.005424 4.144624 -1.398723 0.986068 0.152441
-8.050788 4.124141 -1.349130 0.950063 0.135621
-7.167027 4.646507 -1.126550 1.731009 0.305203
-8.727233 3.743008 -1.789940 0.429065 0.033077
0.318436 0.356035 -0.648386 0.362985 0.681621
2.008174 2.310994 2.657747 2.565059 2.879463

Jarque-Bera 4.399531 3.272576 5.995851 2.387359 6.243195
Probability 0.110829 0.194701 0.049890 0.303104 0.044087

Observations 76 80

40. Spain to UK
Date: 03/22/98 Time: 19:38
Sample: 1976:1 1995:4
Included observations: 75
Test assumption: Linear deterministic trend in the data
Series: G7 IN 10 CL40 EX40 FF40
Lags interval: 1 to 4

Eigenvalue Likelihood Ratio 5 Percent Critical Value 1 Percent Critical Value Hypothesized No. of CE(s)

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>5 Percent</th>
<th>1 Percent</th>
<th>Hypothesized</th>
</tr>
</thead>
<tbody>
<tr>
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<td>82.53841</td>
<td>68.52</td>
<td>76.07</td>
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<tr>
<td>0.309100</td>
<td>52.30259</td>
<td>47.21</td>
<td>54.46</td>
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<tr>
<td>0.169063</td>
<td>24.57054</td>
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<td>35.65</td>
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<td>0.101358</td>
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<td>0.034911</td>
<td>2.665158</td>
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<td>6.65</td>
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</table>

**(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>G7</th>
<th>IN10</th>
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<th>EX40</th>
<th>FF40</th>
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<tr>
<td>1.237566</td>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
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<th>IN10</th>
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Log likelihood 928.8592

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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<th>EX40</th>
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Log likelihood 942.7252
### Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 949.6703

### Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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<th>EX40</th>
<th>FF40</th>
<th>C</th>
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<tbody>
<tr>
<td>1.000000</td>
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<td>5.231530</td>
</tr>
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<td>6.817860</td>
<td>-4.545704</td>
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</tbody>
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Log likelihood 953.6779

### Mean, Median, Maximum, Minimum, Std. Dev., Skewness, Kurtosis, Jarque-Bera, Probability

- **G7**: -6.356000, 2.962109, -5.046137, 4.151691, 0.057321
- **G8**: -6.480594, 3.009809, -5.184865, 4.218459, 0.042644
- **IN22**: -6.480594, 3.009809, -5.184865, 4.218459, 0.042644
- **CL41**: -5.546261, 3.446517, -4.206123, 5.007894, 0.154233
- **EX15**: -5.985829, 2.278460, -5.585168, 3.390414, 0.005628
- **FF41**: -0.401386, 0.290946, 0.408151, 0.416930, 0.006156

- **Mean**: -6.356000, 2.962109, -5.046137, 4.151691, 0.057321
- **Median**: -6.480594, 3.009809, -5.184865, 4.218459, 0.042644
- **Maximum**: -5.546261, 3.446517, -4.206123, 5.007894, 0.154233
- **Minimum**: -5.985829, 2.278460, -5.585168, 3.390414, 0.005628
- **Std. Dev.**: 0.401386, 0.290946, 0.408151, 0.416930, 0.006156
- **Skewness**: 0.265433, -0.596797, 0.678098, -0.146407, 0.851635
- **Kurtosis**: 1.619437, 2.579755, 2.049531, 2.167325, 2.608760
- **Jarque-Bera**: 7.292579, 5.337575, 9.142196, 2.596958, 10.18067
- **Probability**: 0.026088, 0.069336, 0.010347, 0.272947, 0.006156

### Observations: 80

41. The IOM to UK

Date: 03/22/98 Time: 19:40

Sample: 1976:1 1995:4

Included observations: 39

Test assumption: Linear deterministic trend in the data

Series: G8 IN22 CL41 EX15 FF41

Lags interval: 1 to 4

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.857383</td>
<td>193.4345</td>
<td>68.52</td>
<td>76.07</td>
<td>None **</td>
</tr>
<tr>
<td>0.781599</td>
<td>117.4785</td>
<td>47.21</td>
<td>54.46</td>
<td>At most 1 **</td>
</tr>
<tr>
<td>0.682273</td>
<td>58.14300</td>
<td>29.68</td>
<td>35.65</td>
<td>At most 2 **</td>
</tr>
<tr>
<td>0.186082</td>
<td>13.42709</td>
<td>15.41</td>
<td>20.04</td>
<td>At most 3</td>
</tr>
<tr>
<td>0.129240</td>
<td>5.397151</td>
<td>3.76</td>
<td>6.65</td>
<td>At most 4 *</td>
</tr>
</tbody>
</table>

**(***) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 3 cointegrating equation(s) at 5% significance level

### Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>G8</th>
<th>IN22</th>
<th>CL41</th>
<th>EX15</th>
<th>FF41</th>
</tr>
</thead>
<tbody>
<tr>
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<td>-9.031514</td>
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<tr>
<td>1.494280</td>
<td>-7.882326</td>
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<td>3.586806</td>
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</tbody>
</table>
Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
<thead>
<tr>
<th>G8</th>
<th>IN22</th>
<th>CL41</th>
<th>EX15</th>
<th>FF41</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
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Log likelihood: 642.4667

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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<tr>
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<th>IN22</th>
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<th>EX15</th>
<th>FF41</th>
<th>C</th>
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Log likelihood: 672.1345

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood: 694.4924

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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<th>C</th>
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Log likelihood: 698.5074

Summary Statistics:

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<td>Std. Dev.</td>
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<td>Skewness</td>
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<td>Jarque-Bera</td>
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Observations: 44 80 80 80 80

Test assumption: Linear deterministic trend in the data

UK to the IOM
Date: 03/22/98 Time: 19:41
Sample: 1976:1 1995:4
Included observations: 39
Series: J1 IN21 CL42 EX15 FF42
Lags interval: 1 to 4

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
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</thead>
<tbody>
<tr>
<td>0.704780</td>
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<td>0.425568</td>
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<td>0.263862</td>
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<td>3.76</td>
<td>6.65</td>
<td>At most 4 *</td>
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</table>

*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 5 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
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<tr>
<th></th>
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<th>CL42</th>
<th>EX15</th>
<th>FF42</th>
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<tbody>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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<th>CL42</th>
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Log likelihood 532.5604

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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<th>EX15</th>
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Log likelihood 545.9248

Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 556.7350

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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<th>EX15</th>
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Log likelihood 562.7086

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<td>0.159395</td>
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Jarque-Bera: 312.3887
Probability: 0.000000
Observations: 44

Specification error was found. We tried with lower lag values;
Date: 03/24/98 Time: 09:29
Sample: 1976:1 1995:4
Included observations: 42
Test assumption: Linear deterministic trend in the data
Series: J1 IN21 CL42 EX15 FF42
Lags interval: 1 to 1

Eigenvalue | Likelihood Ratio | 5 Percent Critical Value | 1 Percent Critical Value | Hypothesized No. of CE(s)
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0.595988 | 84.91467 | 68.52 | 76.07 | None **
0.408770 | 46.84965 | 47.21 | 54.46 | At most 1
0.315344 | 24.77657 | 29.68 | 35.65 | At most 2
0.165564 | 8.653524 | 15.41 | 20.04 | At most 3
0.029632 | 1.263337 | 3.76 | 6.65 | At most 4

\*(* *) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 1 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

<table>
<thead>
<tr>
<th>J1</th>
<th>IN21</th>
<th>CL42</th>
<th>EX15</th>
<th>FF42</th>
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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

<table>
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<tr>
<th>J1</th>
<th>IN21</th>
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Log likelihood 495.1114

Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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<th>EX15</th>
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<tr>
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Log likelihood 506.1480
Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

<p>| | | | | | |</p>
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<tbody>
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Log likelihood: 514.1036

Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood: 517.9046

43. EIRE to the IOM

Date: 03/22/98 Time: 19:43
Sample: 1976:1 1995:4
Included observations: 39

Test assumption: Linear deterministic trend in the data
Series: J2 IN6 CL43 EX43 FF43
Lags interval: 1 to 4

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<th>Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
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<tbody>
<tr>
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</tr>
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*(**) denotes rejection of the hypothesis at 5%(1%) significance level

L.R. test indicates 3 cointegrating equation(s) at 5% significance level

Unnormalized Cointegrating Coefficients:

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Normalized Cointegrating Coefficients: 1 Cointegrating Equation(s)

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Log likelihood: 513.0247
## Normalized Cointegrating Coefficients: 2 Cointegrating Equation(s)

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Log likelihood 527.7851

## Normalized Cointegrating Coefficients: 3 Cointegrating Equation(s)

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Log likelihood 537.5482

## Normalized Cointegrating Coefficients: 4 Cointegrating Equation(s)

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Log likelihood 544.2674

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<td>-0.537918</td>
<td>-0.092243</td>
<td>0.424549</td>
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<td>Median</td>
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<td>3.372912</td>
<td>-0.543020</td>
<td>-0.084877</td>
<td>0.406536</td>
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<td>Maximum</td>
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<td>3.838486</td>
<td>-0.210116</td>
<td>0.074779</td>
<td>0.700814</td>
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<td>Minimum</td>
<td>-6.238811</td>
<td>2.638741</td>
<td>-0.759144</td>
<td>-0.255326</td>
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<td>Std. Dev.</td>
<td>1.230851</td>
<td>0.278141</td>
<td>0.126819</td>
<td>0.085549</td>
<td>0.113763</td>
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<td>Skewness</td>
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<td>-0.493007</td>
<td>0.492975</td>
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<td>0.197915</td>
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<td>Kurtosis</td>
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<td>2.606470</td>
<td>3.061307</td>
<td>1.893484</td>
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Jarque-Bera | 0.822517 | 3.756963 | 3.252847 | 4.700281 | 1.006715 |
Probability | 0.662816 | 0.152822 | 0.196632 | 0.095356 | 0.604498 |
Observations | 44 | 80 | 80 | 80 | 80 |
4. VEC ESTIMATION (ECM)

4.1 GERMANY TO MALTA

VEC ESTIMATION (1-lag)

Included observations: 77 after adjusting endpoints
Standard errors & t-statistics in parentheses

Cointegrating Eq: CointEq1

<table>
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<tr>
<th></th>
<th>D(W3(-1))</th>
<th>D(IN4(-1))</th>
<th>D(CL10(-1))</th>
<th>D(EX10(-1))</th>
<th>D(FF10(-1))</th>
<th>D(W3(-1),2)</th>
<th>D(IN4(-1),2)</th>
<th>D(CL10(-1),2)</th>
<th>D(EX10(-1),2)</th>
<th>D(FF10(-1),2)</th>
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Error Correction: D(W3,2) D(IN4,2) D(CL10,2) D(EX10,2) D(FF10,2)

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<th>D(IN4(-1),2)</th>
<th>D(CL10(-1),2)</th>
<th>D(EX10(-1),2)</th>
<th>D(FF10(-1),2)</th>
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VEC ESTIMATION (2-lags)

Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints
Standard errors & t-statistics in parentheses

Cointegrating Eq: CointEq1

C   | 0.008309  -0.000435  -0.000165  6.87E-05  -0.000179
    | (0.01992) (0.01387) (0.00949) (0.01566) (0.00129)
    | (0.41712) (-0.03136) (-0.01743) (0.00439) (-0.13828)

R-squared | 0.775403  0.472320  0.170405  0.180182  0.345579
Adj. R-squared | 0.756151  0.427091  0.099297  0.109912  0.289486
Sum sq. resid  | 2.135293  1.035000  0.484330  1.320054  0.009021
S.E. equation | 0.174654  0.121597  0.083181  0.137324  0.011352
Log likelihood | 28.77227  56.65406  85.89057  47.28812  239.2440
Mean dependent| 0.003281  0.000195 -0.000503  0.000705 -0.000210
S.D. dependent| 0.353687  0.160649  0.087646  0.145556  0.013468

Determinant Residual Covariance | 5.99E-14
Log Likelihood                  | 818.4061
Akaiake Information Criteria    | -30.23890
Schwarz Criteria                | -29.99538

VEC ESTIMATION (2-lags)

Cointegrating Eq: CointEq1

D(W3(-1))  | 1.000000
D(IN4(-1)) | 1.772599 (0.39546) (4.48234)
D(CL10(-1))| 3.149345 (0.80715) (3.90179)
D(EX10(-1))| 2.992425 (0.60134) (4.97624)
D(FF10(-1))| -4.907623 (2.19894) (-2.23181)

C   | -0.042500

Error Correction: D(W3,2)  D(IN4,2)  D(CL10,2)  D(EX10,2)  D(FF10,2)

CointEq1 | -1.970935  -0.531310  -0.168000  0.220793  0.004275
         | (0.24702)  (0.13117)  (0.09257)  (0.15361)  (0.01342)
         | (-7.97896) (-4.05062) (-1.81490) (1.43740)  (0.31855)

D(W3(-1),2) | 0.713818  0.339403  0.137616  -0.203730  -0.003027
            | (0.17017)  (0.09036)  (0.06377)   (0.10582)  (0.00925)
            | (4.19481)  (3.75613)  (2.15807) (-1.92529) (-0.32736)

D(W3(-2),2) | 0.141936  0.210520  0.089572  -0.125740  -0.002112
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R-squared 0.755310
Adj. R-squared 0.713254
Sum sq. resid 2.321829
S.E. equation 0.190447
Log likelihood 24.72814
Akaike AIC -3.172821
Schwarz SC -3.172821
Mean dependent 0.005154
S.D. dependent 0.005563

Determinant Residual Covariance 1.83E-14
Log Likelihood 852.8363
Akaike Information Criteria -31.29034
Schwarz Criteria -30.89166

VEC ESTIMATION (3-lags)
Sample (adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints
Standard errors & t-statistics in parentheses

Cointegrating Eq: CointEq1

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Error Correction: D(W3(-1),2) D(IN4(-1),2) D(CL10(-1),2) D(EX10(-1),2) D(FF10(-1),2)

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**VEC ESTIMATION (4-lags)**

Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints
Standard errors & t-statistics in parentheses

Determinant Residual Covariance 6.61E-15
Log Likelihood 868.0627
Akaike Information Criteria -32.16405
Schwarz Criteria -31.60360
Cointegrating Eq: CointEq1

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Error Correction:

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Determinant Residual Covariance: 3.08E-15
Log Likelihood: 896.2916
Akaike Information Criteria: -32.79186
Schwarz Criteria: -32.07573

4.2. UK TO MALTA:

VEC ESTIMATION (1-lag)

Included observations: 77 after adjusting endpoints
Standard errors & t-statistics in parentheses

Cointegrating Eq: CointEq1

| D(Z1(-1))     | 1.000000 |
| D(IN2(-1))    | -0.077414 (0.29257) (-0.26460) |
| D(CL1(-1))    | -0.585195 (0.36486) (-1.60388) |
| D(EX1(-1))    | 0.196701 (0.66092) (0.29762) |
| D(FF1(-1))    | 2.050340 (0.88618) (2.31368) |
| C             | 0.005469 |

Error Correction: D(Z1,2) D(IN2,2) D(CL1,2) D(EX1,2) D(FF1,2)

| CointEq1       | -1.967210 (0.13247) (-14.8502) |
| D(Z1(-1),2)    | 0.654838 (0.08577) (7.63486) |
| D(IN2(-1),2)   | 0.007640 (0.18877) |
| C              | 0.025041 (0.08210) (0.05301) |
| D(IN2,2)       | 0.057435 (0.05837) (0.98402) |
| D(CL1,2)       | 0.012153 (0.01753) (0.69325) |
| D(EX1,2)       | 0.002272 (0.02228) (0.010196) |
| D(FF1,2)       | 0.016965 (0.01443) (0.69325) |

0.005469
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**VEC ESTIMATION (2-lags)**

Sample(adjusted): 1977:1 1995:4
Included observations: 76 after adjusting endpoints
Standard errors & t-statistics in parentheses

Cointegrating Eq: CointEq1

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**Error Correction:**

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**R-squared**

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VEC ESTIMATION (3-lags)

Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints
Standard errors & t-statistics in parentheses

Cointegrating Eq: CointEql

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Determinant Residual Covariance 1.42E-14
Log Likelihood 862.3510
Akaike Information Criteria -31.54073
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Determinant Residual Covariance 5.28E-15
Log Likelihood 876.3722
Akaike Information Criteria -32.38863
Schwarz Criteria -31.82819

VEC ESTIMATION (4-lags)

Sample(adjusted): 1977:3 1995:4
Included observations: 74 after adjusting endpoints
Standard errors & t-statistics in parentheses

Cointegrating Eq: CointEq1

D(Z1(-1))  1.000000
D(IN2(-1))  0.220961  (0.39477)  (0.55973)
D(CL1(-1))  -2.446777  (0.92492)  (-2.64540)
D(EX1(-1))  -0.176127  (0.71836)  (-0.24518)
D(FF1(-1))  6.873988  (2.62842)  (2.61525)
C  0.005965

Error Correction: D(Z1,2)  D(IN2,2)  D(CL1,2)  D(EX1,2)  D(FF1,2)
CointEq1  -0.080960  0.258465  0.531632  0.116523  -0.035014
(0.32863)  (0.23667)  (0.18644)  (0.04805)  (0.07546)
(-0.24636)  (1.09207)  (2.85151)  (2.42482)  (-0.46404)

D(Z1(-1),2)  -1.426441  -0.122306  -0.436491  -0.084873  0.068553
(0.31278)  (0.22526)  (0.17745)  (0.04574)  (0.07182)
(-4.56052)  (-0.54295)  (-2.45981)  (-1.85568)  (0.95455)

D(Z1(-2),2)  -1.491608  -0.099501  -0.327693  -0.071597  0.040979
(0.25880)  (0.18639)  (0.14683)  (0.03784)  (0.05942)
(-5.76349)  (-0.53384)  (-2.23185)  (-1.89189)  (0.68961)

D(Z1(-3),2)  -1.441330  -0.007472  -0.185766  -0.026531  0.037175
(0.18072)  (0.13015)  (0.10253)  (0.02643)  (0.04149)
(-7.97558)  (-0.05741)  (-1.81189)  (-1.00397)  (0.89590)

D(Z1(-4),2)  -0.581099  0.044628  -0.060026  -0.017141  0.017431
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Akaike Information Criteria: -33.10252
Schwarz Criteria: -32.38639
5. FORECASTING RESULTS

5.1 OVERALL FORECASTS
(5 years ahead 1991.1-1995.4)

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22. Austria to Turkey

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(2 years ahead 1994.1-1995.4)

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5. Netherlands to Austria

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7. Turkey to Austria

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5.2.2 MALTA INBOUND:

8. Austria to Malta

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9. Denmark to Malta

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10. Germany to Malta

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HW: 0.016
ARMA: 0.163 0.128 24.403 0.069

12. Libya to Malta

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HW: 0.076
ARMA: 0.174 0.163 29.756 0.127

13. UK to Malta

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AS: 0.132 0.101 17.625 0.083
DE: 0.387
HW: 0.044
ARMA: 0.141 0.111 18.659 0.089

14. USA to Malta

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5.2.3 N. CYPRUS INBOUND:

15. Turkey to N. Cyprus (83)

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16. UK to N. Cyprus

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17. Germany to N. Cyprus

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18. USA to N. Cyprus

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27. N. Cyprus to Turkey (AS 86)

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28. Israel to Turkey

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30. Switzerland to Turkey

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31. Greece to Turkey

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32. Belgium to Turkey

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33. Netherlands to Turkey

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5.2.5 UK INBOUND:

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42. UK to IOM

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43. EIRE to IOM

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(1 year ahead 1995.1-1995.4)

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### 5.3.2 MALTA INBOUND:

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### 10. Germany to Malta

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### 13. UK to Malta

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14. USA to Malta

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5.3.3 N. CYPRUS INBOUND:

15. Turkey to N. Cyprus

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16. UK to N. Cyprus

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17. Germany to N. Cyprus

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18. USA to N. Cyprus

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19. Australia to N. Cyprus

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20. Turkey to N. Cyprus

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5.3.4 TURKEY INBOUND:

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**5.3.5 UK INBOUND:**

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38. Japan to UK

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39. Finland to UK

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40. Spain to UK

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41. IOM to UK

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5.3.6 THE IOM INBOUND:

42. UK to IOM

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43. EIRE to IOM

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