THE IMPACT OF THE EUROPEAN ECONOMIC COMMUNITY
ON THE ECONOMIC STRUCTURE OF THE
TURKISH REPUBLIC OF NORTHERN CYPRUS
DEDICATION

To My Wife, Ender,
and
To My Daughter, Mes'ude.
ACKNOWLEDGEMENTS

I am very grateful to three ladies who made it possible for me to be awarded a British Council Scholarship and the acceptance to Leicester University. Without the continuous support and inquires of Miss Theresa Kassell, official of the British Council in Nicosia, it would not be possible for me to get the scholarship. It was very courageous of Dr. Catherine Price to give me an interview and accept me to the Economics Department of Leicester University where there are 85 students from the Southern Part of Cyprus and only myself from the Northern Part. I am very grateful to all of them. Of course, needless to say, I am also grateful to the British Council for giving the scholarship.

Statistics required by the research were all in Northern Cyprus and the research has been carried out in Leicester. The distances were shortened by the operators at the switch board of the telex and fax machines on both ends. I appreciate their help. My wife, Ender has constantly tried to provide the required data for the research. Mr. Suphi Galip and Mr. Feridun Kemal, from the National Planning Office, very patiently did their best to provide these statistics. I would like to thank them all.

I am very much impressed with the cooperation and immediate assistance of the staff in the computer center of the University, specially Dr. Richard Mobbs. Mr. John Beckett is the statistician in the computer center who also deserves
a special thanks for introducing me with the statistical package programs and bearing with me not only in the University but also on the tennis court between the breaks.

For the quality of this thesis, I owe it to my supervisor Prof. Peter Jackson. At every stage of the research he, not only guided and supervised but always encouraged. Knowing him, working and gaining experience from him has been as valuable the degree I will get. It has been a great honour and a pleasure working with someone, that no one says that he is "good" but a "very good person in every respect". Probably this must be the reason why at any period of time he supervises not less than 10 Ph. D. students. I am very grateful to him.

I would like to thank to the external examiner, Prof. Ian McNicoll, and internal examiner, Dr. Catherine Price as their suggestions will contribute in further research.

Staying three years away from my wife and my daughter has been the most difficult part of the research. I am sure life was even more difficult for them in this period of time. My daughter was 1 year old when I left her, now she is 4. During these three years, they must have missed me a lot. I could not been able to be with them and I could not been able to give anything to them. Well, at this stage all I can do is to dedicate this thesis to them, the outcome of three years hard work, with the hope that we never be apart again not even a day. To my wife Ender and to my daughter Mes'ude.
The Cyprus problem started in 1963 with the first coup of the Greeks. The second coup in 1974 by the Greeks aimed to annex Cyprus to Greece and the counter intervention of Turkey led Cyprus being divided into two. The Turkish Republic of Northern Cyprus (TRNC) in the North and the Greek Cypriot Administration in the South.

This research uses input-output theory in analysing the economic structure of TRNC in 1986. Descriptive analysis, enabled comparison of the two economies of the Island. Linkage analysis provided a better understanding of the interindustry relations. Computation of type I and type II output, income, and employment multipliers, and the source of output, income, employment and competitive imports for final demand categories gave a further information about the structural interdependencies of the industries.

Using Klein's adopted model for the TRNC economy, OLSQ, LSQ, 2SLS, and NL-2SLS estimation methods are compared in their backward and forward performances over a period of 1977-1988. Dynamic multipliers are also computed. Financial aid received from Turkey was 11 times more effective than aid received from the EEC. Forward projections showed that unless the financial aid received from the EEC is given with respect to need rather than to the projects in the South, or a separate agreement is made with the TRNC, then the present financial aid has very negligible effect on the TRNC economy.
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\( X_{ij} \) domestic and imported output of industry i used by industry j
\( X_i \) gross output of industry i
\( Y_i \) domestic and imported final demand for the output of industry i
\( a_{ij} \) total input coefficient, \( ij \)’th element of A-matrix
\( A \) total input coefficients matrix
\( b_{ij} \) \( ij \)’th element of the inverse of \( (I-A) \) matrix
\( A^a \) augmented A-matrix
\( a^a_{ij} \) \( ij \)’th element of the augmented A-matrix
\( b^a_{ij} \) \( ij \)’th element of the inverse of augmented matrix
\( Y^* \) domestic and imported final demand, excluding household consumption for the output of industry i
\( X^* \) gross output vector for the augmented matrix
\( D_{ij} \) domestic output of industry i used by industry j
\( d_{ij} \) domestic input coefficient, \( ij \)’th element of D-matrix
\( D \) domestic input coefficients matrix
\( r_{ij} \) \( ij \)’th element of the inverse of \( (I-D) \) matrix
\( d^*_{ij} \) \( ij \)’th element of the augmented D-matrix
\( D^* \) augmented D-matrix
\( r^*_{ij} \) \( ij \)’th element of the inverse of augmented D-matrix
\( Y^d \) domestic final demand for the output of industry i
\( Y^d^* \) domestic final demand, excluding household consumption, for the output of industry i
\( M_1 \) total imports \((M_2 + M_3)\)
\( M_2 \) competitive imports (imports for intermediate use)
\( M_3 \) noncompetitive imports (imports for final demand use)
\( m_{ij} \) import coefficient of industry \( j \), \( (M_{2j} / X_j) \)

\( m_{ij} \) imported input coefficient, \( ij \)'th element of \( M \)-matrix

\( N_{ij} \) import of industry \( i \)'s output used by industry \( j \)

\( M \) imported input coefficients matrix

\( V_j \) value added by industry \( j \)

\( o^{\text{I}}_{i} \) type I output multiplier of industry \( i \)

\( o^{\text{II}}_{i} \) type II output multiplier of industry \( i \)

\( y^{\text{I}}_{i} \) type I income multiplier of industry \( i \)

\( y^{\text{II}}_{i} \) type II income multiplier of industry \( i \)

\( l^{\text{I}}_{i} \) type I employment multiplier of industry \( i \)

\( l^{\text{II}}_{i} \) type II employment multiplier of industry \( i \)

\( L_{i} \) employment in industry \( i \)

\( l_{i} \) employment coefficient of industry \( i \), \( (L_{i} / X_{i}) \)

\( e_{i} \) column vector with all elements except \( i \) being zero

\( W_{i} \) total intermediate input demand for industry \( i \)'s output

\( W \) total intermediate input demands for all industries' output

\( Z_{j} \) total intermediate input demand of industry \( j \)

\( Z \) total intermediate input demands of all industries

\( C_{h i} \) household consumption of the output of industry \( i \)

\( C_{h i} \) household consumption coefficient of industry \( i \)

\( X_{n+1} \) total household income generated

\( H_{j} \) household income received from industry \( j \)

\( h_{j} \) household income coefficient of industry \( j \), \( (H_{j}/X_{j}) \)

\( C_{g i} \) government consumption of the output of industry \( i \)

\( I_{i} \) investment in industry \( i \)

\( E_{i} \) export of the output of industry \( i \)
Variables of the Model

C  Real private expenditures
Y  Gross National Product (in current prices)
T\textsubscript{t}  Total direct and indirect taxes
T\textsubscript{r}  Transfer payments
P  Domestic price index (GNP deflator)
I  Real private investment
K  Real capital stock
M  Money supply
M\textsubscript{a}  Real total imports
M\textsubscript{e}  Real imports from the EEC countries
M\textsubscript{t}  Real imports from Turkey
M\textsubscript{r}  Real imports from rest of the world
L  Employment
W  Annual average wage
N  Labour supply
G  Real government expenditures
R  Interest rate
E\textsubscript{a}  Real total exports
\textit{t}  Chronological time
ER  Exchange rate for pound sterling
C(-1)  Lagged real private consumption
(Y/P)(-1)  Lagged real gross national product
R(-1)  Lagged interest rate
M\textsubscript{e}(-1)  Lagged real imports from the EEC countries
M\textsubscript{t}(-1)  Lagged real imports from Turkey
M\textsubscript{r}(-1)  Lagged real imports from rest of the world
K(-1)  Lagged real capital stock
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CHAPTER 1. INTRODUCTION

In this chapter the aims of the research, the methods that will be used and the structure of the study will be explained. Before dealing with the research in detail, it is important to know the circumstances which led to the evolution of the Turkish Republic of Northern Cyprus (TRNC) in the northern part of Cyprus and its relations with the European Economic Community (EEC). Within a historical approach, the events which caused the division of the Island into two, the TRNC in the North and the Greek Cypriot Administration in the South, will be summarised. Without understanding the historical and political developments on the Island and its relations with the EEC, it is not possible to assess the aims and the results of the research and to derive correct policy implications.

1.1 Turkish Republic of Northern Cyprus

The Turkish Republic of Northern Cyprus (TRNC) is one of the youngest republics of the world, founded on 15 November 1983, in the North of Cyprus. It covers an area of 1,295 square miles, about 37% of the Island, with a population of 165,035 in 19871. In order to justify the existence and understand the evolution of the TRNC, it is essential to

trace the historical and political developments on the Island.

The Turkish presence on Cyprus started with the capture of the Island by the Ottomans, the Sultanate of Selim II, from the Venetians in 1571. Venetians who were the foreign feudal landlords on the Island, with the Maltese pirates harbouring in Cyprus ports had started to attack Turkish pilgrimage and merchant ships sailing in the Mediterranean. Thus, Sultan Selim II capturing the Island put an end to this state of affairs and consolidated the Ottoman control over the East in general. 12,000 soldiers left to defend the Island, 4,000 cavalry men distributed among the local people, 20,000 decommissioned soldiers and 2,000 cavalry remaining as colonists formed the original nucleus of the Turkish Cypriot Community whose members were entirely of pure Turkish origin. Further residential and skilled craftsmen needs of the Island were met from various parts of the mainland Turkey.

The use of resettlement as a general method for the development of the Turkish population of Cyprus continued intermittently until the middle of the eighteenth century. At the time of the British arrival in Cyprus in 1878, approximately 95,000 Turkish Cypriots were residing on the Island.

\(^3\)Ibid., p. 19.
With the opening of the Suez Canal in 1869, Cyprus became strategically important to the British as it was on the route to the Crown Colony of India. Following the Russian-Turkish war of 1877-8, Cyprus was leased to the British and the administration temporarily passed to Great Britain, in exchange for a promise to assist Turkey against the Russians. The deal was a joint governorship of Cyprus and the British agreed to pay a tribute of £92,800 annually to the Ottomans, which continued until 1914. The Island still remained Ottoman territory and its inhabitants Ottoman subjects. On the outbreak of the First World War in 1914, Britain unilaterally annexed Cyprus to the British Crown. The annexation was not recognised until the Treaty of Lausanne in 1924.

After leasing, British ruled the Island though a British High Commissioner supplemented with a partly elected Legislative Council and an Executive Council including Greek and Turkish Cypriots until 1925 when Cyprus became a British Crown Colony. By then a Governor was appointed and later in 1931 the Legislative Council was abolished leaving the Governor in sole charge of the Island’s affairs, advised by his Executive Council.

Starting from this period the Greek Community, in complicity with the Greek Government in Athens, made open intentions of

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taking over the Island for itself through the suppression of the Turkish community. With the leadership of the Greek Orthodox Church and other Enosis (union of Cyprus with Greece) agitators riots has been started in 1931 which were suppressed by the British Authorities and the leaders of the revolt were forced into exile. However, under the directives of Archbishop Makarios and with the assistance of Greece, the newly formed Greek terrorist organisation EOKA commenced a war of terror in Cyprus on 1 April, 1955. A state of emergency declared by the British in November, 1955 and continued for four years.

After four years of Greek terrorism for Enosis against the British and the Turkish community, a settlement was reached at Zurich between the representatives of Turkey and Greece in consultation with the representative leaders of the Turkish and Greek Cypriot communities in Cyprus. As a result the foundations of an independent state were laid down. It is very important to note that both the Zurich and the London Agreement which followed (February 1959)\(^5\), took into consideration the fact that there was not and had never been a Cypriot Nation and that the Turks and the Greeks of Cyprus had always lived and prospered as two independent ethnic communities, always guarding their

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national and communal identity with separate languages, customs, culture, historical heritage and religion.

Under the Cyprus Act 1960, the Island became an independent sovereign republic on 16 August 1960. Constitution was working, the rule of law was being established through the jurisdiction of the Constitutional Court and the Greek and Turkish Cypriots were getting used to the idea of running a Government in partnership. Makarios who had agreed the Zurich and London solution not as a finality but as an interim measure decided to strike. Initially he tried to change the constitution. As he could not change the constitution, he chose to disregard the constitution, the laws of the land, and human rights completely and unilaterally pursued his chosen goal of Enosis. To achieve this aim, Greek Leaders resorted to violence and after a well prepared famous "Akritas Plan" to exterminate the whole Turkish Cypriots in 48 hours, they launched all-out attacks against the Turkish Cypriot people on 21 December 1963. These attacks led to inter-communal troubles and the Turkish Cypriot component was forcibly expelled from the

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6 To confirm this fact, a number of speeches and interviews given by Archbishop Makarios are recorded in, Faulds, A. (1989), Excerpta Cypria for Today, K. Rustem & Brothers, London, pp. 26-33.

7 A copy of the Akritas Plan which was first published by a local Greek newspaper, Patris, on 21 April 1966, is given in, Raddaway, J. (1986), op. cit. pp. 199-206.
executive, legislative and judicial organs of the state. Outnumbered and outgunned Greek Cypriots destroyed 103 Turkish villages, thereby forcing 27,000 Turkish Cypriots to become refugees. With 24,000 unemployed people who were employed in various industries Turkish Cypriots were forced to live in enclaves which could amount only 2.5% of the Island. An inhuman economic blockade, the murder of the Turkish Cypriot hostages, armed attacks on Turkish Cypriot villages, all were either directly inspired by, or certainly connived at by the Greek Cypriot Leadership.

In order to get rid of the Zurich and London Agreements Archbishop Makarios referred the problem to the United Nations. On 27 March 1964, the United Nations Security Council send a peace keeping force to Cyprus to prevent the situation on the Island from deteriorating even further. However, United Nations force failed to restore the constitution and the situation that prevailed prior to the violence. All the attempts to reach a settlement under the auspices of the United Nations failed and went into suspense in 1967. Still, UN Secretary General continued to explore new ways of bringing the two sides together.

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8 A list of the names of the Turkish villages evacuated is given in, Oberling, P. (1982), The Road to Bellapais, The Turkish Cypriot Exodus to Northern Cyprus, Columbia University Press, New York, pp. 237-245.

It was quite evident that the Greek Cypriots were making best of occupying the Cyprus Government by controlling all of the entrance and outlets of the Island and enjoying the recognition by the outside world as the "legitimate government" of the whole Cyprus. They were ruling the whole Island except the Turkish enclaves distributed on the Island. While the Greek Cypriots with outside co-operation and economic aid had been developing fast, Turkish Cypriots were living at a subsistence level with a major part of their budget being financed by Turkey.

On 15 July 1974, mainland Greek officers of the Greek Cypriot National Guard launched a coup d'état against president Makarios and installed a former EOKA member, Nikos Sampson, in his place. Nikos Sampson was the leader of a political party of Greek Cypriots called EOKA B whose main political slogan was to exterminate the Turkish Cypriots, drive them into the sea and thus bring about Enosis.\(^{10}\)

Considering the fact that the Turkish Cypriots were in danger of extermination, the Prime Minister of Turkey, Bulent Ecevit, went to London to ask Britain to fulfil

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\(^{10}\) The aim of the coup d'état was best explained by the speech given at the UN Security Council on 19 July, 1974 by Archbishop Makarios which can be found in, Denktas, R. (1988), The Cyprus Triangle, Revised Edition, K. Rustem & Brother, London, pp. 180-188.
their responsibilities as guarantors acting jointly to restore and maintain the constitutional order on the Island. Britain refused to take any action. As urgent action was needed, Turkish Government, using its Treaty rights, legally intervened in Cyprus to save the Turkish Cypriots from extermination. Turkish troops landing in Cyprus faced with stiff Greek resistance. Two Geneva Conferences held by the leaders of the guarantor countries could not resolve the differences over the Island's political future but recognised the existence of two autonomous administrations in the Island by the Geneva Declaration of 30 July, 1974.

It was important to provide the securities of Turkish Cypriots as a massacre of Turkish Cypriots had already taken place. Thus, an exchange of population was jointly agreed upon, thereby allowing Turkish Cypriots to move to North Cyprus and leaving the South to the Greek Cypriots. Thus Cyprus became separated into a Turkish North and a Greek South.

On 13 February 1975, the Turkish Federated State of Cyprus was proclaimed and its constitution was approved on 8 June 1975. The constitution was open to amendment and adaptation if and when the proposed Federal Republic of Cyprus was set up by the agreement between the Turkish and Greek Cypriot peoples of the Island. Presidential and general elections

were held on 20 June, 1976 and Rauf R. Denktas was elected as the first President of the Turkish Federated State of Cyprus.

The Agreement reached between the leaders of the two people, President Denktas and Archbishop Makarios, on 12 February, 1977, was a major breakthrough and it came to be known as the "Four Guidelines". These "Guidelines" envisage the establishment of an independent, nonaligned, bi-communal Republic. They provide a bi-zonal solution, such that the freedom of movement, freedom of settlement and the right to property, should be settled with regard to the bi-communal and bi-zonal characters of the proposed federal system and to the security of the Turkish Cypriots.12

As the years passed it became apparent that the Greek Cypriots were not really interested in finding a just and lasting settlement through the inter-communal talks as urged by United Nations Resolutions. This state of affairs left the Turkish Cypriot people with no other alternative but to establish their own Republic in Northern Cyprus. On 15 November, 1983, following a petition by the people, Legislative Assembly of the Turkish Federated State of Cyprus unanimously approved the establishment of the Turkish Republic of Northern Cyprus. The constitution of the Turkish Republic of Northern Cyprus was approved by the Turkish Cypriot people at the referendum held on 5 May 1985

and became operative. On 6-7 August 1984, in order to find a negotiated settlement to the Cyprus problem UN. Secretary-General had started with the "Vienna Working Points" and after lengthy, painstaking "proximity talks" and "technical level talks" ended up with the Draft Agreement of January, 1985 and the Draft Framework Agreement of 29 March, 1986. Both proposals were based on equal political status of the two sides and the principle of a bi-zonal federal system and constituted an "indivisible package" and an "integrated whole". With this understanding the Turkish Cypriot Side accepted both of the proposals made by UN. Secretary General in Toto. On the other hand, Greek Cypriot Leader, Spyros Kyprianou, refused both of these proposals in spite of the Greek Cypriot people's will. Because of his negative attitude towards the proposals of the UN. Secretary General, Spyros Kyprianou was bitterly criticized not only in diplomatic circles and in the world media but also in the Greek Cypriot press and in the Greek Cypriot Parliament.

The negative attitudes of the Greek side to the proposals of UN. Secretary-General can be explained by the following reasons:

i. The Greek Cypriot side, which is unjustifiably treated as if they were "the legitimate government of the whole Cyprus", lacks the political incentive to establish a bi-national federation with the Turkish Cypriots, which would require the sharing of the power again, on the basis of political equality.\(^\text{15}\)

ii. The Greek Cypriot side, which, by exploiting its illegitimate title of the "Government of Cyprus" is receiving all international aid which is given to Cyprus as a whole, and as such enjoys a much higher standard of living than the Turkish Cypriot people, lacks the economic incentive to reach an agreement which would involve the sharing of that aid with the Turkish Cypriots.

iii. The Greek Cypriot side has not abandoned its Enosis psychology (union with Greece) which regards Cyprus as a "Greek Island" on which Turkish Cypriots have no share.

iv. Outside factors, mainly the influence of Greece,

played a major and decisive role on Greek Cypriot side for rejecting the proposals of the UN. Secretary General. Greece’s pressure on Cypriot Greeks for an uncompromising attitude is part of its foreign policy which was built on tension, rather than peaceful co-operation with Turkey, by using his favourite theme of the fictitious "Turkish Threat".

As long as the above realities exist, it is hard to have the Greek Cypriot side to come to an agreement which will be based on equal political status of the two sides and the principle of a bi-zonal federal system. On the contrary in his speeches before his election as the President of the Greek Cypriots on 14 February, 1988, George Vassiliou has taken the same uncompromising route as his predecessor, Spyros Kyprianou. He had been rejecting all the offers made for a meeting by President Rauf Denktas by putting forward many preconditions which are expected to be discussed within the framework of a solution and are unacceptable by the Turkish Cypriots without any negotiation. This leaves the Turkish Cypriot with no other alternative but to seek recognition for the Turkish Republic of Northern Cyprus which they had been postponing with the hope of a federal solution on the Island.
1.2 Relations of Cyprus with the EEC

Since the establishment of the Republic of Cyprus in 16 August, 1960, United Kingdom (UK) had been applying preferential tariffs to imports from Cyprus. UK was a very important market for Cyprus. When UK applied to EEC for membership in 1 August, 1961, Cyprus in fear of losing UK market, in line with the article 238 of the Rome Agreement, also applied to EEC in the first half of 1962. It is important to note that the decision for application was taken in 1961 with the consent of both communities on the Island as by then Turkish Cypriots were one of the partners of the Cyprus Government. When the discussions for an Association Agreement started, in spite of all the efforts, no Turkish Cypriot were included in such discussions as the Turkish Cypriots were thrown out of the government by force in 1963. Thus the Association Agreement which was signed on 19 December 1972 and put into force on 1 January, 1973 was signed by the European Council on one side and so called "Cyprus Government" on the other side.\(^{16}\)

Although there had never been referred to Turkish Cypriot views, the Association Agreement was to be applied to the whole Cyprus without any discrimination of the two communities on the Island. This was clearly expressed in the article 5 of the Agreement as "the rules governing trade between the Contracting Parties may not give rise to

\(^{16}\)Necatigil, Z. (1989), \textit{op. cit.}, pp. 299-301.
any discrimination between the Member States, or between nationals or companies of these states, nor nationals or companies of Cyprus\textsuperscript{17}. Nevertheless it is hard to say that this rule has been applied properly.

The Association Agreement was favouring two 5 year periods by the end of which a customs union with EEC would be achieved through eliminating all the factors obstructing trade (tariffs and quotas) between Cyprus and EEC and accepting EEC's trade policy to Third Countries. First period ended on 30 June, 1977 and the Association Agreement continued with annual renewals because of the political situation on the Island until 30 June, 1984. During the period of Greece's chairmanship of the Council of Ministers, referring to article 2 (3) of the Association Agreement Council decided to start the negotiations with "Cyprus Government" for a customs union with the EEC. Turkish side referring to article 5 wanted to participate in the negotiations but could only succeed to have informal meetings with the EEC officials and express their views\textsuperscript{18}.

\textsuperscript{17}Commission of the European Communities (1972), Agreement Establishing an association between the Republic of Cyprus and the European Economic Community, SEC(72) 4552, Brussels, p. 3.

Customs Union Agreement was finalized on 22 May, 1987 and ratified by the parliaments of the EEC and the "Cyprus Government" in October, 1987 and put into force on 1 January, 1988.

After signing the Association Agreement in 1973, EEC reduced the customs duties on industrial products (excluding the petroleum products) originating from Cyprus by 70% and abolished the quota restrictions. Cyprus was expected to reduce the customs duties for industrial products originating from the EEC by the same amount. In reality Greeks reduced the customs duties by 35% while the Turkish side by 15%. It is important to note that industrial products originating from Cyprus to the EEC had to obey the principle of the "rules of origin". That is, the industrial product to be exported to the EEC have to be completely manufactured in Cyprus or its inputs have to be imported from EEC countries.

As far as the agricultural products are concerned, in line with the Association Agreement, EEC reduced the customs duties by 40% and applied annual quotas. Turkish Cypriots could not benefit from this application as much as the Greek Cypriots as the Greek Cypriots using the advantage of being recognised as the "Cyprus Government" used to fill the quotas quite earlier than the Turkish Cypriots¹⁹.

In order to increase the productive capacity and contribute to the economic development of Cyprus, EEC agreed to give

¹⁹Ibid., pp. 88-90.
financial aid to Cyprus within the Financial Protocols. First Financial Protocol was signed on 15 July, 1977 and was put into force on 1 January, 1978. EEC in this Protocol agreed to finance the projects which would be beneficial to both communities and contributed 30 m. ECU (approximately 30 m. US $) for a period of 5 years. In spite of the "communal benefit" requirement of the projects to be financed, the projects financed were mainly in the South and contributing to the development of the Greek economy. None of the projects given by the Turkish side was accepted by the EEC Authorities on the grounds that they were not "communal". The money was spent on (i) Vassilikos-Pendaskinos Irrigation Project (ii) Electric Power Station Project in Dhekelia (iii) Nicosia Sewage Project. When examined it is seen that Vassilikos-Pendaskinos Irrigation Project was totally in the Southern part of the Island contributing to the productive capacity of the Greek economy and the Turkish Cypriots had no benefit out of it what so ever. Out of these three projects only a portion of the Nicosia Sewage Project was in the Turkish side and as it was an infrastructure investment it did not contribute to the economic development of the Turkish side directly. Thus 30 m. ECU was shared between the two communities as 24 m. ECU to the Greek Cypriots and 6.0 m. ECU to the Turkish Cypriots.

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20 A breakdown of the financial aid received in the first two financial protocols by the two communities and the amounts spent on specific projects are given in table 4.8 in chapter 4.5.
With the Second Financial Protocol which was put into force on 1 January, 1984 EEC agreed to contribute 44 m. ECU (approximately 42 m. US $) to the approved projects. As in the case of the First Financial Protocol, all the projects given by the Turkish Cypriots were turned down as not fulfilling the "communality" requirement and the previous three projects were financed for another five years. In this Protocol the share of the Turkish Cypriots was further reduced and they were allocated 1.13 m. ECU. while the Greek Cypriots got 38.87 m. ECU and 4 m. ECU is still to be spent.

The Third Financial Protocol which was agreed by the EEC Authorities and the "Cyprus Government" was approved by the Council of Ministers on 24 January, 1989. It provides 62 m. ECU. (69 m. US. $) for a period expiring on 31 October, 1993.

1.3 The Aims of the Study

The aim of the study is two fold. The first one is to analyse the structure of the economy of the TRNC. Besides the descriptive analysis of the two input-output tables of TRNC Economy, type I and type II multipliers for output, income, employment and imports will be the main tools to assess the impact of a unit change of final demand on the

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output, income, employment and imports of each sector of the economy. Determining the source of output, income, employment and imports for actual expenditures on final demand categories for each sector will add more in understanding the structural interdependencies of the economy. In the meantime the technical coefficients of the two input-output tables (1980 and 1986) of the TRNC will be compared to see if there had been any significant change in the stability of the technical coefficients.

The second aim of the study is to examine the contribution of the Association Agreement on the economic development of the TRNC. The first phase of the Association Agreement is taken as the period 1973 to 1987. In this period the question to be answered is whether the benefits acquired from the first phase of the Association Agreement (specially the aid given in the framework of the First and Second Financial Protocols) had contributed to the economic development of the TRNC. Would there be any reduction in the economic development of the TRNC had there not been the Association Agreement and thus the Financial Protocols between the EEC and the "Cyprus Government"?

As a special interest, the study will try to shed a light on Turkey's financial aid to the TRNC. It will try to trace the economic performance of the TRNC within the study period of 1977-1987, had there not been any financial aid from Turkey. The results obtained will be compared with the performance of the TRNC economy that would have been
realised in the absence of the financial aid from the EEC.

The study will also examine the possible effects of the Third Financial Protocol which contains 69 m. US. $ and starts in 1989. The contribution of the existing (favoured) amount of financial aid in the Third Financial Protocol, to the development of the TRNC economy will be assessed. Besides, other more realistic criteria of distributing the financial aid between the two communities will be suggested. Such as with respect to the "proportion of the population" and with respect to the "need". The study will try to assess the effects of the financial aid being given with respect to these criteria on the future development of the TRNC economy in the years 1989-1992.

1.4 Methods Used in the Study

In analysing the economic structure of the TRNC, besides the descriptive analysis of input-output tables, input-output theory is used and type I and type II multipliers of output, income, and employment are calculated for each sector from the input-output table of the TRNC, dated 1986. Stability analysis of the coefficients of the two tables (1980 and 1986) are carried out by using Wilcoxon's nonparametric test. In analysing inter-industry relations forward and backward linkages are calculated by using Rasmussen's formulations. Source of output, income, employment, and imports for actual expenditures on final demand categories
for each sector is another set of calculations from the input-output table (1986) in analysing structural interdependence of the economy. A detailed explanation of the applications of input-output theory, treatment of imports and their implementation in calculating gross output, and calculation of type I and type II multipliers and source of output, income, employment, and imports are all given in chapter 2.

In order to evaluate the effects of the Association and Customs Union Agreements (aids given in the framework of Financial Protocols) Klein’s macro model for developing countries is adopted to the structure of the TRNC economy. Adopted macro economic model is basically a nonlinear model in variables but linear in parameters. This model is estimated for the years 1977-1987 by using four estimation methods: (i) Ordinary Least Squares (OLSQ) (ii) Two Stage Least Squares (2SLS) (iii) Non-linear Least Squares (LSQ) and (IV) Non-linear Two Stage Least Squares (NL-2SLS). For each method of estimation, dynamic backward simulations are carried out and the simulated values are compared with the actual values in order to assess the performance of each method. Each method is also evaluated with respect to their forward simulation (ex-post forecast) performances. By the end of these evaluations the best two models are used to calculate the dynamic multipliers for government expenditures, exports, interest rates and exchange rates.

Macro economic model adopted for the TRNC from Klein’s
model for developing countries is used in answering the questions put forward in the previous section. This is done by changing the values of the various exogenous variables. A detailed explanation of building the model, estimation by four methods and simulations, calculation of dynamic multipliers are given in chapter 5.

1.5 Structure of the Study

After explaining the historical and political evolution of the TRNC, the relations between the EEC and Cyprus are examined since the establishment of the Cyprus Republic in 1960. Chapter 1 explaining the aims of the study, gives information about the methods used in the research and the structure of the study.

In chapter 2 basic principles of the input-output theory is explained. Quadrants in an input-output table, treatment of imports and valuation conventions cover the first part of the chapter. Calculations and definitions of type I and type II multipliers follow the explanations on open and closed input-output tables.

Chapter 3 contains the application of input-output theory on the input-output tables of the TRNC. After a brief explanation on the two tables available dated 1980 and 1986, stability analysis compares the technical coefficients of the two tables by applying Wilcoxon's nonparametric test.
Descriptive analysis applied enables the comparison of the macro economic variables of the TRNC economy in 1980 and 1986, and the TRNC economy with the Greek economy of Southern Cyprus. It also provides a detailed examination of the competitive and noncompetitive imports and export of each industry. Inter-industry relations are examined by linkage analysis. This chapter ends with the analysis of the structural interdependencies of the economy through the calculation of output, income, and employment type I and type II multipliers and the source of output, income, employment and imports for each industry of the TRNC Economy.

Chapter 4 gives a background information about the emergence of the EEC and its institutions and about the Customs Union Agreement put into force in 1988. After explaining the conceptualization of the impact of the EEC on the economic structure of the TRNC, related studies are critically summarized. Chapter 4 ends with a summary of an assessment of some macro economic variables of the TRNC economy which are relevant for the comparison of the findings of the following sections.

Chapter 5 starts with a summary review of the macro econometric model applications. After adopting the Klein's model to the economic structure of the TRNC by using OLSQ, the model is estimated by three other methods (2SLS, LSQ and NL-2SLS) as well. The performance of these four ways of estimations are compared for their simulated values both backwards and forwards. Graphs given in the following
section provides another view of the comparison. Calculation of dynamic multipliers with the best two estimation methods for government expenditures, exports, interest rates and exchange rates ends this chapter.

Chapter 6 tries to discover the development path in the absence of the Association Agreement and financial aid from the EEC. It compares the relative significance of the financial aid given by the EEC and Turkey to the development of the TRNC economy in years 1977-1987. The rest of the chapter involves the future development of the TRNC economy for the years 1989-1992. It compares the future performance of the economy under the assumptions that the financial aid favoured in the Third Financial Protocol is given (i) as it exists (ii) no financial aid is to be given (iii) financial aid to be given with respect to the proportion of the populations of the two communities (vi) financial aid to be given with respect to the need. Graphs given at the end of the chapter enable a better understanding of the effects of the above assumptions on the TRNC economy.

In chapter 7, a summary of the study and the main findings of the research are given. This is followed by the policy implications of the study. The chapter is concluded with the shortcomings of the study and further research recommendations.
CHAPTER 2. INPUT-OUTPUT THEORY AND MULTIPLIERS

In this chapter, basic features of input-output tables will be discussed. After the input-output theory, quadrants of an input-output table and its valuation conventions will be explained. Different treatments of imports in an input-output table will be discussed with reference to their implementation in calculating gross output. Following the explanations on open and closed input-output models, chapter will end with the formulations of type I and type II multipliers for output, income, and employment, and a brief comment on other related forms of multipliers.

2.1 Input-output Theory

In any economy gross output for each industry and thus for the whole economy can be represented by a number of simultaneous equations given as below:

\[ X_i = \sum_j D_{ij} + Y_{di} \quad (i = 1, 2, 3 \ldots n) \quad (1) \]

where, 
\begin{align*}
X_i & \quad \text{gross output of industry } i \\
D_{ij} & \quad \text{domestic output (excluding imported output) of industry } i \text{ used by industry } j \\
Y_{di} & \quad \text{domestic (excluding imported) final demand for the output of industry } i
\end{align*}

Equation one simply means that the gross output of an
industry goes partly to the intermediate use of other industries ($\frac{\mathbf{Y}}{\mathbf{D}} \mathbf{D}_{ij}$) and partly to the final demand use. Final demand use consists of consumption, investment and exports.

It is important to specify that $D_{ij}$ does not contain any imported inputs and it is only composed of the output of the domestic industry. Likewise, final demand for the output of industry $i$ excludes the demand for the same output which is imported. In some studies this is not made clear until the discussion of the treatment of imports in input-output tables. At that stage they produce another matrix which is said to contain only the domestic inputs, thus indirectly implying that the previous matrix contains total imports. Of course if the matrix they previously formed contains the total input coefficients, then their formulation of obtaining gross output for a given set of final demand is not correct\(^1\). Some studies after their first formulation of the theory, at the calculation stage of gross output they produce another formulation of calculating the gross output, as the matrix they used contains the total inputs and thus do not work with their first formulation\(^2\). As will be emphasized in section 2.4 a matrix formed with only domestic


input coefficients and a matrix formed with total input (including the imported inputs as well) coefficients are formulated in different ways in calculating the gross output levels of industries for a given set of final demand.

Considering the "constant input coefficients" assumption which implies a linear relationship between the inputs and the outputs for every industry it is possible to write their total input coefficients and domestic input coefficients respectively, as follows:

\[ a_{ij} = \frac{X_{ij}}{X_j} \]  \hspace{1cm} (2)

\[ d_{ij} = \frac{D_{ij}}{X_j} \]  \hspace{1cm} (3)

Where, \( X_{ij} \) is the domestic and imported output of industry \( i \) used by industry \( j \)
\( a_{ij} \) is the total input coefficient
\( d_{ij} \) is the domestic input coefficient

It is important to note here that the superiority of using total input coefficients over domestic input coefficient is in its stability. That is, it gives the actual relationship between the inputs and the output of an industry. On the other hand domestic input coefficients not being stable, in the sense that at any time the domestic and the imported content of total inputs may change, provide the required account for the calculation of the gross output of an industry.
Using domestic input coefficients \( d_{ij} \) from equation (3), it is possible to write equation (1) as follows:

\[
X_i = \sum_j d_{ij} X_j + Y^d_i \quad (i = 1, 2, 3 \ldots n)
\]  

(4)

It is possible to express \( a_{ij} \)'s and \( d_{ij} \)'s in separate matrices of \((nxn)\), where \( n \) is the number of industries. Thus the matrix composed of \( a_{ij} \)'s for all industries in the economy makes the total input coefficients matrix \((A)\) and the matrix containing \( d_{ij} \)'s makes the domestic input coefficients matrix \((D)\). These matrices are usually referred to structural matrices of the economy. Using matrix notations it is possible to write equation (4) as follows:

\[
X = DX + Y^d
\]  

(5)

where \( X \) is a column vector of \((nxl)\), \( D \) is a square matrix of \((nxn)\) and \( Y^d \) is also a column vector of \((nxl)\). Thus once the domestic input coefficients matrix \((D)\) is known, using equation (5) it is possible to obtain the gross output for a given set of domestic final demand. Likewise one can use the same equation to find out the domestic final demand for a given set of gross output. From equation (5) it follows that:

\[
X - DX = Y^d
\]  

(6)

\[
X (I - D) = Y^d
\]  

(7)

\[
X = (I - D)^{-1} Y^d
\]  

(8)
Equation (8) derived from equation (5) is the fundamental equation of the input-output theory. I in the equation denotes an identity matrix with the same dimensions as D (nxn), and it is composed of all zeros except the diagonal values which are all one. In literature \((I - D)^{-1}\) is known as the Leontief Inverse Matrix. It is used not only to find the gross output for a given set of final demand and compare it with the gross output obtained from another set of final demand (impact analysis) but also it is used in linkage and multiplier analysis. More details on these analysis are given in the following sections.

2.2 Quadrants of an Input-output Table

Tables 8.3 and 8.4 in the Appendix describe the inter-industry relations in the TRNC for the years 1980 and 1986 respectively. These tables are known as inter-industry transactions tables or input-output flow tables and they indicate the actual flow of goods and services of various TRNC industries from and to one another and from and to other parts of the local and non-local (i.e., imports and exports) economy.

For analytical reasons which will become apparent later, input-output transactions tables are divided into three main quadrants and sometimes depending on the availability of the data it can be divided into four quadrants. These quadrants can be described as follows:
a. First Quadrant: Intermediate (or Processing) Sector.

This section of the table forms the basic inter-industry relations and it is known as the intermediate sector. It summarises all the transactions between the industries in the economy. Reading along any row, each cell entry indicates the quantity sold by the industry on the left to the industry at the top. While reading down any column, each cell indicates the amount purchased by the industry at the top from the industry on the left. Every cell entry can be interpreted in the same double entry fashion: either as a sale from one industry to another, or as a purchase by the latter from the former.

Thus, \( x_{ij} \) indicating the flow of products from \( i \) to \( j \) industry, the sum of \( x_{ij} \) along the row (\( \sum_j x_{ij} \)), will give the total intermediate demand for \( i \)th industry's product.

\[
W_i = x_{i1} + x_{i2} + \ldots + x_{in} = \sum_j x_{ij} \quad (9)
\]

In the same manner total intermediate input demand of \( j \)'th industry is obtained by adding the entries along the column (\( \sum_i x_{ij} \)).

\[
Z_j = x_{1j} + x_{2j} + \ldots + x_{nj} = \sum_i x_{ij} \quad (10)
\]

It must be stated that it is very unlikely to have the total intermediate demand for an industry's product to be equal to its total intermediate input demand (\( W_i = Z_j \)). But on the other hand it is quite obvious that total intermediate
demand for all industries' products is equal to the total intermediate demand of all industries. This can be shown as follows:

\[ \sum_{i} x_{ij} = \sum_{i} w_{i} = w \]

(11)

\[ \sum_{j} x_{ij} = \sum_{j} z_{j} = z \]

(12)

\[ W = Z \quad \text{since} \quad \sum_{i} \sum_{j} x_{ij} = \sum_{i} \sum_{j} x_{ij} \]

(13)

b. Second Quadrant: Final Demand Sector.
The columns of this sector indicate the volume of sales made by each intermediate industry to final demand categories. It explains how the product of each industry left behind, after satisfying intermediate demand of industries, is distributed among consumption, investment, stock change and export. Consumptions and investments of each industry are further divided giving the shares of private and public sectors.

Negative entries of stock changes indicate a decrease, while positive entries indicate an increase in stocks. On some tables no distinctions are made between private and public consumptions and the stock changes are included in investments rather than being given separately.

c. Third Quadrant: Primary Input Sector.
This section includes the inputs which are not produced by the intermediate sector. It shows the payments made by
each industry to factors of production, land, labour and capital. These payments make up the value added of each industry and they include, salaries and wages, net profits, interest payments, rents, indirect tax and depreciation. It should be noted that if the values are expressed in factor prices then value added figures do not include indirect taxes and indirect taxes are given in a separate row. Tables valued in market prices, essentially include indirect taxes in value added figures.

It is very unfortunate that TRNC tables do not give any detailed information on the break down of value added figures into their components. Value added figures in the table are simply the difference between the value of the products and the value of the total intermediate inputs for each industry. The absence of such important information will not only narrow the area of study but also prevent a classical formulation and interpretation of type II multipliers.

The last three columns of the table shows total demand, imports, and gross output for each industry. It shows that the total demand in the economy is met by the gross output and imports. It should be noted that for each industry by definition gross output is equal to gross input while as it was shown previously intermediate output does not necessarily be equal to intermediate input for any industry. However, over the table intermediate transactions are self cancelling so that total final demand (net of total imports)
is equal to total primary inputs. It is important to note that this is very unlikely to hold at a single industry level.

\[ \sum V_i + \sum N_{ii} = \sum Y_i \]  \hspace{1cm} (14)

\[ \sum V_i = \sum (Y_i - N_{ii}) \]  \hspace{1cm} (15)

Where, \( V_i \) is the value added coefficient of industry \( i \)
\( Y_i \) is the domestic and imported final demand for the output of industry \( i \)
\( N_{ii} \) is the total imports of industry \( i \)

Some tables have a fourth quadrant as well which consists of indirect factor inputs to final demand such as labour used by Government, payments to household services and net factor income. Although these entries in the fourth quadrant are not so crucial for input-output models, their inclusion provides a check for the table as their addition to gross domestic product gives the gross national product.

2.3 Valuation Conventions

2.3.1 Choice Between Producers' and Purchasers' Price

It is important to know the valuation conventions used in evaluating inter-industry flows otherwise a correct
interpretation of the cell entries in the transactions table is not possible. With different valuation conventions the values of a flow will have different magnitudes. Two of the valuation conventions used in constructing input-output tables involve using producers' or purchasers' prices. Thus in some input-output tables cell entries reflect the price that a producer receives and in others they reflect the price that a purchaser pays. The difference between the two is that purchasers' prices include net indirect taxes (indirect taxes less subsidies) and trade and transportation margins i.e. transport costs, wholesale and retail trade mark-ups, insurance and warehouse costs, in addition to producers' prices.

Specially in developing countries it is very difficult to determine the values of net indirect taxes paid on inputs used by the processing industries. Most of the purchases of the industries are recorded in purchasers' prices which are easily available, whereas little information is directly available on producers' prices. Besides obtaining values in producers' prices requires expensive procedures whose accuracies are open to doubt. Mainly because of the easy, readily availability of the purchasers' prices, TRNC tables are constructed in purchasers' prices. In using purchasers' prices rather than producers' prices one should not forget

and should not underestimate the following superiorities of producers' prices over purchasers' prices:

(i) Using purchasers' prices means that the row total for each industry will include trade and transportation costs in each delivery of the output. Such costs varying with the distribution costs causes changes in recorded total output, although the actual production remaining constant. As the row totals (gross output) are used in the denominator to obtain technical coefficients, instability is expected to increase when purchasers' prices are used.

(ii) When purchasers' prices are used, trade and transportation costs are double counted. Such costs are included both in the value of the output of the producing industry and as inputs to the producer. In producers' prices trade and transportation costs are counted only once, as an input to the purchasing industry.

(iii) In producers' prices trade and transportation costs vary with the input structure and thus the technical coefficients obtained in this valuation system are more stable than the ones obtained in purchasers' prices.

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prices where the trade and transportation costs vary with the output structure.

It should also be noted that when producers' prices are used it is possible to separate each element which makes up the value up to the final user. Thus transactions expressed in producers' prices correspond more closely to actual physical flows, which reflect the technology of the industry.

It is possible to find some input-output tables prepared in market prices i.e. producers' prices plus net indirect taxes as well. On such tables the row total of each industry represents the value of the industry output including the value of net indirect taxes levied on that output.

It is important to note that trade and transportation industry in TRNC tables does not include the value of the goods sold in its output. It considers only the gross trade and transportation margins. Similarly, their purchases exclude the value of the goods bought for resale or taken for transportation and they are composed of the goods and services bought to provide trade and transportation services.

Besides the discussion of expressing the values of transactions in producers' prices and purchasers' prices, in some input-output tables transactions are expressed in physical quantities rather than values. On such tables, although the rowwise summation is possible, columnwise
summation is not meaningful. This is because of the diverse nature of the industry outputs i.e. wheat, iron, electricity, etc. and the different units of measurements used i.e. kilo, meter, tons, etc.

2.3.2 Valuation of Imports and Exports

The values of imports in TRNC tables are given in c.i.f. values, which is the sum of (i) foreign port value (ii) freight charges and (iii) insurance charges. In some tables imports are given in "domestic port values" which includes c.i.f value of the imported goods and any import duties levied by the domestic government. It should be noted that not all the c.i.f. prices are payments to the foreigners which are regarded as imports. Some payments are made to local shipping and insurance companies and these payments are considered as imports in the TRNC tables.

Unlike imports, exports have a unique place on the input-output tables and they are recorded columnwise in the second quadrant of the TRNC tables. The values of the exports are expressed in f.o.b. prices consisting of producers' price plus trade and transportation costs of delivering the goods to the port of embarkation. In some tables such entries may include export taxes in addition to f.o.b. prices.
2.4 Treatment of Imports

The manner in which imports are handled in input-output analysis requires some discussion as there is no unique way of handling them. It is important to distinguish competitive and noncompetitive imports before the discussion of various treatments of imports. Competitive imports are commodities which have domestically produced close substitutes while noncompetitive imports do not have such domestically produced close substitutes. In input-output analysis these two expressions, "competitive imports" and "noncompetitive imports" are used for imports for intermediate use and for imports for final demand use respectively.

There are four basic ways in which the imports are treated and this may be described in terms of the way they appear in the transactions tables\(^5\). It is very important to distinguish each treatment of imports from the other because each case requires different calculations in obtaining the gross output.

In one treatment of the imports, both competitive and noncompetitive imports are placed in a row in the primary sector or in a column in the final demand sector. In this case all the transactions within the intermediate sector and the purchases of final demand components are domestic.

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products only. Thus the technical coefficients matrix is made of domestic input coefficients which does not include any imported inputs. This treatment is perfectly acceptable as far as all the imports are noncompetitive and that there are no competitive imports i.e. imports for intermediate use, otherwise it is expected to cause an instability in the technical coefficients. In this case gross output for a bill of final demands is given by simply post-multiplying the inverse matrix with the final demand component. In matrix formulation it is given as follows:

\[(I - D)^{-1} Y^d = X\]  \hspace{1cm} (16)

where, \( D \) is the domestic input coefficients matrix
\( Y^d \) is the domestic final demand
\( X \) is the gross output

In the second treatment of imports, all imports, both competitive and noncompetitive, are recorded in a single row in the primary sector or in a column in the final demand sector. But unlike the first case all the cells contain flows of both imported and domestically produced commodities. This solves the problem of instability in the coefficients that would have appeared by excluding imported inputs from the intermediate sector. It is very important to note that in estimating the gross output through post-multiplying the inverse matrix computed by a given set of final demand requires an special treatment of the final demand. In this case as both the intermediate sector and
the final demand include imports, total imports (both competitive and noncompetitive imports which are given together in a row or in a column) should be subtracted from the final demand. Gross output in this case is obtained as follows:

\[(I - A)^{-1} (Y - M) = X\]  \hspace{1cm} (17)

Where, 
- \(A\) is the total input coefficients matrix 
- \(Y\) is the total domestic and imported final demand 
- \(M\) is the total imports 
- \(X\) is the gross output

This approach, however implies that the level of imports are specified in advance whereas normally the level of imports are determined as part of the solution.

In the third way of treatment of imports competitive imports are included in the intermediate sector with the domestic inputs, thus providing the stability of the input coefficients, and the total competing imports are recorded in the final demand sector as a negative column. Noncompetitive imports on the other hand appear as a row in the primary sector and as a negative column in the final demand sector. Gross output in this case can be calculated by using equation (17). The total imports in the equation is the sum of competitive and noncompetitive imports i.e. \(M = M_2 + M_3\).
Availability of competitive imports for each industry provides greater flexibility and enables the calculation of the total competitive imports requirement for a unit increase in the final demand of each industry (chapter 3.5).

In case the quantities of competitive imports are known by destination, it is possible to calculate the gross outputs by another way. After assuming that such imports are a constant proportion of each sector's output, imported input coefficients for each cell is obtained to form the imported input coefficients matrix (M).

\[ m_{ij} = \frac{M_{ij}}{X_j} \]  \hspace{1cm} (18)

where, \( m_{ij} \) is the \( ij \)'th imported input coefficient, 
\( M_{ij} \) is the import of industry \( i \)'s output used by industry \( j \)
\( X_j \) is the gross output of industry \( j \)

Thus the alternative solution is formulated as follows:

\[ (I - A + M)^{-1} (Y - M_3) = X \]  \hspace{1cm} (19)

where, \( A \) is the total input coefficients matrix 
\( M \) is the imported input coefficients matrix 
\( Y \) is the total domestic and imported final demand, 
\( M_3 \) is the noncompetitive imports 
\( X \) is the gross output
Actually equation (16) is a simplified version of equation (19). It can easily be seen that \( (I - A + N) = [I - (D + M) + N] = (I - D) \) and \( Y^d = (Y - M_3) \). Of course equation (16) is simpler and rather more direct.

In the final case of the treatment of imports, all the cells are separated into two and both imported and domestically produced commodities are recorded in every cell side by side. This is equivalent of preparing two tables: one for domestic flows and one for imported products. The main advantage of this method is that information about import substitution in particular elements can be accurately incorporated in the table. With the flexibility provided by such a table, gross output levels for a given level of final demand can be obtained by using any one of the equations (16), (17) and (19) given previously.

Two input-output tables obtained from the TRNC for the years 1980 and 1986 given in tables 8.3 and 8.4 in the Appendix have the same structure. That is all competitive imports are included in the intermediate sector in the cells together mixed with the domestic inputs and a column of total imports (both competitive and noncompetitive) are recorded next to the total final demand column. Thus, for a given level of final demand, gross output levels can be obtained by using equation (17).

Fortunately, in addition to the above mentioned two basic tables, TRNC produced two more tables. One is for domestic
inputs and another for imported inputs separately. These tables are given in tables 8.5 and 8.6 in the Appendix. This gave the opportunity of calculating two sets of input coefficients i.e. domestic and imported input coefficients, and constructing two more matrices for domestic and imported commodities. These tables are also given in tables 8.8 and 8.9 in the Appendix, respectively. Given this flexibility, for a given set of final demand gross output for each industry is obtained by using all of the equations mentioned above i.e. equations (16), (17) and (19).

2.5 Open and Closed Input-Output Models

Before getting into the discussion of direct, indirect and induced effects and type I and type II multipliers it is essential at this stage to distinguish open and closed input-output models.

In open input-output models intermediate sector (quadrant one) is composed of totally inter-industry relations and it does not include either any columns of the final demand or any rows of the primary inputs. Thus in an open input-output model, A-matrix involves only the inputs received by industries from other industries and considers those outputs of the industries that go to intermediate use. The dimensions of the A-matrix in this case is equal to the number of industries included in the transactions table. Given a set of final demand, the gross output levels
can be obtained by using any one of the equations (16), (17) or (19), depending on the treatment of the imports.

In the case of the TRNC, the solution of the open input-output model will be obtained mainly by using equation (16), given below

$$\left(I - D\right)^{-1} y^d = X$$

(16)

Closed input-output models are constructed by including some components of final demand (usually household consumption) in the last column and some components of primary inputs (usually household income) in the last row of the open model. It is possible to move, one by one, each of the remaining sectors from the final demand vector into the inter-industry coefficients matrix until there are no exogenous sector at all. This is named as completely closed model. However, economic logic behind fixed coefficients of non-producing sectors is not easy to be accepted and thus completely closed models are less frequently implemented in

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6 Same results have been obtained by using the equations (17) and (19). As domestic input coefficients matrix is more relevant to internal economic repercussions and thus to multiplier analysis, equation (16) is preferred in most of the calculations.

practice. By including household consumption in the technology matrix, it is made endogenous to the system and it is no more determined exogenously. Thus in a closed model D-matrix includes not only inter-industry input coefficients but also household consumption and household income (salaries and wages) coefficients as well.

Household consumption coefficients for each sector are calculated by dividing the household consumption of each sector by the total household income generated in the economy. Household income coefficients are obtained in the same way as value added coefficients, by dividing the household income received in each industry by that industry's gross output. Household consumption and income coefficients can be derived from the below equations.

\[
\begin{align*}
  c_{hi} &= C_{hi} / X_{(n+1)} \\
  h_j &= H_j / X_j
\end{align*}
\]

where, 
- \(c_{hi}\) is the household consumption coefficient of industry i
- \(C_{hi}\) is the household consumption of the output of industry i
- \(X_{(n+1)}\) is the total household income generated
- \(h_j\) is the household income coefficient of industry j
- \(H_j\) is the household income received from industry j
- \(X_j\) is the gross output of industry j
The dimensions of the A-matrix in this case is one more than the number of the industries included in the transactions table \((n+1) \times (n+1)\). The element on the \((n+1)\)'st row and \((n+1)\)'st column represents labour service purchases of the households. Sum of the household income (portion of the value added by household) row i.e. \((n+1)\)'st row gives the total value of its sale of labour services (total earnings) which is equal to the total income earned by the household sector (gross output of the household sector), \(X_{n+1}^*\).

Given a set of final demand excluding the household consumption, the solution for the gross output vector can be obtained as follows:

\[
(I - D^*)^{-1} Y^{d*} = X^* \tag{22}
\]

Where, \(D^*\) is the augmented domestic input coefficients matrix, \(Y^{d*}\) is the final demand excluding household consumption, \(X^*\) is the gross output.

Closed model solution for the equation (19), where the competitive imports are contained mixed with the domestic inputs in the intermediate sector and noncompetitive imports within the final demand, can be formulated as follows:

\[
(I - A^*)^{-1} (Y^* - M_{1^*}) = X^* \tag{23}
\]
Direct, Indirect, and Induced Effects

Theoretically the level of activity in every industry can be ascribed to the level and composition of final demand. Empirically this arises from the fact that an industry can increase its sales only if other industries or final demand sectors are willing to increase their purchases from this industry. In case of an increase in final demand purchases the process is direct. On the other hand, an industry in order to finance its increased purchases from the former industry has to sell its product either to an other industry or directly to final demand. This continues on and finally the level of output of each industry depends on its, and other industries' sales to final demand.

Above process outlines the determination of output and the generation of income and employment in an economy. In order to have a better understanding of how the changes in final demand is transmitted, assume that there is an increase in the final demand of agricultural industry by 100 Turkish Lira (TL). This direct increase in demand for agricultural products will start a chain reaction in the economy. An increase in its sales by 100 TL. shows that (see total input coefficients table 8.2, in the Appendix) agricultural industry must purchase 4.77 TL. of inputs from itself, 0.074 TL. from animal husbandry, 21.72 TL. from manufacturing industry and so on. Now these industries supplying inputs to agricultural industry will have an increase in demand for their products and they in return will have to purchase more
inputs from other industries in order to produce the additional output. Manufacturing industry in order to meet the increasing demand of 21.72 TL. to its product has to have an input of 6.90 TL. \((0.3176 \times 21.72 \text{ TL.})\) from agriculture, 0.18 TL. \((0.008 \times 21.72 \text{ TL.})\) from animal husbandry industries, 2.910 TL. \((0.134 \times 21.72 \text{ TL.})\) from itself and so on. Thus, to provide the initial increase in demand for agricultural product, every industry will increase its output in the proportions indicated by the appropriate column in the coefficients table. To meet this new demand for their outputs, industries will have to increase their outputs further, thereby increasing demand still further and so on. This round by round increase in the level of output of each industry resulting from the initial direct increase in demand for agricultural product is known as the indirect effect on output. The total indirect effect can be measured by summing the individual indirect effects of successive rounds. In practice the series tend to converge fairly rapidly, so that the cumulative total after a few rounds is a close approximation to that obtained after a theoretically infinite number of rounds.

In case the households are included in the intermediate sector so that they are made endogenous to the system, an increase in sales to final demand by any industry will increase household income by the proportion of their value added in that industry. This increase in income of
households will in turn be translated into additional household demand for final demand commodities. This will induce industries to increase their outputs, thereby increasing households income and thus expenditures, and so on. This increase in output brought about as a result of household income-consumption relationship is known as the induced effect on output. Of course, there is no induced effect on output in an open input-output model as the household is kept outside the intermediate sector.

In case of a closed input-output model, a change in the final demand of any industry will have a direct, indirect and an induced effect on the output.

2.6 Multipliers

2.6.1 Type I and Type II Multipliers

Income and employment multipliers of Keynes are important tools of macroeconomic analysis but they are highly aggregative in nature as they are based on the assumption of one sector economy. It is also possible to derive a set of multipliers within the framework of input-output model that gives a summary of the total repercussions in terms of adjustments in output, employment and income etc. generated as a result of a change in the final demand. The impact of

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\(^8\) Cameron, B. (1968), \textit{op. cit.}, pp. 4-9.
an initial expenditure on an economic system depends not only on its volume (expenditure) but also on the inter-industrial linkages of the sector with the rest of the economy.

In an inter-industrial framework output / income / employment multipliers of a sector may be defined as the ratio of the total (direct, indirect and sometimes induced as well) to direct additions to output / income / employment in response to an initial one unit increase in its final demand. Multipliers calculated for an open model are called type I multipliers and they exclude the induced effects as the household is exogenous to the system. On the other hand type II multipliers obtained from a closed input-output model include both the indirect and induced effects. Thus, type I multipliers excluding induced effects underestimates while type II multipliers assuming linear-homogeneous production functions over-estimate a given impact.

2.6.2 Theoretical Derivation of Multipliers

In this section derivation of the various multipliers will be given and their applications will follow in the next chapter. Three types of multipliers considered in the study

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are: (i) Output, (ii) Income and (iii) Employment multipliers.

(i) Output Multipliers

Type I output multipliers, as discussed in the previous section, are obtained from open input-output models which exclude household sector from the intermediate sector. Type I multiplier for industry $i$ is given by the ratio of total direct and indirect output generated in the economy to direct change in its output, as a result of one unit of increase in its final demand. This can be formulated as follows:

$$\frac{O_i}{O_i} = \frac{O_i}{O_i}$$  \hspace{1cm} (24)

where, $O_i$ is the type I output multiplier of industry $i$

$O_i$ is the direct output change in industry $i$

$O_i$ is the total direct and indirect output change in the economy.\(^{10}\) and it is given by,

$$O_i = \sum_j (I - D)^{-1} e_i$$  \hspace{1cm} (25)

\(^{10}\)A-matrix containing both domestic and imported inputs gives a total increase in outputs which includes both domestic and foreign increase in output. While D-matrix gives the domestic output increase only which is the main concern in the study.
where, $e_i$ is a column vector with all of its elements being zero except the $i$'th term which is 1.

In finding the total direct and indirect output generated, $O_i$, the inverse matrix is postmultiplied by a column vector $e_i$. This process is nothing but adding the coefficients of sector $i$ column wise in the inverse matrix. On the other hand the direct output change in sector $i$, $o_i$, is equal to the unit initial increase in the final demand of this sector, and it is taken as 1. Thus type I output multiplier can also be expressed and practically implemented as follows:

$$o^I_{ij} = \frac{1}{\rho_{ij}}$$  \hspace{1cm} (26)

Where, $\rho_{ij}$ is the $ij$'th element of the inverse of $(I - D)$ matrix.

Type II output multipliers are derived from the closed input-output models where household is included in the intermediate sector and it is endogenous to the system. Type II output multipliers are defined analogously to type I multipliers as above, except that it also includes the induced effects and uses the augmented matrix, $D^*$. Formulation of type II output multiplier is as follows:

$$o^{II}_{i} = \frac{O^*}{\sigma_i}$$  \hspace{1cm} (27)

where, $o^{II}_{i}$ is the type II output multiplier of industry $i$. 

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\( o^*_i \) is the direct output change in industry \( i \)

\( o^*_i \) is the total direct, indirect and induced output change in the economy and it is given by

\[
o^*_i = \sum_j (I - D^*)^{-1} e^*_i
\]

(28)

where, \( D^* \) is the augmented D-matrix

\( e^*_i \) is a vector as defined above and compatible with \((I - D^*)^{-1}\) matrix

As in the case of type I output multipliers, type II output multiplier for industry \( i \) can be obtained by adding the column coefficients of industry \( i \) in the inverse of the augmented matrix. Thus the practical calculation of type II output multipliers can also be formulated as follows:

\[
o^{*II}_i = \sum_j r^*_ij
\]

(29)

where, \( r^*_ij \) is the \( ij \)'th element of the inverse of augmented D-matrix, i.e. \((I - D^*)^{-1}\).

(ii) Income Multipliers

Type I income multiplier for industry \( i \) is defined as the total direct and indirect change in income resulting from a unit change in its final demand divided by direct income
change in industry \( i \). It can be formulated as follows:

\[
y_{ki}^{I} = \frac{U_{i}}{u_{i}} \tag{30}
\]

where, \( y_{ki}^{I} \) is the type I income multiplier for industry \( i \)
\( u_{i} \) is the direct income change of industry \( i \)
\( U_{i} \) is the total direct and indirect income generated in the economy and it is given by:

\[
U_{i} = V ( I - D )^{-1} e_{i} \tag{31}
\]

where, \( V \) is the row vector of value added coefficients and, other variables are as defined before.

In this case direct income change of industry \( i \) is equal to the value added coefficient of that industry, \( u_{i} = v_{i} \), as the initial increase to final demand of industry \( i \) is taken as 1 unit. Value added coefficient of industry \( i \) is obtained by dividing the value added in industry \( i \) by its gross output, \( v_{i} = V_{i} / X_{i} \).

It should not be surprising to find out that total direct and indirect income generated within the economy as a result of one unit of increase in final demand is less than 1, as part of the income generated goes out due to imported inputs. On the other hand A-matrix generates a total income of one unit as it includes the income given for imported inputs. Thus, for A-matrix \( U_{i} = 1 \), while for D-matrix \( U_{i} < 1 \).
Practically it is also possible to obtain type I income multiplier as follows:

$$y^I_{kj} = \frac{v_i r_{ij}}{v_j}$$  \hspace{1cm} (32)

Type II income multipliers involve the augmented matrix and they can be obtained similarly to type I income multipliers by using the following formulae:

$$y^ {II} _{kj} = u_i^* / v_i = v_i^* (I - D_i^*)^{-1} e_i^* / v_i^*$$  \hspace{1cm} (33)

$$y^ {II} _{ij} = \frac{v_i^* r_{ij}}{v_j^*}$$  \hspace{1cm} (34)

It is important to note that the total direct, indirect and induced income generated for industry $j$, $U^*_{kj}$, is given directly by the $((n+1),j)$'th element in the inverse of the augmented matrix. Thus type II income multipliers for each industry practically can be obtained by dividing the $(n+1)$'th row in the inverse of the augmented matrix by each industry's corresponding direct income change i.e. value added coefficients$^{11}$.

(iii) Employment Multipliers

Type I employment multiplier for industry $i$ is obtained by dividing the total direct and indirect employment generated

$^{11}$Kundu, A. (1976), op. cit., p. 71.
in the economy as a result of a unit change in final demand of industry $i$, by direct employment change in that industry. Formulation of type I employment multiplier for industry $i$ is as follows:

$$k^1_i = N_i / n_i$$  \hspace{1cm} (35)

where, $k^1_i$ is the type I employment multiplier of industry $i$

$n_i$ is the direct employment change in industry $i$

$N_i$ is the total direct and indirect employment change in the economy and it is given by:

$$N_i = L (I - D)^{-1} e_i$$  \hspace{1cm} (36)

where, $L$ is a row vector of employment coefficients, $l^i$.

Assuming a constant relation between the labour employed and the output, the employment coefficient of industry $i$ is obtained by dividing the employment in industry $i$ by its gross output, $l^i = L_i / X_i$. In this case as the initial increase in final demand of industry $i$ is taken as 1, the direct increase in employment of industry $i$ is equal to the employment coefficient of this industry, $n_i = l^i$.

A practical way of obtaining type I employment multiplier is given by the following formulation:
Type II employment multiplier can also be obtained by applying the same procedure as in type I employment multiplier but using the augmented matrix. Related formulations are as follows:

\[ \lambda_{ij}^{II} = \frac{\lambda_{ij}^I}{r_{ii}^{*}/l_{ij}^{*}} \]  

\[ \lambda_{i}^{II} = \frac{\lambda_{i}^{*}}{N_{i}^{*}/n_{i}^{*}} = L_{i}^{*}(I - D_{i}^{*})^{-1} e_{i}^{*}/l_{i} \]  

\[ (37) \]

(iv) Other Multipliers

It is also possible to obtain an output multiplier for a unit change in gross output of an industry, just as it is obtained for a unit change in final demand (net output) of the industry. The former is known as "gross output" and the latter as "net output" multipliers. Gross output multiplier for an industry can be obtained by dividing the type I output multiplier by \( r_{ii}^{*} \) (where \( r_{ii}^{*} \) is an element of \( (I - D)^{-1} \)), that is \( \lambda_{i}^{II} \). This multiplier gives the total amount of increase in output of the economy required to support a unit of increase in industry's gross output. Similarly, for industry \( i \) gross multipliers of type I and type II for income and employment can be obtained by dividing their net multipliers by \( r_{ii}^{*} \).

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12Kundu, A. (1976), op. cit., p. 171.
Because of their insignificance to this analysis gross output multipliers will not be calculated. For this reason the term "net" will not be used along the net output multipliers in order to distinguish them from the gross output multipliers but simply they will be addressed as "output multipliers". This will apply for income and employment multipliers as well.

It should be noted that total income and employment generated as a result of an initial increase in final demand of an industry, $\frac{1}{v_i} r_{ij}$ and $\frac{1}{l_i} r_{ij}$, are multipliers in themselves. They give the amount of total income and employment generated per unit increase in an industry's final demand. It is sometimes more relevant to see the impact of a change in final demand on total income or employment generated rather than the impact of a change in income or employment on total income or employment generated. Similarly this applies for type II multipliers as well.

\[\text{\cite{ref}}\]

CHAPTER 3. ECONOMIC STRUCTURE OF THE TRNC

This chapter provides an introduction to the input-output tables of the TRNC. Two tables available for the years 1980 and 1986 are compared with respect to their technical coefficients. Direct and indirect comparison of the technical coefficients will be carried out by using Wilcoxon's nonparametric test. A descriptive analysis following this section will analyse the data made available by the two tables. TRNC economy will be compared for the years 1980 and 1986. Using the same data from 1986 input-output table, TRNC economy will be compared with the Greek Cypriot economy in the Southern part of the Island and an account of the differences will be provided. Descriptive analysis of the TRNC economy by using input-output tables will be concluded by a closer examination of the competitive and noncompetitive imports and exports of each industry.

Inter-industry relations will be analysed by calculating forward and backward linkages by using Rasmussen's formulation. In the following section type I and type II multipliers of output, income, and employment will be calculated for a better understanding of the structural interdependence of the economy. In the final section of the chapter, calculating source of output, income, employment, and competitive imports for actual expenditures on final demand categories will enable to see which component of the final demand is more influential in transforming expenditures into output, income, employment and imports.
3.1 Input–Output Tables of the TRNC

Turkish Republic of Northern Cyprus has two input–output tables established for the years 1980 and 1986. First table was established through a survey while the second table is projected from the first and adjusted to the changes in prices and performance of some industries. This projection of 1986 table is realised by using RAS method due to its certain advantages over the other updating methods. Some of other updating methods are: i. Mathematical programming methods (linear programming, weighted and unweighted least squares method, Lagrangian method, quadratic programming method) ii. Statistical methods iii. Ex-ante method and iv. Best practice method\(^1\). It is very unlikely to expect a change in technological coefficients of input–output tables of small economies in short periods of time.

Both input–output tables of 1980 and 1986 are based on 44 sectors. In this study, for a better understanding of the structure of inter-industry relations, 44 industries in the original tables are aggregated into 13 industries with regard to the similarity of their input structures\(^2\). In such


\(^2\)Aggregation of 44 industries into 13 industries is given in table 8.2 in the Appendix.
a process it is inevitable not to have a certain degree of aggregation error. Aggregation error arising both at the first stage of classification of industries and when aggregating large numbers of sectors into manageable number can never be reduced to zero but can only be minimized\(^3\).

Input-output tables of the TRNC are national input-output tables. They are not single region or multi-regional input-output tables. All the transactions within the TRNC are recorded in inter-industry or final demand transactions while all the purchases and sales made outside the TRNC (imports and exports) are distinguished and treated as explained in the previous chapter 2.4.

3.2 Stability Analysis

3.2.1 Direct and Indirect Comparison of Technical Coefficients

Theoretically, the assumptions involved in constructing input-output tables guarantee the continuity of the same production technique used and thus the stability of the technical coefficients. These assumptions simply stated are: i. There is only one primary factor of production,

\(^3\)Bulmer, T. V. (1982), Input-output Analysis in Developing Countries, Sources Methods and Applications, John Wiley and Sons Ltd., Chichester, pp. 72-85.
ii. Constant returns to scale, iii. The output of each industry is homogenous products and iv. Non-existing joint production.

In reality technical coefficients are subject to change over time due to changes in technical progress, relative prices, pattern of return of scale and product mix. Analytically such changes can be demonstrated by using generalised Leontief cost function^.

A number of studies carried out to examine the stability of input-output coefficients proved that technical coefficients do change over time. Technical coefficients of two tables can be compared either by directly or indirectly as explained below.

Direct comparison involves directly the technical coefficients of the two tables. Each technical coefficient of one table is compared with its corresponding in the other table (total direct comparison). This comparison can be carried out for each column and each row of a table with its counterpart on the other table one by one (direct column and direct row comparison).

In indirect comparison of the technological coefficients of the two tables, gross outputs obtained for a given final demand for the two tables are compared. A significant

^Field, K. (1986), op. cit., p. 3.
difference between the two gross output levels implies a significant difference in the technical coefficients of the two tables.

In this analysis technical coefficients of the two aggregated tables (13 x 13) of the TRNC (1980 and 1986) are compared. In comparing the technical coefficients directly and the gross outputs obtained in the indirect method, Wilcoxon's nonparametric tests are used. Wilcoxon's test is superior to "difference of means" or "analysis of variance" tests, as it does not require a prerequisite assumption of normal distribution or large sample size.

### 3.2.2 Results of the Comparison

Technical coefficients of the two tables of the TRNC are compared directly and indirectly by using Wilcoxon's nonparametric tests and the results are given below in order.

(i) Direct Comparison

Direct comparison of the technical coefficients of the two tables are carried out as total, columnwise and rowwise.

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Direct total comparison of the 169 (13 x 13) pair of technical coefficients is concluded with no evidence that the technical coefficients of the two tables are significantly different. The results of direct total comparison of technical coefficients of the two tables are given in table 3.1.

Table 3.1 Results of Direct Total Comparison of the Technical Coefficients of 1980 and 1986 Tables

<table>
<thead>
<tr>
<th>Achieved Confidence</th>
<th>Confidence Interval**</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>N 169</td>
<td>Median 0.000</td>
<td>0.935</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.000 , 0.000)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.955</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.000 , 0.000)</td>
</tr>
</tbody>
</table>

* A significance level of 95% is used for all the Wilcoxon's nonparametric tests carried out in this section.

** Wilcoxon's test is decided by examining this interval. If the interval contains the "zero", then the null hypothesis of "no difference" is accepted, otherwise the null hypothesis is rejected and a significant difference is concluded. In case of both or one of the scores are zero, it is accepted that the interval contains zero.
Direct columnwise comparison of the technical coefficients of the two tables concluded that all the column coefficients, except for the electricity and water industry, are not significantly different. The column coefficients of electricity and water industry are found to be significantly smaller in 1986's table from those in 1980's table. The results are given in table 3.2.

Direct rowwise comparison of the technical coefficients of the two tables resulted with no significant difference between the technical coefficients of the rows. The results are given in table 3.3.

(ii) Indirect Comparison

Using the equation (17) given in the previous chapter 2.4 inverse matrices of the two tables of the TRNC 1980 and 1986 are post-multiplied by the final demand (net of total imports) of 1986 table and two sets of gross output levels are obtained for each table. As expected gross output levels obtained for 1986 by post-multiplying its inverse by its final demand (net of total imports) is actually the same as the ones recorded in its transactions table. Comparing the two sets of output levels, it is found that they are not significantly different. The results of this test is given in table 3.4.

In small economies it is very unlikely to have a change in the technical coefficients of input-output tables in a short
Table 3.2 Results of Direct Columnwise Comparison of the Technical Coefficients of 1980 and 1986 Tables

<table>
<thead>
<tr>
<th>Col. No.</th>
<th>N</th>
<th>Median Achieved Confidence Interval</th>
<th>Confidence Interval</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
<td>0.001</td>
<td>0.908 (-0.000, 0.023)</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>13</td>
<td>0.001</td>
<td>0.908 (-0.003, 0.032)</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>-0.001</td>
<td>0.908 (-0.026, 0.004)</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>13</td>
<td>-0.016</td>
<td>0.908 (-0.027, 0.009)</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>13</td>
<td>0.003</td>
<td>0.908 (0.000, 0.015)</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>13</td>
<td>-0.003</td>
<td>0.908 (0.000, 0.025)</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>13</td>
<td>0.003</td>
<td>0.908 (0.000, 0.032)</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>13</td>
<td>0.001</td>
<td>0.908 (0.000, 0.044)</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>13</td>
<td>0.000</td>
<td>0.908 (-0.000, 0.11)</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>13</td>
<td>-0.003</td>
<td>0.908 (-0.063, 0.000)</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>13</td>
<td>-0.016</td>
<td>0.908 (-0.070, 0.000)</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>13</td>
<td>0.000</td>
<td>0.908 (0.000, 0.000)</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>13</td>
<td>0.000</td>
<td>0.908 (0.000, 0.001)</td>
<td>4</td>
</tr>
</tbody>
</table>

period of time. Both direct and indirect tests carried out for the two tables of the TRNC concluded the absence of any significant difference between the technical coefficients of the two tables.

Electricity and water industry in 1986's table are found to have significantly smaller technical coefficients in its column. This decrease in the coefficients of electricity and water industry can be due to any one or the mixed effect of the reasons mentioned before i.e. changes in technology, relative prices, product mix and the pattern of
### Table 3.3 Results of Direct Rowwise Comparison of the Technical Coefficients of 1980 and 1986 Tables

<table>
<thead>
<tr>
<th>Row. No.</th>
<th>N</th>
<th>Median</th>
<th>Achieved Confidence</th>
<th>Achieved Confidence Interval</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
<td>0.000</td>
<td>0.908</td>
<td>(-0.020, 0.009)</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>13</td>
<td>0.000</td>
<td>0.978</td>
<td>(-0.026, 0.016)</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>13</td>
<td>0.013</td>
<td>0.908</td>
<td>(-0.029, 0.083)</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>13</td>
<td>0.001</td>
<td>0.908</td>
<td>(-0.075, 0.098)</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>13</td>
<td>-0.016</td>
<td>0.908</td>
<td>(-0.056, 0.000)</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>13</td>
<td>0.009</td>
<td>0.908</td>
<td>(-0.011, 0.032)</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>13</td>
<td>-0.010</td>
<td>0.908</td>
<td>(-0.040, 0.000)</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>13</td>
<td>0.000</td>
<td>0.908</td>
<td>(-0.066, 0.000)</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>13</td>
<td>0.000</td>
<td>0.908</td>
<td>(-0.052, 0.002)</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>13</td>
<td>0.000</td>
<td>0.908</td>
<td>(-0.056, 0.007)</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>13</td>
<td>0.010</td>
<td>0.908</td>
<td>(-0.001, 0.003)</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>13</td>
<td>0.000</td>
<td>0.908</td>
<td>(-0.012, 0.020)</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>13</td>
<td>0.000</td>
<td>0.908</td>
<td>(-0.001, 0.000)</td>
<td>4</td>
</tr>
</tbody>
</table>

### Table 3.4 Results of Indirect Comparison of the Technical Coefficients of 1980 and 1986 Tables

<table>
<thead>
<tr>
<th>N</th>
<th>Median</th>
<th>Achieved Confidence</th>
<th>Achieved Confidence Interval</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>232.6</td>
<td>0.908</td>
<td>(-2217, 4736)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.978</td>
<td>(-9336, 6418)</td>
<td>3</td>
</tr>
</tbody>
</table>

returns to scale. A decrease in column technical coefficients of the electricity and water industry indicates that in 1986 electricity and water industry is
using lesser intermediate and more primary inputs to produce one unit of output.

As 1986 table is a projection of 1980 table and that it is not constructed through a survey, the tests carried out did not compare the two sets of technical coefficients obtained empirically. In this sense the comparison is not an ideal one and the results have to be evaluated by keeping this fact in mind.

3.3 Descriptive Analysis

In the previous chapter format, valuation conventions and treatment of imports in the TRNC tables were discussed. In this section using vast amount of statistics provided by the tables, various descriptive analysis will be carried out. It is quite well known that besides providing statistics and enabling descriptive analysis, input-output tables are widely used in impact analysis, comparative analysis and in economic modelling (simulation and forecasting).\(^6\)

In the following sections, with a descriptive analysis, two tables of the TRNC (1980 and 1986) and 1986's table with the statistics of the Greek Cypriot economy in the Southern part of the Island will be compared. It is very unfortunate that Greek Cypriot economy did not have any input-output tables at the time this research was carried out. Unavailability of input-output tables for the Greek Cypriot economy restricted an extensive comparison of the two economies in this framework. On the other hand Turkey has its latest input-output table prepared in 1973 which makes any comparison irrelevant. Besides, the difficulties of obtaining any relevant statistics from any one of these two countries are beyond compare.

Using trade statistics extracted from 1986 input-output table, performance of TRNC in international trade is assessed. At the end of this section, by using Rasmussen's formulation, inter-industry linkages of TRNC are analysed.\(^7\)

3.3.1 Comparison of the TRNC 1980 and 1986 Tables

Gross domestic product (GDP) can be measured by any one of the two national income accounting conventions by making use of the informations provided in an input-output table: (i) income approach or, (ii) expenditure approach.

---

The income approach involves the sum of all value added by each industry. Value added by each industry is given by the difference between the value of the gross inputs and the intermediate inputs and it comprises household salary and wages, interest payments, profits, depreciation and net indirect taxes. On the other hand expenditure approach considers the final demand components and uses the table rowwise in its calculation. Each industry's contribution to GDP is obtained by subtracting its output given to intermediate sector and its total imports from its gross output.

Equivalency of both approaches can be shown as follows:

\[ \sum X_{ij} + \sum V_i + \sum N_{ii} = \sum X_{ij} + \sum Y_i \]  \hspace{1cm} (40) \\
\[ \sum V_i = \sum X_{ij} + \sum Y_i - \sum X_{ij} - \sum N_{ii} \]  \hspace{1cm} (41) \\
\[ \sum V_i = \sum Y_i - \sum N_{ii} \]  \hspace{1cm} (42)

By definition GDP, through income approach convention, is the total value added and it is given by the left hand side of the equation (42). The right hand side of the equation gives GDP through expenditure approach as total final demand net of total imports. It should be noted that as expressed in equation (41) in chapter 2.2.a (output of an industry for intermediate use is very unlikely to be equal to its
intermediate inputs but total output of all industries for intermediate use is equal to total intermediate inputs \((\sum_{j} X_{ij} = \sum_{j} Y_{ij})\), there is no necessity that value added by a single industry will be equal to its final demand net of its imports i.e. \(V_i + Y_i - M_{ii}\). But the total value added by all the industries is equal to the total final demands of all industries net of total imports as given in equation (42).

It is necessary to point out that GDP is not the same as the sum of industry gross outputs as the latter includes all intermediate transactions as well as value added at each stage of the production. Besides, GDP is not equal to the Gross National Product as the latter includes Net Factor Income (NFI) from abroad in addition to GDP. As the TRNC table does not include any entries in the fourth quadrant it is not possible to calculate NFI from abroad. Thus this in return prevents the calculation of GNP for the TRNC by using only the informations available in its input-output tables.

In comparing the huge amount of statistics provided by the two TRNC tables, expenditure approach convention for obtaining GDP is used and table 3.5 is constructed.

Examining table 3.5, high percentage of consumptions (76 and 98%) are supported by high levels of imports in both years. It is seen that even a higher percentage of consumption, investment and exports have been realised in 1986 through the increasing levels of imports.
As the values in both tables are expressed in current prices and because of high annual inflations between 1980 and 1986, it is irrelevant to compare the values of the two tables.

Table 3.5 Gross Domestic Products of the TRNC Economy in 1980 and 1986 (Tr. TL.)

<table>
<thead>
<tr>
<th></th>
<th>1980</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption*</td>
<td>13,204.1 (76%)</td>
<td>185,611.0 (98%)</td>
</tr>
<tr>
<td>Investment</td>
<td>2,879.7 (17%)</td>
<td>50,375.0 (27%)</td>
</tr>
<tr>
<td>Export</td>
<td>9,171.5 (53%)</td>
<td>83,662.0 (44%)</td>
</tr>
<tr>
<td>Import</td>
<td>-7,944.6 (46%)</td>
<td>-130,911.0 (69%)</td>
</tr>
<tr>
<td>GDP</td>
<td>17,311.5 (100%)</td>
<td>188,737.0 (100%)</td>
</tr>
<tr>
<td>Population**</td>
<td>149.6</td>
<td>162.6</td>
</tr>
<tr>
<td>GDP/Head**</td>
<td>115.7</td>
<td>1,160.2</td>
</tr>
</tbody>
</table>

* All final demand categories contain both domestic and imported products.
** Expressed in thousands.

3.3.2 Comparison of the TRNC and the Greek Cypriot Economies

Availability of the corresponding statistics for the Greek Cypriot economy enabled the comparison of the two economies. Currencies of both economies, Turkish Lira (TL.) and Cyprus Pound (CP.), are converted into US. dollars. In 1986 the
A comparison of GDP and its components for the two economies is given in Table 3.6.

Table 3.6 Gross National Product of TRNC and Cyprus Greek Economy (m. US. $)

<table>
<thead>
<tr>
<th></th>
<th>TRNC</th>
<th>SOUTHERN CYPRUS</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consump.</td>
<td>271.926</td>
<td>2,310.543</td>
<td>2,582.469</td>
</tr>
<tr>
<td>Invest.</td>
<td>73.801</td>
<td>825.526</td>
<td>899.327</td>
</tr>
<tr>
<td>Export</td>
<td>122.567</td>
<td>1,398.803</td>
<td>1,521.370</td>
</tr>
<tr>
<td>Import</td>
<td>-191.789</td>
<td>-1,509.041</td>
<td>-1,700.830</td>
</tr>
<tr>
<td>GDP*</td>
<td>276.505</td>
<td>3,064.386</td>
<td>3,340.891</td>
</tr>
<tr>
<td>NFI</td>
<td>4.931</td>
<td>56.185</td>
<td>61.116</td>
</tr>
<tr>
<td>GNP</td>
<td>281.436</td>
<td>3,120.571</td>
<td>3,402.007</td>
</tr>
<tr>
<td>Pop.**</td>
<td>162.679</td>
<td>548.000</td>
<td>710.679</td>
</tr>
<tr>
<td>GNP/Head**</td>
<td>1.730</td>
<td>5.694</td>
<td>4.787</td>
</tr>
</tbody>
</table>

* Column totals may not give the exact value for GDP. This is due to round offs in converting local currencies into US. $.

** Expressed in thousands.

---

Sources:

Comparing the statistics, TRNC makes up 23% of the total population and gets only 8% of the total GNP produced on the Island. This shows a great imbalance in the distribution of the total output between the two communities. Greeks' share of the GNP is 11 times greater than the Turks' share. GNPs per head, indicating the life standards, appears 3.3 times higher in the Southern Cyprus than what it is in the North.

A detailed analysis of this big gap between the prosperities of the two economies is beyond the scope of this study, but nevertheless a preliminary analysis can explain the main reasons.

The primary reason is a political one which leads to economic consequences. Greek Cypriot Administration in the Southern part of the Island, is recognised as 'the "legitimate government" of the whole Island, while the TRNC has not been recognised yet as it did not seek any recognition up to now. Thus the economic consequences of this political appearance are as follows:
(i) Vast amount of money has been injected into the Greek Cypriot economy through various donations, loans and spendings. The main ones include:

a. Donations made to refugee fund and other various social and economic projects by a variety of national and international institutions.

b. Long term, low interest rate borrowings from the World Bank and other commercial banks.

c. United Nations soldiers' spendings in the South. Their spendings are very negligible in the relatively less developed North.

d. Commercial trade resulting from the recognition of the Greek Cypriot Administration as the "legitimate" government of the whole Cyprus. All planes and ships can visit the Southern part but none of foreign airlines except Turkish Airlines fly to the "unrecognised" TRNC. This is a part of the economic and political embargo applied to the TRNC by the Greek Cypriot Administration.

(ii) Vast economic embargo applied by the Greek Cypriot Government to the TRNC prevents TRNC from developing economic relations with the outside world. They apply economic sanctions to any economic agent which would try to do any business with the TRNC. Any ship that
visits North Cyprus can not go to the South, otherwise its captain is arrested and put into jail at least for six months. Any tourist coming to the TRNC is not allowed to go to the Southern part by the Greek Cypriot Authorities through the border between the two parts. Any tourist in the South is only allowed to visit Northern part for a day and has to get back before twilight so that he/she should not have dinner in the North.

(iii) GNP per head can be regarded as a measure of labour productivity for the two regions and it is accepted that the greater the capital input, the greater is the productivity of labour. Assuming a two factor production function of labour and capital it can be shown that \( \frac{\partial APN}{\partial K} > 0 \), where APN is the average productivity of labour and K is the capital inputs\(^9\). Thus the lower productivity in the TRNC economy can be attributed to the use of lesser capital intensive i.e. more labour intensive, methods of production.

### 3.3.3 Trade Structure of the TRNC Economy

TRNC having a small Island economy, is expected to be heavily dependent on trade and have high proportions of imports to intermediate sector as well as to final demand.

Domestic and imported portions of intermediate inputs and final demand are summarised in table 3.7. Intermediate inputs supplied domestically or imported are obtained from the row totals of domestic input and imported input tables. Likewise the final demand components. Thus the domestic

Table 3.7 Domestic and Imported Supply for Intermediate and Final Demand Use (m. TL.)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Intermediate Use</th>
<th>Final Demand Use</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dom.S. %</td>
<td>Imp.S. %</td>
<td>Dom.S. %</td>
<td>Imp.S. %</td>
<td>Dom.S. %</td>
<td>Imp.S. %</td>
</tr>
<tr>
<td>1. Agricul.</td>
<td>9,603 94</td>
<td>575 6</td>
<td>20,016 86</td>
<td>3,272 14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Ani. &amp; Hsb.</td>
<td>5,553 100</td>
<td>000 0</td>
<td>11,703 96</td>
<td>509 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Manufac.</td>
<td>10,706 23</td>
<td>35,647 77</td>
<td>50,685 39</td>
<td>78,005 61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. E. &amp; W.</td>
<td>769 99</td>
<td>4 1</td>
<td>1,025 100</td>
<td>2 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Building</td>
<td>000 0</td>
<td>000 0</td>
<td>30,750 99</td>
<td>192 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Commerce</td>
<td>9,807 67</td>
<td>4,873 33</td>
<td>34,010 96</td>
<td>1,476 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Rest. &amp; Hot.</td>
<td>360 70</td>
<td>151 30</td>
<td>13,152 87</td>
<td>1,933 13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Transp.</td>
<td>2,614 93</td>
<td>187 7</td>
<td>13,885 80</td>
<td>3,569 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Commun.</td>
<td>408 91</td>
<td>41 9</td>
<td>2,107 100</td>
<td>6 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Fin. Ins.</td>
<td>3,413 99</td>
<td>26 1</td>
<td>4,536 100</td>
<td>12 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Prof. S.</td>
<td>5,411 99</td>
<td>37 1</td>
<td>6,367 94</td>
<td>393 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Pub. S.</td>
<td>000 0</td>
<td>0 0</td>
<td>35,607 100</td>
<td>0 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. House O.</td>
<td>000 0</td>
<td>0 0</td>
<td>6,436 100</td>
<td>0 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>48,644 54</td>
<td>41,540 46</td>
<td>230,279 72</td>
<td>89,369 28</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
supply of an industry for intermediate use and for final demand use makes up the gross output of that industry i.e. agriculture industry supplies 9,603 m. TL. of its output for intermediate use and 20,016 m. TL. for final demand use which makes up its gross output, 29,619 m. TL. Agricultural products imported for intermediate use, 575 m. TL. and for final demand use, 3,274 m. TL. adds up to give the total agricultural products imports, 3,849 m. TL.

Total intermediate and final demand uses of the economy is obtained by adding the domestic and imported portions. Thus total intermediate use of the economy is 90,184 m. TL. (48,644 + 41,540 m. TL.) and final demand use is 319,648 m. TL. (230,279 + 89,369 m. TL.). As expected 46% of the total intermediate inputs and 28% of the total final demand are imported. This is a very high percentage. Total imports, 130,909 m. TL. (41,540 + 89,369 m. TL.) which corresponds to 191.786 m. US. $ is 69% (130,909/188,737) of GDP.

Examining table 3.7 on industry level, 77% (35,647/46,353) of the total intermediate demand for manufacturing industry’s products are actually imported and only 23% is domestically produced. Manufacturing industry ranks at the first place in this respect. Commerce, and hotels & restaurants industries rank in the second and third places with their 33% (4,873/14,680) and 30% (151/511) of their products for intermediate use being imported. As far as the imports for final demand are concerned, manufacturing industry takes the first place again with 61%
of the final demand for manufacturing products being met through imports. Transportation, agriculture and hotels and restaurants industries occupy the second and third places with 61%, 20%, 14% and 13% of the total final demand for their products being imported, respectively.

Considering total imports for intermediate use and total final demand use, it is seen that imports of manufacturing products for intermediate use account 86% (35,647/41,540) of the total imports for intermediate use and 87% (78,005/89,369) of the total imports for final demand use. These high percentages of imports of manufacturing products both for intermediate use and final demand use can be regarded as an indication of the weakness of the manufacturing industry in the economy.

In order to examine the domestic input and imported inputs of the industries table 3.8 is constructed. Total inputs is the sum of the domestic inputs and imported inputs of the industries which are obtained by column wise summation of total, domestic, and imported inputs tables. Thus the first row shows that agricultural industry in 1986 used a total input of 10,696 m. TL. whose 4,048 m. TL. (38%) was domestically provided and 6,612 m. TL. (62%) was imported. Ranking industries with respect to the percentage of imported input use, it is seen that commerce (69%), agriculture (62%), electricity and water (59%) occupies the first three ranks. Manufacturing industry with 48% appears
in the sixth position. As important as this ranking is the proportion of the imported inputs of industries in the total imports for intermediate use. Manufacturing industry alone accounts for 36% (14,804/41,542) of the total imports for intermediate use, while building industry and commerce cover another 20% (8,227/41,542) and 17% (6,982/41,542) respectively.

Table 3.8 Domestic and Imported Inputs of Industries

<table>
<thead>
<tr>
<th>Industry</th>
<th>Total Inputs</th>
<th>Domestic Inputs</th>
<th>Domestic %</th>
<th>Imported Inputs</th>
<th>Imported %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agricult.</td>
<td>10696</td>
<td>4084</td>
<td>38</td>
<td>6612</td>
<td>62</td>
</tr>
<tr>
<td>2. Ani.&amp; Hsb.</td>
<td>9154</td>
<td>8891</td>
<td>97</td>
<td>263</td>
<td>3</td>
</tr>
<tr>
<td>3. Manufac.</td>
<td>31118</td>
<td>16314</td>
<td>52</td>
<td>14804</td>
<td>48</td>
</tr>
<tr>
<td>4. Elec.&amp; W.</td>
<td>626</td>
<td>258</td>
<td>41</td>
<td>368</td>
<td>59</td>
</tr>
<tr>
<td>5. Building</td>
<td>15847</td>
<td>7620</td>
<td>48</td>
<td>8227</td>
<td>52</td>
</tr>
<tr>
<td>6. Commerce</td>
<td>10103</td>
<td>3121</td>
<td>31</td>
<td>6982</td>
<td>69</td>
</tr>
<tr>
<td>7. Rest.&amp; Hot.</td>
<td>3408</td>
<td>2985</td>
<td>88</td>
<td>423</td>
<td>12</td>
</tr>
<tr>
<td>8. Transport.</td>
<td>5558</td>
<td>2497</td>
<td>45</td>
<td>3061</td>
<td>55</td>
</tr>
<tr>
<td>9. Communic.</td>
<td>522</td>
<td>356</td>
<td>68</td>
<td>166</td>
<td>32</td>
</tr>
<tr>
<td>10. Fin. Ins.</td>
<td>749</td>
<td>666</td>
<td>89</td>
<td>83</td>
<td>11</td>
</tr>
<tr>
<td>11. Prof. Ser.</td>
<td>1334</td>
<td>916</td>
<td>69</td>
<td>418</td>
<td>31</td>
</tr>
<tr>
<td>12. Public Ser.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>13. House Ow.</td>
<td>1071</td>
<td>936</td>
<td>87</td>
<td>135</td>
<td>13</td>
</tr>
</tbody>
</table>

Totals 90186 48644 54 41542 46
More about trade statistics involving imports, exports and trade balance is given in table 3.9. Exports compose 44% of GDP with 83,662 m. TL. (122.6 m. US. $). The main exporting industries are manufacturing (34,077 m. TL.), commerce (18,891 m. TL.), agriculture (12,779 m. TL.), and

Table 3.9 Total Imports, Exports and Trade Deficit (m. TL.)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Exports</th>
<th>%</th>
<th>Imports</th>
<th>%</th>
<th>Trade Bal*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agriculture</td>
<td>12,779</td>
<td>15</td>
<td>3,847</td>
<td>3</td>
<td>8,932</td>
</tr>
<tr>
<td>2. Animal Husbandry</td>
<td>1,078</td>
<td>1</td>
<td>509</td>
<td>0</td>
<td>569</td>
</tr>
<tr>
<td>3. Manufacturing</td>
<td>34,077</td>
<td>41</td>
<td>113,652</td>
<td>87</td>
<td>-79,575</td>
</tr>
<tr>
<td>4. Elect. &amp; Water</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>-6</td>
</tr>
<tr>
<td>5. Building</td>
<td>0</td>
<td>0</td>
<td>192</td>
<td>0</td>
<td>-192</td>
</tr>
<tr>
<td>6. Commerce</td>
<td>18,891</td>
<td>23</td>
<td>6,349</td>
<td>5</td>
<td>12,542</td>
</tr>
<tr>
<td>7. Rest. &amp; Hotels</td>
<td>9,862</td>
<td>12</td>
<td>2,084</td>
<td>2</td>
<td>7,778</td>
</tr>
<tr>
<td>8. Transportation</td>
<td>6,975</td>
<td>8</td>
<td>3,756</td>
<td>3</td>
<td>3,219</td>
</tr>
<tr>
<td>9. Communication</td>
<td>0</td>
<td>0</td>
<td>47</td>
<td>0</td>
<td>-47</td>
</tr>
<tr>
<td>10. Financial Inst.</td>
<td>0</td>
<td>0</td>
<td>38</td>
<td>0</td>
<td>-38</td>
</tr>
<tr>
<td>11. Per. &amp; Prof. Ser.</td>
<td>0</td>
<td>0</td>
<td>430</td>
<td>0</td>
<td>-430</td>
</tr>
<tr>
<td>12. Public Services</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>13. House Ownership</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td>83,662</td>
<td>100</td>
<td>130,909</td>
<td>100</td>
<td>-47,247</td>
</tr>
</tbody>
</table>

* Negative entries indicate trade deficits.
restaurant and hotels (9,862 m. TL.) with 41%, 23%, 15%, and 12% shares, respectively in total exports.

It is interesting to note that only 25% (8,366 m. TL.) of the exports of the manufacturing industry are domestically produced while 75% (25,711 m. TL.) are actually imported. Exports of these imported manufacturing goods account 31% (25,771 / 83,622) of the total exports and 20% (25,771 / 130,909) of the total imports. Thus, the imports of manufacturing industry for final demand use (78,005 m. TL.), given in the previous section, includes the products which are then exported (25,711 m. TL.). The net import of manufacturing industry for final demand use is 52,294 m. TL. This makes a percentage of 59% (52,294/89,369) for the net imports of manufacturing industry for final demand use which is quite less than the previous percentage, 87% (78,005/89,369) including the imported manufacturing products for exporting.

Total trade balance (exports-imports) is -47,247 m. TL. (-69,218 m. US. $) which is actually a deficit. As expected this deficit is mainly caused by high amount of imports of manufacturing industry. Its contribution to trade deficit is 79,575 m. TL. (116,580 m. US. $). Of course this trade deficit of the TRNC is balanced by other items in its balance of payments table. TRNC economy with such high proportions of imports (69% of GDP, 130,909 / 188,737) and exports (44% of GDP, 83,662 / 188,737) can be regarded as highly open to international trade.
3.4 Inter-industry Linkage Analysis

The disaggregated nature of the input-output tables enables a detailed examination of inter-industry relations between various industries that make up the table. These inter-industry relations have been widely examined by linkage analysis which has a significant place in Development Economics. It is pointed out by the pioneering economist Hirschman that, subject to some assumptions, by investing in key industrial sectors which have high forward and backward linkages, industrialisation process can be speeded up.¹⁰

Backward linkages measure the purchases made locally by a given industry. They measure the potential of an industry to induce local creation and development of its supplying industries. On the other hand forward linkages involve the local sales of an industry as inputs to other industries. With the availability of such domestic supplies and the creation of new markets an inducement is provided to the using industries. Thus, an industry with a high forward and backward linkages is regarded as a sensitive industry (key industry) in industrial relations.

In the literature there is a wide range of differing views on how to calculate the forward and backward linkages. In

this study Rasmussen's approach will be used\textsuperscript{11}. According to this approach forward and backward linkages are obtained by using the elements of the inverse of \((I-A)\) matrix, where \(A\) is the total input coefficients matrix, as indicated in the equations (43) and (44) given below:

\[
U_i = \frac{1}{n} \frac{\sum_j b_{ij}}{\left(\frac{1}{n} \sum_i b_{ij}\right)^2} \tag{43}
\]

\[
U_j = \frac{1}{n} \frac{\sum_j b_{ij}}{\left(\frac{1}{n} \sum_i b_{ij}\right)^2} \tag{44}
\]

\(U_i\) and \(U_j\) are the forward and backward linkage indexes respectively. In the numerator forward linkages, \(\frac{\sum_j b_{ij}}{\sum_i b_{ij}}\) and backward linkages, \(\frac{\sum_j b_{ij}}{\sum_i b_{ij}}\), are averaged by multiplying them with \(1/n\). Denominator is used to normalise the index and thus to provide a ground for comparison. Any sector with \(U_i > 1\) is said to have high forward linkages and similarly any sector with \(U_j > 1\) is said to have high backward linkages. Otherwise they do not have high linkages. It must be noted that any sector with high forward linkages does not necessarily have high backward linkages and vice-versa.

Using the above equations forward and backward linkages (inter-industry linkages) for TRNC industries are calculated and given in table 3.10. Thus, the industries with backward linkages greater than one are agriculture (1.105), manufacturing (2.739), commerce (1.313) and professional

\textsuperscript{11}Rasmussen, P. (1956), op. cit., pp. 133-142.
services (1.002). These industries can be said to be sensitive in the sense that any increase in their final

Table 3.10 Inter-industry Linkages of the TRNC Economy

<table>
<thead>
<tr>
<th>Industry</th>
<th>Backward Linkage</th>
<th>Forward Linkage</th>
<th>Backward L. Index</th>
<th>Forward L. Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(\bar{b}_{ij})</td>
<td>(\bar{b}_{ij})</td>
<td>(U_{j})</td>
<td>(U_{i})</td>
</tr>
<tr>
<td>1. Agriculture</td>
<td>1.735</td>
<td>1.612</td>
<td>1.185*</td>
<td>1.101</td>
</tr>
<tr>
<td>2. Animal Hus.</td>
<td>1.371</td>
<td>1.873</td>
<td>0.936</td>
<td>1.279</td>
</tr>
<tr>
<td>3. Manufacturing</td>
<td>4.011</td>
<td>1.894</td>
<td>2.739</td>
<td>1.293</td>
</tr>
<tr>
<td>4. Elect. &amp; Water</td>
<td>1.068</td>
<td>1.591</td>
<td>0.729</td>
<td>1.086</td>
</tr>
<tr>
<td>5. Building</td>
<td>1.000</td>
<td>1.902</td>
<td>0.683</td>
<td>1.299</td>
</tr>
<tr>
<td>6. Commerce</td>
<td>1.923</td>
<td>1.330</td>
<td>1.313</td>
<td>0.908</td>
</tr>
<tr>
<td>7. Rest. &amp; Hotels</td>
<td>1.056</td>
<td>1.407</td>
<td>0.721</td>
<td>0.961</td>
</tr>
<tr>
<td>8. Transportation</td>
<td>1.171</td>
<td>1.547</td>
<td>0.799</td>
<td>1.056</td>
</tr>
<tr>
<td>9. Communication</td>
<td>1.035</td>
<td>1.348</td>
<td>0.707</td>
<td>0.920</td>
</tr>
<tr>
<td>10. Fin. Inst.</td>
<td>1.202</td>
<td>1.134</td>
<td>0.821</td>
<td>0.774</td>
</tr>
<tr>
<td>11. Prof. Ser.</td>
<td>1.467</td>
<td>1.175</td>
<td>1.002</td>
<td>0.802</td>
</tr>
<tr>
<td>12. Pub. Ser.</td>
<td>1.000</td>
<td>1.000</td>
<td>0.683</td>
<td>0.683</td>
</tr>
<tr>
<td>13. House Owner.</td>
<td>1.000</td>
<td>1.228</td>
<td>0.683</td>
<td>0.838</td>
</tr>
<tr>
<td>Totals (\bar{F}_{ij})</td>
<td>19.040</td>
<td>19.040</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Numerator, \(1/n \sum_{i} \bar{b}_{ij} = 1.735 / 13 = 0.13346\)

Denominator, \(1/n^2 \sum_{i} \sum_{j} \bar{b}_{ij} = 19.040 / 169 = 0.11266\)

Backward Linkage Index = 0.13346 / 0.11266 = 1.185
demands will effect the structure of the economy more than the others. This effect is achieved through their purchases from other industries.

Industries with forward linkages greater than one are agriculture (1.101), animal husbandry (1.279), manufacturing (1.293), electricity and waters (1.086), building (1.299), and transportation (1.056). These industries compared to those with forward linkages less than one, are expected to provide an inducement to those industries which use their products as inputs. This is achieved through creating new markets and easy supplies of their products.

Manufacturing industry has the highest backward (2.739) and second highest forward (1.293) linkage indexes in the economy. It is definitely an important sector for the economy. But considering the fact that 48% of its inputs are imported and that it provides only 23% of the input requirements of the other industries, one has to think twice in choosing manufacturing industry as a leading (key) industry simply on linkage analysis results.

In fact the assumptions put forward by Hirschman are so strong that ranking sectors or investments in terms of linkages is not a very satisfactory guide to industrial planning.\(^\text{12}\)

3.5 Multipliers

In this section, by using the theoretical derivation of multipliers given in the previous chapter, type I and type II multipliers of output, income and employment will be calculated and evaluated for the TRNC. Total input matrices containing both domestic and imported inputs in the intermediate sector do not isolate the effects of a change in final demand on domestic industries but include the changes on external sources as well i.e. imports for intermediate use. On the other hand domestic input matrices containing only the domestic inputs give the net domestic repercussions on output, income and employment in response to a change in final demand. Thus in this analysis mainly domestic input matrix will be used, while some results obtained using total inputs matrix will also be given to derive further conclusions.

3.5.1 Output Multipliers

Type I and type II output multipliers for the 13 industries of the TRNC are derived by using the equations (26) and (29) in the previous chapter 2.6.2. Before presenting the results obtained, it is essential to comment on the structuring of the augmented matrix from which type II multipliers are derived.

It is unfortunate that there is no detailed data available
on the components of value added for each industry. That is, value added figures available in the table are global figures reflecting the difference between the price of the commodity and the cost of total intermediate inputs. This global value added figures are not divided into household income (salaries and wages), profit, interest payments, depreciations, rents and indirect tax. Unavailability of household income figures of the TRNC table obliged the study to be carried out by using the total value added figures for each industry rather than the household incomes. Thus (n+1)’th row of the augmented matrix showing the value added coefficients for each industry is obtained by dividing the total value added of each industry by their gross outputs, \( v_j = V_j/X_j \), rather than dividing the household incomes by the gross outputs, \( h_j = H_j/X_j \).

Augmented matrix constructed for the TRNC table has private consumption as endogenous to the system. It is widely common that the single final demand sector moved inside the model is the household sector (consumption) and this is due to its being the largest component of the final demand and due to its direct linkage between earned income and consumption and between consumption and output. Household consumption coefficients for the TRNC table are obtained by dividing household consumptions of each industry by the total value added (GDP) rather than the total income earned, as the latter was not available. Thus household consumption coefficients obtained in this way are different than the required theoretical form.
\[ c_{hi} = \frac{C_{hi}}{\sum_j V_j} \]  \hspace{1cm} (45)

where, \( c_{hi} \) is the household consumption coefficient of industry \( i \)
\( C_{hi} \) is the household consumption of the output of industry \( i \)
\( \sum_j V_j \) total of the value added of all industries, GDP

It should be noted that the cell \( d^{(n+1),(n+1)} \) in the augmented matrix is taken as zero as there is no entry in this cell in the TRNC table. As explained in the previous chapter this cell includes the labour services bought by the household sector.

After structuring the augmented matrix for the TRNC table with the above modifications, type I and type II output multipliers derived for each industry are given in table 3.11.

Evaluating table 3.11 it is possible to derive the following conclusions:

(i) The values of type II output multipliers are higher than normally expected. This is due to the way household consumption and household value added coefficients are derived in the augmented matrix. Using total value addeds instead of households incomes increased the induced effects more than expected.
Table 3.11 Type I and Type II Output Multipliers of the TRNC

<table>
<thead>
<tr>
<th>Industry</th>
<th>Type I</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>1.158</td>
<td>9</td>
</tr>
<tr>
<td>Animal Husbandry</td>
<td>1.618</td>
<td>1</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1.348</td>
<td>2</td>
</tr>
<tr>
<td>Elect. &amp; Water</td>
<td>1.164</td>
<td>7</td>
</tr>
<tr>
<td>Building</td>
<td>1.301</td>
<td>3</td>
</tr>
<tr>
<td>Commerce</td>
<td>1.080</td>
<td>12</td>
</tr>
<tr>
<td>Rest. &amp; Hotels</td>
<td>1.281</td>
<td>4</td>
</tr>
<tr>
<td>Transportation</td>
<td>1.170</td>
<td>6</td>
</tr>
<tr>
<td>Communication</td>
<td>1.171</td>
<td>5</td>
</tr>
<tr>
<td>Financial Inst.</td>
<td>1.098</td>
<td>10</td>
</tr>
<tr>
<td>Per. &amp; Prof. Ser.</td>
<td>1.089</td>
<td>11</td>
</tr>
<tr>
<td>Public Services</td>
<td>1.000</td>
<td>13</td>
</tr>
<tr>
<td>House Ownership</td>
<td>1.163</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Type II</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>3.130</td>
<td>12</td>
</tr>
<tr>
<td>Animal Husbandry</td>
<td>3.864</td>
<td>1</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>3.192</td>
<td>10</td>
</tr>
<tr>
<td>Elect. &amp; Water</td>
<td>3.172</td>
<td>11</td>
</tr>
<tr>
<td>Building</td>
<td>3.069</td>
<td>13</td>
</tr>
<tr>
<td>Commerce</td>
<td>3.251</td>
<td>8</td>
</tr>
<tr>
<td>Rest. &amp; Hotels</td>
<td>3.707</td>
<td>3</td>
</tr>
<tr>
<td>Transportation</td>
<td>3.234</td>
<td>9</td>
</tr>
<tr>
<td>Communication</td>
<td>3.525</td>
<td>7</td>
</tr>
<tr>
<td>Financial Inst.</td>
<td>3.650</td>
<td>4</td>
</tr>
<tr>
<td>Per. &amp; Prof. Ser.</td>
<td>3.573</td>
<td>6</td>
</tr>
<tr>
<td>Public Services</td>
<td>3.603</td>
<td>5</td>
</tr>
<tr>
<td>House Ownership</td>
<td>3.728</td>
<td>2</td>
</tr>
</tbody>
</table>

Thus, type II multipliers containing induced effects in addition to direct and indirect effects have been overestimated.

(ii) As it has been expected for all industries type II output multipliers are greater than the corresponding type I output multipliers as the former includes induced effects in addition to direct and indirect effects.
(iii) The rankings of the industries with respect to their type I and type II output multipliers are not the same. This indicates that the induced effects of some industries are great enough to change their rankings. Manufacturing and building industries ranking in the 2nd and 3rd places respectively with their type I multipliers pushed back to 10th and 13th positions when the induced effects are included. This implies that in spite of these two sectors having very high indirect output effects (high backward linkages) on the economy, their share of the household consumption basket is relatively small. On the other hand, the public services sector without any indirect output effect on the economy ranking at the last with its type I output multiplier, has a greater induced output effect on the economy. This is evident from its 5'th position in the rankings of type II output multipliers.

(iv) Type I output multipliers have a range of 0.618 with animal husbandry industry having the highest multiplier, 1.618, and public services sector having the lowest multiplier, 1.0. This range is 0.795 for type II output multipliers. Animal husbandry industry ranks at the first place in both type I and type II output multiplier rankings. House ownership, and restaurant and hotels industry appear in the 2nd and 3rd places respectively with their type II output multipliers. Such a detailed analysis of industries with respect to their individual impacts on the
The economy can be considered as an advantage over the Keynesian multipliers which take the whole sectors as one aggregate and thus conceals these differences.

As discussed previously, type I output multiplier of an industry indicates the total direct and indirect output change in the economy due to a unit change in demand to its product. Thus if there is a 1,000 TL. increase in the final demand of the animal husbandry industry's products, this will increase the total direct and indirect output of the economy by 1,618 TL. The direct increase in output is the initial increase in demand, 1000 TL., and the indirect increase is the rest, 618 TL. Considering the induced effects, animal husbandry industry with a type II output multiplier of 3.864, is expected to result a total direct, indirect and induced increase in output as high as 3,864 TL. Thus the net induced effect increase in output will be 2,246 TL. (3,864 - 1,618).

It is important to note that the multipliers are assumed to operate systematically, so that a decrease in final demand to an industry's product is expected to have the same amount of impact on the economy's output as in the case of an increase but in the opposite direction. Had there been a 1,000 TL. decrease in final demand to the animal husbandry products, there would be a total direct, indirect and induced decrease in the economy's output by 3,864 TL.

The value of a multiplier for a given industry reflects the
degree of its interdependence with the local industries. Greater the degree of interdependence with the other industries the greater is the value of its output multiplier. It should be noted that both the output multipliers and the linkage indexes are derived from the coefficients of the inverse matrix. While linkage analysis involves both forward and backward linkages, multiplier analysis gives an account of only the backward linkages and does not involve forward linkages.

In general, it is expected that the more advanced an economy is the more specialised production it has, leading to an increased degree of structural interdependence. A greater degree of industrial interdependence also appears the more self-sufficient the economy becomes. In comparing the industry multipliers of different countries it is important to note that the values of the multipliers depend not only on the industry definitions and accounting conventions adopted but also on the degree of the aggregation of the table. Such comparisons of industry multipliers of different economies should be taken with great caution.

At this stage of the analysis it would have been very useful to compare the industry multipliers of the TRNC with those of the Southern Cyprus or even with Turkey’s. This would have provided a measure of their relative degree of interdependence among the local industries of the TRNC.
3.5.2 Income Multipliers

In the previous section, the degree of interdependence among local industries were analysed by using output multipliers. As important as the interdependence among the industries is the knowledge of the effects of changes in final demand of each industry on the level of income. Income multipliers will try to serve for this purpose. They are obtained by dividing the total income generated as a result of a given change in final demand of an industry by the direct change in income. Derivation of income multipliers were given in equations (32) and (34) in the previous chapter 2.6.2. Direct income effect for a unit change in an industry’s final demand is given by the value added coefficient of that industry, \( v_j = \frac{v_j}{X_j} \). Direct income change includes not only the households income changed but the whole value addeds i.e. profits, interest payments, rents, depreciations and indirect taxes as well.

It is important to note that, for A-matrix, where total inputs include both the domestic and the imported inputs and thus the column totals of each industry in the coefficients matrix is equal to one, total income generated for the open model is equal to 1 TL., \( \sum_i v_i b_{ij} = 1 \) TL., for all the industries. It is quite obvious that a unit increase in final demand of any industry will create a unit increase in total income. On the other hand D-matrix, as it excludes the imported inputs, the column sums of each industry in the coefficients matrix is less than one, and thus the
income generated for each industry is less than one, in response to a unit change in the final demand of each industry.

As far as the total income generated in closed models are concerned, this can be obtained for each industry by using the numerators of equations 33 and 34 given in the previous chapter 2.6.2. Besides using these formulae, total income generated can be obtained more directly from the inverse of the augmented matrix. For each industry total income generated is given by their corresponding element in the \((n+1)\)'st row of the inverse of augmented matrix, \((I - D^*)^{-1}\). The last element on the last row, \([(n+1),(n+1)]\), is regarded as the consumption multiplier\(^{13}\). For TRNC the consumption multiplier is 1.623. This indicates that if the final demand for household services increases for one unit, then the total income generated in the economy through consumption will increase by 1.623 TL. Consumption multiplier obtained by using A-matrix is 1.903.

Comparing the values of type I and type II income multipliers, it can be seen that the ratio of type II multiplier to type I multiplier for each industry is a constant i.e. type II/type I = \(k^{14}\). This constant for TRNC table is 1.623 which is equal to the consumption multiplier. Using A-matrix the ratio of type II to type I multiplier is

\(^{13}\text{Kundu, A. (1976), op. cit., p. 71}\)
\(^{14}\text{Miller, R. E. and Blair, P. D. (1985), op. cit., p. 109.}\)
also equal to the consumption multiplier obtained from its augmented matrix inverse and it is equal to 1.903.

As noted before type II multipliers are superior to type I multipliers in explaining the total impact on the economy in response to a unit change in the final demand of an industry as the former include the induced effects as well. However, if the study aims in ranking or ordering the industries i.e. which industry has the largest multiplier, which has the next largest and so on, then type I multipliers are just as useful as type II multipliers.

Type I and type II income multipliers calculated for the TRNC are given in table 3.12. As the value added figures (direct income generated) are also given in the table it is possible to derive the total income generated in both open and closed models by multiplying value added figures with type I and type II multipliers respectively. Total income generated for the closed model for each industry in response to 1,000 TL increase in their final demands is given in table 3.13.

Examining the table 3.12, it is possible to derive the following conclusions:

(i) The rankings of the industries with respect to their type I and type II multipliers are the same, as the type II multiplier of each industry is a constant multiple of its type I multiplier.
Table 3.12 Type I and Type II Income Multipliers of the TRNC

<table>
<thead>
<tr>
<th>Industry</th>
<th>V.Added</th>
<th>Rank</th>
<th>Type I</th>
<th>Rank</th>
<th>Type II</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agricult.</td>
<td>0.639</td>
<td>10</td>
<td>1.186</td>
<td>6</td>
<td>1.924</td>
<td>6</td>
</tr>
<tr>
<td>2. Animal Husb.</td>
<td>0.469</td>
<td>13</td>
<td>1.838</td>
<td>1</td>
<td>2.981</td>
<td>1</td>
</tr>
<tr>
<td>3. Manufact.</td>
<td>0.493</td>
<td>11</td>
<td>1.436</td>
<td>2</td>
<td>2.330</td>
<td>2</td>
</tr>
<tr>
<td>4. Elec. &amp; Water</td>
<td>0.651</td>
<td>9</td>
<td>1.186</td>
<td>7</td>
<td>1.923</td>
<td>7</td>
</tr>
<tr>
<td>5. Building</td>
<td>0.485</td>
<td>12</td>
<td>1.402</td>
<td>3</td>
<td>2.274</td>
<td>3</td>
</tr>
<tr>
<td>6. Commerce</td>
<td>0.769</td>
<td>6</td>
<td>1.084</td>
<td>10</td>
<td>1.758</td>
<td>10</td>
</tr>
<tr>
<td>7. Rest. &amp; Hotel</td>
<td>0.748</td>
<td>7</td>
<td>1.246</td>
<td>4</td>
<td>2.021</td>
<td>4</td>
</tr>
<tr>
<td>8. Transport.</td>
<td>0.663</td>
<td>8</td>
<td>1.195</td>
<td>5</td>
<td>1.939</td>
<td>5</td>
</tr>
<tr>
<td>9. Communic.</td>
<td>0.792</td>
<td>5</td>
<td>1.141</td>
<td>9</td>
<td>1.851</td>
<td>9</td>
</tr>
<tr>
<td>10. Finan. Inst.</td>
<td>0.906</td>
<td>2</td>
<td>1.083</td>
<td>11</td>
<td>1.756</td>
<td>11</td>
</tr>
<tr>
<td>11. Prof. Ser.</td>
<td>0.887</td>
<td>3</td>
<td>1.076</td>
<td>12</td>
<td>1.745</td>
<td>12</td>
</tr>
<tr>
<td>12. Public Ser.</td>
<td>1.000</td>
<td>1</td>
<td>1.000</td>
<td>13</td>
<td>1.622</td>
<td>13</td>
</tr>
<tr>
<td>13. House Owner.</td>
<td>0.834</td>
<td>4</td>
<td>1.157</td>
<td>8</td>
<td>1.892</td>
<td>8</td>
</tr>
</tbody>
</table>

(ii) As in the case of output multipliers, type II income multipliers are greater than the type I income multipliers as the former include induced effects in addition to direct and indirect effects.

(iii) Animal husbandry industry with the lowest value added coefficient (direct income generated) of 0.469 ranked at the first place with its highest type I and type II multipliers, 1.838 and 2.981 respectively. Manufacturing and building industries took the second
and third places respectively, with type I multipliers 1.436 and 1.402 and type II multipliers 2.330 and 2.274.

Multipliers obtained above can be used to assess the relative importance of the secondary income generation in each industry, given a specified change in direct income of that industry. For example, if 1,000 TL. direct income is to be generated in animal husbandry industry, 838 TL. (1,838 - 1,000) will be created indirectly, while another 1,143 TL. (2,981 - 1,000 - 838) will be generated by induced effects, making a total increase in income of 2,981 TL., within the TRNC economy.

Further information about the direct, indirect and induced income generated by each industry in response to 1,000 TL. change in its final demand is given in table 3.13. If there is a 1,000 TL. increase in final demand of animal husbandry, this will generate 469 TL. of direct income in this industry. Indirect and induced income increased will be 393 TL. and 536 TL. respectively, resulting in a total income increase of 1,398 TL. in the economy. Manufacturing industry generated second largest impact of indirect incomes after animal husbandry with 215 TL. But because of its very low induced income effect (second lowest after building industry) its total income effect dropped so low to place it as the second lowest total income generating industry in the economy. Public services and financial institutions, in spite of having the lowest indirect income contributions they occupied the first and the second places with their
Table 3.13 Direct, Indirect and Induced Income Generated by Each Industry in Response to 1,000 TL. Increase in their Final Demands

<table>
<thead>
<tr>
<th>Industry</th>
<th>Direct</th>
<th>Indirect</th>
<th>Induced</th>
<th>Total</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agriculture</td>
<td>639</td>
<td>119</td>
<td>471</td>
<td>1,229</td>
<td>11</td>
</tr>
<tr>
<td>2. Animal Husb.</td>
<td>469</td>
<td>393</td>
<td>536</td>
<td>1,398</td>
<td>7</td>
</tr>
<tr>
<td>3. Manufacturing</td>
<td>493</td>
<td>215</td>
<td>440</td>
<td>1,149</td>
<td>12</td>
</tr>
<tr>
<td>4. Elect. &amp; Water</td>
<td>651</td>
<td>121</td>
<td>480</td>
<td>1,252</td>
<td>10</td>
</tr>
<tr>
<td>5. Building</td>
<td>485</td>
<td>195</td>
<td>422</td>
<td>1,102</td>
<td>13</td>
</tr>
<tr>
<td>6. Commerce</td>
<td>769</td>
<td>65</td>
<td>519</td>
<td>1,353</td>
<td>8</td>
</tr>
<tr>
<td>7. Rest. &amp; Hotels</td>
<td>748</td>
<td>184</td>
<td>580</td>
<td>1,512</td>
<td>5</td>
</tr>
<tr>
<td>8. Transportation</td>
<td>663</td>
<td>130</td>
<td>493</td>
<td>1,286</td>
<td>9</td>
</tr>
<tr>
<td>9. Communication</td>
<td>792</td>
<td>112</td>
<td>562</td>
<td>1,467</td>
<td>6</td>
</tr>
<tr>
<td>10. Financial Inst.</td>
<td>906</td>
<td>75</td>
<td>610</td>
<td>1,590</td>
<td>2</td>
</tr>
<tr>
<td>11. Prof. Ser.</td>
<td>887</td>
<td>67</td>
<td>593</td>
<td>1,547</td>
<td>4</td>
</tr>
<tr>
<td>12. Public Ser.</td>
<td>1,000</td>
<td>0</td>
<td>622</td>
<td>1,622</td>
<td>1</td>
</tr>
<tr>
<td>13. House Owner.</td>
<td>834</td>
<td>131</td>
<td>613</td>
<td>1,577</td>
<td>3</td>
</tr>
</tbody>
</table>

Sometimes it is more relevant to know how much the final demand of an industry should increase in order to generate a unit (or 1,000 TL.) of total income (direct, indirect and induced) in the economy. This is obtained simply by dividing 1 (or 1,000 TL.) by that industry's total income.
generated in response to a unit (or 1,000 TL.) change in its final demand. Thus, in order to have a 1,000 TL. total income increase in the economy sales of the animal husbandry industry to final demand should increase by 715 TL. (1,000/1.398). This value is 0.715 TL. when a unit of final demand change is concerned and it may be called as "a unit income

Table 3.14 Final Demand Sales by Each Industry to Generate 1,000 TL. of Total Income in the Economy

<table>
<thead>
<tr>
<th>Industry</th>
<th>Sales to Final Demand TL.</th>
<th>Rank*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agriculture</td>
<td>814</td>
<td>11</td>
</tr>
<tr>
<td>2. Animal Husbandry</td>
<td>715</td>
<td>7</td>
</tr>
<tr>
<td>3. Manufacturing</td>
<td>870</td>
<td>12</td>
</tr>
<tr>
<td>4. Elect. &amp; Water</td>
<td>799</td>
<td>10</td>
</tr>
<tr>
<td>5. Building</td>
<td>907</td>
<td>13</td>
</tr>
<tr>
<td>6. Commerce</td>
<td>739</td>
<td>8</td>
</tr>
<tr>
<td>7. Rest. &amp; Hotels</td>
<td>662</td>
<td>5</td>
</tr>
<tr>
<td>8. Transportation</td>
<td>778</td>
<td>9</td>
</tr>
<tr>
<td>9. Communication</td>
<td>682</td>
<td>6</td>
</tr>
<tr>
<td>10. Financial Inst.</td>
<td>629</td>
<td>2</td>
</tr>
<tr>
<td>11. Per. &amp; Prof. Ser.</td>
<td>646</td>
<td>4</td>
</tr>
<tr>
<td>12. Public Services</td>
<td>617</td>
<td>1</td>
</tr>
<tr>
<td>13. House Ownership</td>
<td>634</td>
<td>3</td>
</tr>
</tbody>
</table>

* Rankings of the industries with respect to their sales to final demand are from small to large.
generating output level" for the industry. Sales requirement to final demand by each industry to generate 1,000 TL. of total income in the economy is given in table 3.14. The ranking of the industries are the same as the ranking of their total income generation in table 3.13. This is simply because "sales to final demand" is calculated by taking the reciprocal of total income generated and then ranked from small to large, rather than from large to small.

3.5.3 Employment Multipliers

The effects of final demand changes on output and income is ultimately expected to have an impact on the level of employment in the economy. It is quite difficult to develop a simple relationship between the level of employment and the level of output and level of income. This is mainly because, an increase in income and output may not necessarily lead to an increase in the level of employment. For example, an increase in output can be due to:

(i) Employers' utilisation of the existing labour forces more intensively through overtime, so that output (and income) may change significantly without a change in the number of persons employed.

(ii) Disguised unemployment, being one of the main characteristics of the developing countries, may not result in an increase in the number of the persons
employed in response to an increase in final demand.

(iii) Mechanisation increasing the productivity of the existing employed persons may meet an increase in final demand without an increase in the number of the persons employed.

To some extent these problems can be overcome by estimating industry employment production functions in which the level of employment in each industry is related to its gross output. Thus, to estimate the employment multipliers, it is assumed that the level of employment in each industry is directly proportional to its gross output. This is formulated as below:

\[ l_i = \frac{L_i}{X_i} \quad (46) \]

where, \( L_i \) is the total employment in industry \( i \)

\( l_i \) is the employment coefficient of industry \( i \)

\( X_i \) is the gross output of industry \( i \)

Mathematical derivation of type I and type II employment multipliers are given in equations (37) and (39) in the previous chapter 2.6.2.

It is expected that a change in final demand of an industry will eventually result in a change in the level of employment in that industry. This initial change in the level of employment is known as the direct change in
employment. Final demand change will have indirect employment changes in other industries which provide inputs to the concerned industry. Thus the total change in employment will be greater than the direct change in employment. An employment multiplier for a given industry is defined as the ratio of the total change in employment in the economy to the direct change in employment of the industry concerned. As in the case of output and income multipliers, type II employment multiplier has household consumption endogenous and thus the total change in employment includes induced effects as well. Type I and type II employment multipliers for each industry of the TRNC are given in table 3.15.

It is advised to consider the employment multipliers calculated for the TRNC industries given in table 3.15 as showing the maximum probable changes in total employment, due to the problem of labour utilisation explained before. The minimum value for any multiplier will be 1, assuming that the creation of a new job does not decrease employment elsewhere in the economy.

Examining table 3.15, it is possible to derive the following conclusions about the type I and type II employment multipliers of the industries:

(i) Unlike as in the case of type I and type II income multipliers, the rankings of the industries with respect to their type I and type II multipliers are
Table 3.15 Type I and Type II Employment Multipliers of TRNC

<table>
<thead>
<tr>
<th>Industry</th>
<th>Emp. Coef.</th>
<th>Rank</th>
<th>Type I</th>
<th>Rank</th>
<th>Type II</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricul.</td>
<td>0.413</td>
<td>4</td>
<td>1.116</td>
<td>8</td>
<td>1.503</td>
<td>11</td>
</tr>
<tr>
<td>Animal Hus.</td>
<td>0.459</td>
<td>2</td>
<td>1.406</td>
<td>3</td>
<td>1.802</td>
<td>7</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.089</td>
<td>11</td>
<td>2.107</td>
<td>1</td>
<td>3.786</td>
<td>2</td>
</tr>
<tr>
<td>Elect. &amp; Water</td>
<td>0.635</td>
<td>1</td>
<td>1.066</td>
<td>10</td>
<td>1.322</td>
<td>12</td>
</tr>
<tr>
<td>Building</td>
<td>0.187</td>
<td>9</td>
<td>1.275</td>
<td>4</td>
<td>2.041</td>
<td>5</td>
</tr>
<tr>
<td>Commerce</td>
<td>0.104</td>
<td>10</td>
<td>1.198</td>
<td>5</td>
<td>2.895</td>
<td>3</td>
</tr>
<tr>
<td>Rest. &amp; Hotels</td>
<td>0.087</td>
<td>12</td>
<td>1.912</td>
<td>2</td>
<td>4.161</td>
<td>1</td>
</tr>
<tr>
<td>Transport.</td>
<td>0.231</td>
<td>7</td>
<td>1.169</td>
<td>6</td>
<td>1.894</td>
<td>6</td>
</tr>
<tr>
<td>Communication</td>
<td>0.310</td>
<td>6</td>
<td>1.085</td>
<td>9</td>
<td>1.700</td>
<td>8</td>
</tr>
<tr>
<td>Financ. Inst.</td>
<td>0.197</td>
<td>8</td>
<td>1.137</td>
<td>7</td>
<td>2.188</td>
<td>4</td>
</tr>
<tr>
<td>Prof. Ser.</td>
<td>0.426</td>
<td>3</td>
<td>1.054</td>
<td>11</td>
<td>1.527</td>
<td>9</td>
</tr>
<tr>
<td>Public Ser.</td>
<td>0.412</td>
<td>5</td>
<td>1.000</td>
<td>12</td>
<td>1.511</td>
<td>10</td>
</tr>
<tr>
<td>House Owner.*</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>---------</td>
<td>------</td>
</tr>
</tbody>
</table>

* House ownership does not have any employed persons. For this reason it does not generate any direct employment, but as it takes inputs from other industries it creates indirect employment.

not the same. While it is not possible to establish a constant relationship between type I and type II employment multipliers, as in the case of type I and type II income multipliers, there is an expression for the difference in value between the total employment
generated in the two versions.\textsuperscript{15}

(iii) Type II employment multipliers are greater than the type I employment multipliers for each industry as the former include induced effects besides the direct and indirect effects.

(iii) Hotels & restaurants, manufacturing and commerce industries appeared in the first three places respectively with their type II employment multipliers. Animal husbandry industry having a 3rd place with its type I multiplier appeared at the 7th position with its type II employment multiplier. Interpreting the employment multipliers of restaurant and hotels industry, it is expected to have 912 persons of indirect employment increase in the economy if the employment in this industry increases by 1,000 persons. Further to this increase, another 2,249 persons of increase in employment is expected through induced effects making the total increase in employment in the economy 4,161 persons.

Table 3.16 provides a breakdown of the direct, indirect and induced employment generated by each industry in response to 1 bil. TL. (note that the values in the table are expressed in millions) increase in their final demand.

\textsuperscript{15}Miller, R. E. and Blair, P. D. (1985), \textit{op. cit.}, p. 113.
It is interesting to see that industries with very high type II employment multipliers, (restaurants, hotels, manufacturing and commerce industries) appeared in the bottom of the ranking with respect to total employment generation in response to 1 bil. TL. change in final demands. On the other hand, electricity and water industry having a very low type II employment multiplier ranked at the first place with its total employment generation.
Comparing the indirect and induced employment creation of the industries it is seen that with the exception of animal husbandry, manufacturing, and restaurant and hotels industries, all industries have relatively poor indirect employment generation.

As in the case of income analysis, sometimes it is more essential to know by how much the final demand in a given industry must increase in order to generate one unit of

Table 3.17 Unit Employment Generating Net Output Levels of Industries (m. TL.)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Unit Emp. Gen. Output Level</th>
<th>Rank*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agriculture</td>
<td>1.612</td>
<td>5</td>
</tr>
<tr>
<td>2. Animal Husbandry</td>
<td>1.802</td>
<td>2</td>
</tr>
<tr>
<td>3. Manufacturing</td>
<td>2.968</td>
<td>11</td>
</tr>
<tr>
<td>4. Elect. &amp; Water</td>
<td>1.191</td>
<td>1</td>
</tr>
<tr>
<td>5. Building</td>
<td>2.619</td>
<td>9</td>
</tr>
<tr>
<td>6. Commerce</td>
<td>3.331</td>
<td>12</td>
</tr>
<tr>
<td>7. Rest. &amp; Hotels</td>
<td>2.749</td>
<td>10</td>
</tr>
<tr>
<td>8. Transportation</td>
<td>2.289</td>
<td>7</td>
</tr>
<tr>
<td>9. Communication</td>
<td>1.899</td>
<td>6</td>
</tr>
<tr>
<td>10. Financial Inst.</td>
<td>2.324</td>
<td>8</td>
</tr>
<tr>
<td>11. Per. &amp; Prof. Ser.</td>
<td>1.539</td>
<td>3</td>
</tr>
<tr>
<td>12. Public Services</td>
<td>1.604</td>
<td>4</td>
</tr>
<tr>
<td>13. House Ownership</td>
<td>3.054</td>
<td>13</td>
</tr>
</tbody>
</table>

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employment in the economy. This index may be called as "a unit employment generating net output level" and it is calculated by dividing 1 by the total (direct, indirect and induced) employment generated in the economy in response to a unit change in the final demand of each industry. Unit employment generating output levels for each industry in the TRNC is given in table 3.17.

Unit employment generating net output levels of industries depend not only on the total employment generated through inter-industry relations but also on the direct employment generated i.e. labour intensiveness of each industry. Electricity and water industry, because of its labour intensiveness (i.e. high direct employment generation) and in spite of its relatively poor indirect and induced employment generation, appeared in the first place with the least sales to final demand necessary to generate one unit of employment. Animal husbandry industry also having a high labour intensive production but a relatively very large indirect and induced employment generation ranked at the second place.

3.6 Source of Output Income Employment and Imports

In this section the effects of the actual expenditures on final demand categories on sectoral output, income, employment and imports will be discussed. This will enable to see which component of the final demand is more
influential in transforming expenditures into output, income, employment and imports for each industry. Calculation of output, income, employment and imports generation per TL of expenditure of final demand categories will provide a better assessment of the effects of final demand categories.

3.6.1 Source of Output by Final Demand Categories

The effects of final demand categories' expenditures on the output levels of each industry can be obtained by multiplying the total direct and indirect output generated in response to a unit change in final demand of each industry by the column vectors of total consumption, investment and exports as given below:

\[
O_1 C_i \quad (47) \\
O_1 I_i \quad (48) \\
O_1 E_i \quad (49)
\]

where, 

- \( O_1 \) is the total output generated in response to a unit change in the final demand of industry \( i \), (type I multipliers given in table 3.11)
- \( C_i \) is the total consumption of the output of industry \( i \)
- \( I_i \) is the investment expenditures on industry \( i \)
- \( E_i \) is the exports of industry \( i \)
The results are given in table 3.18. Examining table 3.18, total consumption is the most influential of final demand categories in generating outputs for each industry with the exception of building industry whose output is totally determined by the expenditures on investment.

Table 3.18 Source of Output for Each Industry by Final Demand Category (m. TL.)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Consumption</th>
<th>Investment</th>
<th>Export</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agriculture</td>
<td>8866</td>
<td>-485</td>
<td>14798</td>
<td>23179</td>
</tr>
<tr>
<td>2. Animal Hus.</td>
<td>17353</td>
<td>-162</td>
<td>1744</td>
<td>18935</td>
</tr>
<tr>
<td>3. Manufacturing</td>
<td>50465</td>
<td>6581</td>
<td>11277</td>
<td>68323</td>
</tr>
<tr>
<td>4. Elect. &amp; Water</td>
<td>1193</td>
<td>0</td>
<td>0</td>
<td>1193</td>
</tr>
<tr>
<td>5. Building</td>
<td>0</td>
<td>40006</td>
<td>0</td>
<td>40006</td>
</tr>
<tr>
<td>6. Commerce</td>
<td>13383</td>
<td>2945</td>
<td>20402</td>
<td>36731</td>
</tr>
<tr>
<td>7. Rest.&amp; Hotels</td>
<td>4214</td>
<td>0</td>
<td>12633</td>
<td>16848</td>
</tr>
<tr>
<td>8. Transportation</td>
<td>7218</td>
<td>867</td>
<td>8161</td>
<td>16245</td>
</tr>
<tr>
<td>9. Communication</td>
<td>2467</td>
<td>0</td>
<td>0</td>
<td>2467</td>
</tr>
<tr>
<td>10. Financial Inst.</td>
<td>4981</td>
<td>0</td>
<td>0</td>
<td>4981</td>
</tr>
<tr>
<td>11. Per.&amp; Prof. Ser.</td>
<td>6934</td>
<td>0</td>
<td>0</td>
<td>6934</td>
</tr>
<tr>
<td>12. Public Services</td>
<td>35607</td>
<td>0</td>
<td>0</td>
<td>35607</td>
</tr>
<tr>
<td>13. House Ownership</td>
<td>7485</td>
<td>0</td>
<td>0</td>
<td>7485</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>160166</strong></td>
<td><strong>49752</strong></td>
<td><strong>69016</strong></td>
<td><strong>278934</strong></td>
</tr>
</tbody>
</table>

* Realised total gross output in the table is 278,923 m. TL.
Manufacturing, building, commerce, and public services industries having a share of 25%, 14%, 13%, and 13%, respectively in the total outputs generated, account for more than 60% of the total outputs generated in the economy in that year.

In order to compare the effects of final demand categories' expenditures on the total output generated in the economy table 3.19 is constructed. Output generated per TL. expenditure of final demand categories (average output generated) is obtained by dividing the total output generated by each category by the actual expenditures of that category. Average output generated by total consumption is 1.198 TL. (160,166/133,747) and it indicates the amount of the output generated by a unit expenditure of

Table 3.19 Total and Average Output Generated by Final Demand Categories (m. TL.)

<table>
<thead>
<tr>
<th>Final demand</th>
<th>Total Output</th>
<th>Av. Output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Generated</td>
<td>% Generated</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Total Cons.</td>
<td>133747</td>
<td>160166</td>
</tr>
<tr>
<td>Investment</td>
<td>38581</td>
<td>49752</td>
</tr>
<tr>
<td>Export</td>
<td>57951</td>
<td>69016</td>
</tr>
<tr>
<td>Totals</td>
<td>230279</td>
<td>278934</td>
</tr>
</tbody>
</table>
total consumption. It is observed that the composition of final demand categories' expenditures is reflected onto the total output generated in the economy. Thus high share of total consumption in the total output generated (57%) is explained by its high share (58%) in the actual expenditures of final demand. Expenditures on investment generated only 18% of the total output which is due to its low share in the actual expenditures of final demand, in spite it generates the highest average output (1.290 TL).

3.6.2 Sources of Income by Final Demand Categories

In assessing the effects of final demand categories' expenditures on the total income generated in the economy, augmented domestic input coefficients matrix, which captures the induced effects as well as direct and indirect effects, is used.

Total income generated by each industry for final demand categories' expenditures is obtained by multiplying the "total income generated in response to a unit change in final demand of each industry" by the actual final demand expenditures. This is formulated as below:

\[ U^i_k C_{gi} \] (50)

\[ U^i_k I_i \] (51)

\[ U^i_k E_i \] (52)
where, $U^*_i$ is the total income generated in the economy in response to a unit change in the final demand of i'th industry (given in table 3.13)

$C_{gi}$ is the government consumption of the output of industry $i$

and $I_i', E_i$ are as defined before

Using the above formulations table 3.20 is constructed.

**Table 3.20 Source of Income for each Industry by Final Demand Category (m. TL.)**

<table>
<thead>
<tr>
<th>Industry</th>
<th>Consumption</th>
<th>Investment</th>
<th>Export</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agriculture</td>
<td>123</td>
<td>-515</td>
<td>15706</td>
<td>15314</td>
<td>8</td>
</tr>
<tr>
<td>2. Animal Hus.</td>
<td>187</td>
<td>-140</td>
<td>1509</td>
<td>1556</td>
<td>1</td>
</tr>
<tr>
<td>3. Manufacturing</td>
<td>4078</td>
<td>5608</td>
<td>9611</td>
<td>19298</td>
<td>10</td>
</tr>
<tr>
<td>4. Elect. &amp; Water</td>
<td>477</td>
<td>0</td>
<td>0</td>
<td>477</td>
<td>0</td>
</tr>
<tr>
<td>5. Building</td>
<td>0</td>
<td>33886</td>
<td>0</td>
<td>33886</td>
<td>18</td>
</tr>
<tr>
<td>6. Commerce</td>
<td>1054</td>
<td>3690</td>
<td>25559</td>
<td>30303</td>
<td>16</td>
</tr>
<tr>
<td>7. Rest. &amp; Hotels</td>
<td>1589</td>
<td>0</td>
<td>14907</td>
<td>16495</td>
<td>9</td>
</tr>
<tr>
<td>8. Transportation</td>
<td>648</td>
<td>953</td>
<td>8968</td>
<td>10568</td>
<td>6</td>
</tr>
<tr>
<td>9. Communication</td>
<td>701</td>
<td>0</td>
<td>0</td>
<td>701</td>
<td>0</td>
</tr>
<tr>
<td>10. Financial Inst.</td>
<td>280</td>
<td>0</td>
<td>0</td>
<td>280</td>
<td>0</td>
</tr>
<tr>
<td>11. Prof. Ser.</td>
<td>2199</td>
<td>0</td>
<td>0</td>
<td>2199</td>
<td>1</td>
</tr>
<tr>
<td>12. Public Ser.</td>
<td>57747</td>
<td>0</td>
<td>0</td>
<td>57747</td>
<td>31</td>
</tr>
<tr>
<td>13. House Owner.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>69083</strong></td>
<td><strong>43482</strong></td>
<td><strong>76259</strong></td>
<td><strong>188824</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

112
Negative entries for agricultural and animal husbandry industries indicate the use of stocks from the previous year, and thus investment expenditures in these industries do not contribute a net income generation. It is important to see that expenditures on exports play a major part in generating incomes for agriculture, animal husbandry, manufacturing, commerce, restaurant and hotels, and transportation industries. Income in building industry is totally generated by the expenditures on investment. It is not surprising to see public services sector to have a 31% share in the total income generated in the economy given the high level of government involvement in such a small Island economy. Public services (31%), building (18%), commerce (16%) and manufacturing (10%) industries comprised 75% of the total income generated in the economy given the actual expenditures on final demand categories.

With a similar aim as in output generation, table 3.21 is constructed to show the shares of total income generated by each category of final demand and the income generated per TL. of expenditure of each category of final demand (average income generated). Expenditures on exports generated the highest share of income in the economy (40%). This is explained by its high proportion in the composition of final demand. Government consumption in spite of its relatively low proportion in the final demand, generated 37% of the total income in the economy. This is due to its high average income generation of 1,563 TL, implying that, given a 1,000 TL. expenditure on government consumption this will generate 1,563 TL. in the economy.
Table 3.21 Total and Average Income Generated by Final Categories (m. TL.)

<table>
<thead>
<tr>
<th>Final demand</th>
<th>Total Income</th>
<th>Av. Income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Generated</td>
<td>% Generated</td>
</tr>
<tr>
<td>Gov. Cons.</td>
<td>44181</td>
<td>31</td>
</tr>
<tr>
<td>Investment</td>
<td>38581</td>
<td>28</td>
</tr>
<tr>
<td>Export</td>
<td>57951</td>
<td>41</td>
</tr>
<tr>
<td>Totals</td>
<td>140713</td>
<td>100</td>
</tr>
</tbody>
</table>

3.6.3 Source of Employment by Final Demand Categories

As previously discussed, like all incomes, all employment can be attributed to final demand. Thus, in assessing the effects of final demand categories' expenditures on the employment generation by each industry, "total employment generated in response to a unit change in final demands of each industry" is multiplied by the actual expenditures on final demand categories. They are formulated as follows:

\[ N^*_i C_{gi} \]  \hspace{1cm} (53)

\[ N^*_i I_i \]  \hspace{1cm} (54)

\[ N^*_i E_i \]  \hspace{1cm} (55)

Where, \( N^*_i \) is the total employment generated in response...
to a unit change in final demand of i'th
industry's product (given in table 3.16)
and
and $c_{i1}, i_1, e_1$ are as defined before.

Results obtained by using the above formulations are
recorded in table 3.22. Expenditures of exports are quite

Table 3.22 Source of Employment for Each Industry by Final
Demand Categories (m. TL.)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Consumption</th>
<th>Investment</th>
<th>Export</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agriculture</td>
<td>62</td>
<td>-260</td>
<td>7926</td>
<td>7728</td>
<td>12</td>
</tr>
<tr>
<td>2. Animal Hus.</td>
<td>111</td>
<td>-83</td>
<td>892</td>
<td>920</td>
<td>1</td>
</tr>
<tr>
<td>3. Manufacturing</td>
<td>1196</td>
<td>1645</td>
<td>2819</td>
<td>5660</td>
<td>9</td>
</tr>
<tr>
<td>4. Elect. &amp; Water</td>
<td>320</td>
<td>0</td>
<td>0</td>
<td>320</td>
<td>1</td>
</tr>
<tr>
<td>5. Building</td>
<td>0</td>
<td>11742</td>
<td>0</td>
<td>11742</td>
<td>18</td>
</tr>
<tr>
<td>6. Commerce</td>
<td>234</td>
<td>819</td>
<td>5671</td>
<td>6724</td>
<td>4</td>
</tr>
<tr>
<td>7. Rest. &amp; Hotels</td>
<td>382</td>
<td>0</td>
<td>3587</td>
<td>3969</td>
<td>6</td>
</tr>
<tr>
<td>8. Transportation</td>
<td>220</td>
<td>324</td>
<td>3047</td>
<td>3591</td>
<td>6</td>
</tr>
<tr>
<td>9. Communication</td>
<td>252</td>
<td>0</td>
<td>0</td>
<td>252</td>
<td>0</td>
</tr>
<tr>
<td>10. Financial Inst.</td>
<td>76</td>
<td>0</td>
<td>0</td>
<td>76</td>
<td>0</td>
</tr>
<tr>
<td>11. Prof. Ser.</td>
<td>924</td>
<td>0</td>
<td>0</td>
<td>924</td>
<td>1</td>
</tr>
<tr>
<td>12. Public Ser.</td>
<td>22192</td>
<td>0</td>
<td>0</td>
<td>22192</td>
<td>35</td>
</tr>
<tr>
<td>13. House Owner.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td>25970</td>
<td>14187</td>
<td>23940</td>
<td>64097</td>
<td>100</td>
</tr>
</tbody>
</table>

* Total employment realised in the Economy is 64066.
important in generating a major share of most industries' total employment. For public services and building industries, their employments are totally generated by the expenditures of government consumption and investments respectively, as in the case of their income generation. Public services (35%) together with building (18%), agriculture (12%) and manufacturing (9%) industries explain 75% of the total employment generated in the economy given the expenditures on final demand categories.

Table 3.23 gives the share of total and average employment generated in the economy by the expenditures on final demand categories. Government consumption in spite of its relatively low composition in the expenditures on final demand categories (31%), generated the highest proportion in the total income (41%). Considering its relatively high

<table>
<thead>
<tr>
<th>Final demand</th>
<th>Total Emp. Generated</th>
<th>Av. Emp. Generated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gov.Cons.</td>
<td>44181 31 25970 41 0.588</td>
<td></td>
</tr>
<tr>
<td>Investment</td>
<td>38581 28 14187 22 0.368</td>
<td></td>
</tr>
<tr>
<td>Export</td>
<td>57951 41 23940 37 0.413</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>140713 100 64097 100 0.456</td>
<td></td>
</tr>
</tbody>
</table>
average employment generation (0.588), one can conclude that government consumption can efficiently be transformed to employment in the economy. Given a 1,000 units of expenditure (one billion TL.) on government consumption, it is expected to generate employment for 588 persons. In fact it is a major government policy to generate employment through government consumption and it is widely applied specially prior to general elections.

3.6.4 Source of Competitive Imports by Final Demand Categories

In order to assess the effects of final demand categories’ expenditures on the generation of competitive imports, total competitive imports generated in response to a unit change in the final demands of each industry has to be calculated. For both open and closed models total competitive imports generated by each industry are obtained by using the below equations:

\[ m (I-D)^{-1} e \]  \hspace{2cm} (45)

or

\[ \sum r_{ij} \]  \hspace{2cm} (46)

\[ m^* (I-D^*)^{-1} e^* \]  \hspace{2cm} (47)

or

\[ \sum r^*_{ij} \]  \hspace{2cm} (48)

Where, \( m_i \) is the competitive imports coefficient of industry \( i, \) \( (M_{2i}/X_i) \)

\( m \) is a row vector of competitive imports coefficients of industries
$D$ is the domestic input coefficients matrix
$e_i$ is the column matrix with all elements being zero except the $i$'th term which is 1
$r_{ij}$ $i,j$'th element of the inverse of $D$-matrix

and variables with "*" are as defined for augmented matrix operations.

Direct, indirect and induced competitive imports for each industry generated in response to a unit change in their final demands are calculated using the above formulations and recorded in table 3.24. As mentioned before in the previous section, total domestic income generated in the economy in response to a unit increase in the final demand of any industry is less than one. This was due to the payments made to the competitive imports used in the intermediate sector. Domestic total, direct, and indirect income generated for a unit increase in final demands of each industry is given in the first and second column of table 3.13. In the same way, total, direct, and indirect payments made to competitive imports generated for a unit increase in the final demands of each industry is given in the first and second columns of table 3.24. As expected the total of these four columns, giving the total domestic and foreign income generated for a unit increase in the final demands of each industry, adds up to one.

It is found that indirect competitive imports generated are not as important as direct or induced imports for all the industries. Animal husbandry industry generated the highest
Table 3.24 Direct, Indirect and Induced Competitive Imports Generated by Each Industry in Response to 1,000 TL. Increase in their Final Demands

<table>
<thead>
<tr>
<th>Industry</th>
<th>Direct</th>
<th>Indirect</th>
<th>Induced</th>
<th>Total</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agriculture</td>
<td>223</td>
<td>19</td>
<td>113</td>
<td>355</td>
<td>3</td>
</tr>
<tr>
<td>2. Animal Hus.</td>
<td>15</td>
<td>122</td>
<td>128</td>
<td>265</td>
<td>7</td>
</tr>
<tr>
<td>3. Manufacturing</td>
<td>241</td>
<td>51</td>
<td>105</td>
<td>397</td>
<td>2</td>
</tr>
<tr>
<td>4. Elect. &amp; Water</td>
<td>205</td>
<td>23</td>
<td>115</td>
<td>343</td>
<td>4</td>
</tr>
<tr>
<td>5. Building</td>
<td>268</td>
<td>52</td>
<td>101</td>
<td>421</td>
<td>1</td>
</tr>
<tr>
<td>6. Commerce</td>
<td>159</td>
<td>7</td>
<td>124</td>
<td>290</td>
<td>6</td>
</tr>
<tr>
<td>7. Rest. &amp; Hotels</td>
<td>31</td>
<td>37</td>
<td>138</td>
<td>206</td>
<td>9</td>
</tr>
<tr>
<td>8. Transportation</td>
<td>106</td>
<td>21</td>
<td>118</td>
<td>325</td>
<td>5</td>
</tr>
<tr>
<td>9. Communication</td>
<td>66</td>
<td>30</td>
<td>134</td>
<td>230</td>
<td>8</td>
</tr>
<tr>
<td>10. Financial Inst.</td>
<td>10</td>
<td>9</td>
<td>146</td>
<td>165</td>
<td>12</td>
</tr>
<tr>
<td>11. Prof. Ser.</td>
<td>36</td>
<td>10</td>
<td>141</td>
<td>187</td>
<td>10</td>
</tr>
<tr>
<td>12. Public Services</td>
<td>0</td>
<td>0</td>
<td>148</td>
<td>148</td>
<td>13</td>
</tr>
<tr>
<td>13. House Ownership</td>
<td>21</td>
<td>14</td>
<td>147</td>
<td>182</td>
<td>11</td>
</tr>
</tbody>
</table>

indirect competitive imports with 122 TL. of competitive imports per 1,000 TL increase in its final demand. Building, manufacturing, agriculture, and electricity and water industries generate the highest direct competitive imports in order, while public services, house ownership, personal and professional services and financial institutions sectors take the first four ranks by generating the highest induced competitive imports. As far as the total imports generated
by the industries are concerned building, manufacturing and agricultural industries occupy the first three ranks with 421, 397 and 355 TL. of competitive imports for every 1,000 TL. increase in their final demands.

Using the total competitive imports generated by each industry recorded in the fourth column of table 3.24, it is possible to derive the source of total competitive imports by final demand categories. For each final demand category's expenditure, competitive imports generated by each industry is obtained by using the below formulations and the results obtained are recorded in table 3.25.

\[ M_{gi}^{*} = C_{gi} \]  
\[ M_{gi}^{*} = I_{i} \]  
\[ M_{gi}^{*} = E_{i} \]

Where, \( M_{gi}^{*} \) is the total competitive imports generated as a result of one unit of increase in its final demand (given in table 3.24) and \( C_{gi}, I_{i}, E_{i} \) are as defined before.

Examining table 3.25, expenditures on exports are generally more influential in generating competitive imports for all the industries except the public services and building industries. For public services all of the competitive imports are generated by the expenditures on government consumption while the imports for building industry is
Table 3.25 Source of Competitive Imports for Each Industry by Final Demand Categories (m. TL.)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Consumption</th>
<th>Investment</th>
<th>Export</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agriculture</td>
<td>35</td>
<td>-149</td>
<td>4532</td>
<td>4419</td>
<td>11</td>
</tr>
<tr>
<td>2. Animal Hus.</td>
<td>36</td>
<td>-27</td>
<td>286</td>
<td>295</td>
<td>1</td>
</tr>
<tr>
<td>3. Manufacturing</td>
<td>1409</td>
<td>1938</td>
<td>3320</td>
<td>6667</td>
<td>16</td>
</tr>
<tr>
<td>4. Elect. &amp; Water</td>
<td>130</td>
<td>0</td>
<td>0</td>
<td>130</td>
<td>0</td>
</tr>
<tr>
<td>5. Building</td>
<td>0</td>
<td>12956</td>
<td>0</td>
<td>12956</td>
<td>31</td>
</tr>
<tr>
<td>6. Commerce</td>
<td>226</td>
<td>790</td>
<td>5471</td>
<td>6487</td>
<td>16</td>
</tr>
<tr>
<td>7. Rest. &amp; Hotels</td>
<td>217</td>
<td>0</td>
<td>2035</td>
<td>2252</td>
<td>5</td>
</tr>
<tr>
<td>8. Transportation</td>
<td>164</td>
<td>241</td>
<td>2267</td>
<td>2671</td>
<td>6</td>
</tr>
<tr>
<td>9. Communication</td>
<td>110</td>
<td>0</td>
<td>0</td>
<td>110</td>
<td>0</td>
</tr>
<tr>
<td>10. Financial Inst.</td>
<td>29</td>
<td>0</td>
<td>0</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td>11. Prof. Ser.</td>
<td>266</td>
<td>0</td>
<td>0</td>
<td>266</td>
<td>0</td>
</tr>
<tr>
<td>12. Public Ser.</td>
<td>5285</td>
<td>0</td>
<td>0</td>
<td>5285</td>
<td>13</td>
</tr>
<tr>
<td>13. House Ownership</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>7907</strong></td>
<td><strong>15749</strong></td>
<td><strong>17911</strong></td>
<td><strong>41567</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

* Realised total competitive imports is 41542 m. TL.

totally the result of the expenditures on investment. Building industry ranks at the first place with the highest share (31%) in the total competitive imports generated in the economy. Manufacturing (16%), commerce (16%), public services (13%) and agriculture (11%) industries explained almost the rest of the competitive imports generated by the given expenditures on final demand categories.
Total and average competitive imports generated by the expenditures on final demand categories are given in Table 3.26. Expenditures on exports has the highest share in total competitive imports generated (43%) which appears to be the result of its high proportion in the composition of final demand expenditures. On the other hand 38% share of the competitive imports generated by the expenditures on investment is explained by its high average competitive imports generation rather than its proportion in the final demand expenditures. Government consumptions has the least share in the total competitive imports generated and appeared the last in generating competitive imports per unit of expenditures.

Table 3.26 Total and Average Competitive Imports Generated by Final Demand Categories (m. TL.)

<table>
<thead>
<tr>
<th>Final demand</th>
<th>Total C. Imp.</th>
<th>Av. C. Imp.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Generated</td>
<td>% Generated</td>
</tr>
</tbody>
</table>

| Gov. Cons.   | 44181        | 31          | 7907        | 19  | 0.179 |
| Investment   | 36581        | 28          | 15749       | 38  | 0.408 |
| Export       | 57951        | 41          | 17911       | 43  | 0.309 |
| Totals       | 140713       | 100         | 41567       | 100 | 0.295 |

Average competitive imports generated by the exports is found to be 0.309 indicating that for every 1,000 TL. of
domestically produced products' exports 309 TL. of competitive imports will be generated. In other words export of 1,000 TL. domestically produced product will have a net export effect of 691 TL. on the balance of payments table.
CHAPTER 4. EEC AND THE ASSOCIATION AGREEMENTS

In this chapter, the establishment and the evolution of the European Economic Community and its institutions will be summarised. The content of the Customs Union Agreement which starts the second stage of the Association Agreement between the EEC and Cyprus will be discussed with reference to the Third Financial Protocol attached to it. After explaining how the association with the EEC will be conceptualised in testing various hypotheses in the next chapter, a summary of the related previous studies will be given. The chapter will end with an analysis of some macro economic variables of the TRNC economy, namely, gross national product, exports and imports, and foreign aid received.

4.1 Evolution of the EEC and its Institutions

The idea of bringing a United Europe under French hegemony goes back to Napoleon. Other peaceful efforts of creating "United States of Europe" and "European Union" within the framework of the League of Nations were proposed in 1923 by the Pan-European leader Count Coudenhove Kalergi and in 1929 by the French foreign minister Gustav Stresemann respectively both of which had not been successful\(^1\). First successful European organisation, Organisation for European

Economie Cooperation (OEEC), was established after the Second World War in 1948 with the American initiative. It was aiming to reconstruct Europe with the contribution of the Americans within the framework of Marshall Plan. In 1960 United States of America (USA) and Canada joined to OEEC and the aims of the organisation was extended to include the development aid for the Third World. Thus OEEC was renamed as Organisation of Economic Construction and Development (OECD).

OEEC was followed by the establishment of a military pact, North Atlantic Treaty Organisation (NATO) in 1949, between USA, Canada and majority of the states in Europe. Council of Europe was established on the same year. It was aiming to include as many European States as possible, especially those which were unwilling to join in any organisation involving supranational powers and those who wanted to preserve their neutrality. Starting with 10 founding members Council of Europe currently has 21 members. It aims to create closer relations among European States and promote economic and social progress.

European Coal and Steel Community (ECSC) was established in 1951 while European Atomic Energy Community (EAEC) and European Economic Community (EEC) were established in 1957. These organisations were united in 1967 to form European Community (EC). Main distinguishing feature of these organisations from others is that their member states surrendered part of their national sovereignty in order to
form a more integrated, cohesive organisation and political unit. ECSC was established by the six European Countries, France, Germany, Belgium, Netherlands, Luxemburg and Italy upon a plan put forward by the French foreign minister in 1950. According to this plan the whole of Franco-German coal and steel production would be controlled by a joint "High Authority" within the organisation open to the participation of the other European Countries.

For a further integration of this six countries a report presented in 1956 formed the basis for the negotiations on treaties establishing the European Economic Community which was signed in March, 1957 and put into force on 1 January, 1958.

During these negotiations British put forward the idea of European Free Trade Area (EFTA) which would involve no sacrifice of national sovereignty. Tariffs between the member states would be abolished but each country would be free in its relations with non-member countries. As the British and French could not reconcile, European Free Trade Organisation was established as an alternative to EEC. It included Britain, Norway, Sweden, Denmark, Austria, Portugal, Iceland and Switzerland as full members and Finland as an associate member. EFTA had purely economic objectives unlike to EEC which had political objectives as well.

In 1961 Britain was the first member of EFTA who applied for
full membership to the Community. This was followed by Denmark, Norway, and Ireland. Their application were turned twice, in 1963 and 1967. It was after De Gaulle stepped down in France in 1969 that Britain, Ireland and Denmark became members of the community from 1 January, 1973 while the people of Norway voted against (53.5%) the membership in a referendum. Free trade agreement signed between EEC and EFTA in 1972 formed the greatest free trade area on the world.

Next application for full membership came from Greece (1975) followed by Portugal and Spain (1977). Greece became the tenth member since 1 January, 1981 while Spain and Portugal became the eleventh and twelfth members since 1 January, 1986.

The main decision making bodies of EC are the Council of Ministers and the European Commission. Commission makes the policy proposals and Council of Ministers take the decision after consulting the European Parliament and the Social Economic Committee. The main institutions of EC are as follows:

(i) European Council
(ii) Council of Ministers

It is possible to find more detailed information about the institutions of EEC in their own publications sent free of charge on request.
European Council is formed by the head of the governments who meet at least three times a year along with their foreign ministers. President and vice president of the European Commission also attend these meetings.

Council of Ministers is the major decision making body of the Community. The Council is made up of one or more representatives (ministers) of the governments. According to the subject of the discussion appropriate ministers attend the meetings. Council is assisted by a committee of permanent representatives (coreper) whose task is to prepare the works of ministers and reduce the areas of disagreement. In all the meetings of coreper and ministers, commission is represented.

Presidency of the Council is held for six months period by each member state in an alphabetic order, chairing both the council and coreper meetings. By the Treaty of Rome, Council decisions can be reached with the majority of votes, but usually the discussion continues until unanimity is reached.

European Commission has 17 members. Big countries like
United Kingdom, Germany, France, Italy and Spain have two while others have one member in the commission. Commissioners are appointed by their governments for four year renewable term. They act only in the interest of the Community and may not receive any instructions from any national government. Commissioners select their president and vice-president for two years renewable term. Their main task is to prepare the policy proposals and act like a guardian of the treaties.

European Parliament has 518 members who are elected for a five years period. The first direct elections were held in 1979. Although the European Parliamentarians are identified politically as socialists, liberals, they tend to vote with respect to their nations rather than with respect to their political groups. European Parliament does not have legislative powers like those of national parliaments but it can reject the budget and give opinions before council takes any decisions. Unanimous vote by the Council is the last word. With the signing of the Single European Act, from 1 January, 1987 onwards Parliament's agreement is also required for the conclusion of international agreements and whenever the Community is to be further enlarged. With two-thirds majority the parliament can dismiss the entire Commission.

Economic and Social Committee is a consultative body for Council of Ministers and it is made up of 189 members who represent the interests of employers, workers, consumers and
other interest groups.

**Court of Justice** is composed of 13 judges, at least one from each member state, and 6 advocate generals. All of them are appointed by the consent of the member states for a renewable six years term. The court is the final arbiter on all disputes arising from the Community treaties. Judgements of the court, in the field of Community law, overrule those of national courts.

**Court of Auditors** consist of 12 members appointed by the mutual agreement of the Council of Ministers for six years. They have an extensive power to examine the legality and regularity of community receipts and expenditures and the sound financial management of the budget.

**European Investment Bank** provides loans for private and public projects in the fields of industry, energy and infrastructure. It raises money on capital markets and re-lends it on a non-profit-making basis which covers not more than 50% of the total cost of the project. About 90% of the lending goes to the member states and the rest to the developing countries of Mediterranean, Africa, Caribbean and Pacific.

### 4.2 Customs Union Agreement

**Customs Union Agreement** lays down the conditions and
procedures for the transition to the second stage of the Cyprus-EEC Association Agreement for Customs Union. This stage provides two phases, the first one is ten years and the second one is four or five years (article 1). According to article 2, the movement of goods between Cyprus and EEC has to obey the principle of "rules of origin" in the first phase. The only exception to this is the "men's and boys' outer garments" (heading no. 61.01). Requests for further exemptions from the rules of origin is to be examined by the Association Council in the early stages of the first phase and could be abolished completely at the end of the first phase. It is important to note that article 4 eliminates all quota restrictions on "man made fibres, carded combed or otherwise prepared for spinning" and "men's and boys' outer garments" (heading nos. 56.04 and 61.01, respectively). It was the Turkish Cypriots who were quite adversely effected from any quota restrictions, as the quotas were not determined community-wise and that the Greek Cypriots used to fill the quotas before the Turkish Cypriots could move. This was not only due to the better transportation facilities of the Greek Cypriots but also due to the economic embargo applied by the Greek Cypriots on the Turkish Cypriots.

For industrial and some of the agricultural products which have relatively less competitive counterparts, Cyprus is to abolish customs duties and charges having an equivalent effect progressively and adopt the Common Customs Tariff (CCT) (article 5). Besides other products, petroleum products are the primary exception which Cyprus has not undertaken to reduce the existing customs duties on imports from the EEC nor is it committed to adopt the CCT. Those products which are relatively less competitive and could not be put into the exemptions list are to follow a slower rate of abolition of customs duties and an adoption of CCT (article 6). All the reductions in customs duties will take the applied rates on 1 January, 1986 as the starting point.

Article 7 of the Agreement gives the right to the Cypriot side, after consultations with the Association Council, to establish or increase duties by 20% and in exceptional cases by 25% for 15% of its imports from the community. As far as the application of CCT is concerned, for products on which the customs duties on 1 January, 1986 are less than 15%, the customs duties will be abolished completely, while the products having more than 15% customs duties will follow a gradual reduction of tariffs as indicated in articles 5 & 6.

Concessions given by the EEC to Cyprus on agricultural products include the increase of quotas on new potatoes, fresh table grapes, dried grapes, wines of fresh grapes (article 18) and they will apply a reference price on oranges, lemons, table grapes, unbottled wines and Cypriot
liqueur wines from 1990 and onwards. Application of increased quotas on new potatoes and reference prices on oranges and lemons is expected to have a favourable effect on the Turkish exports to the EEC while other products do not occupy a significant place in the Turkish exports. Reference prices are expected to contribute the competitiveness of these products in the EEC markets after the membership of Spain and Portugal which provides about 75% of the EEC’s demand for citrus.

Transition from the first to the second phase will not be automatic but it will be decided by the Association Council. In the second phase the conditions and procedures determining the free movement of the rest of the agricultural products will be decided and Cyprus will adopt the mechanisms of the common agricultural policy for the agricultural products which will be covered by the Customs Union (article 30).

Article 32 favors the establishment of "the Trade and Economic Co-operation Committee" which will consist of the representatives of the Community and Cyprus, and the chairmanship would be held alternatively by the two parties. It is important to note that Turkish Cypriots' application of having a representative in this Committee was turned down, thus producing another example of the violation of the article 5 of the Association Agreement that prohibits any communal, national discrimination on the Island.

Considering the fact that the Agreement of Customs Union
might put special emphasis to the financing of the Cypriot production sectors in order to facilitate their adjustment to the new competitive conditions, negotiations between the Community and "Cyprus Government" for arrangements of financial co-operation within the framework of "Third Financial Protocol" started after the agreement is put into force. Turkish Community as usual has not been represented in these negotiations as well.

4.3 Conceptualization of the Impact

In order to understand what is exactly meant by "accession to the EEC" in the study, it is essential to examine the various levels of economic integration in an ascending form:

(i) Free Trade Area (FTA): It consist of an arrangement between states in which they agree to remove all customs duties and quotas on trade passing in between them. However, each party is free to determine unilaterally the level of customs duties on imports coming from outside the area.

(ii) Customs Union (CU): Here in addition to the removal of the tariffs and quotas on trade between the members, the members agree to apply a common level of duty on

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goods entering the union from outside the area.

(iii) Common Market (CM): This form of integration, in addition to the agreements reached in CU, they agree to allow perfect factor mobility i.e. labour, capital and enterprise, within the geographical area of the market.

(iv) Economic Union (EU): This is the ultimate form of the economic integration. In addition to forming a common market, it involves a complete unification of monetary and fiscal policy which is to be controlled by a central authority and the member states is to become regions within the union.

Given the above levels of economic integration one may want to know the degree of integration achieved by the EEC. It is obvious that all tariff and quota restrictions are abolished among the members and they are applying a common tariff and quota to all imports coming from outside the EEC. It can also be seen that labour and capital mobility is encouraged by member countries. European Community has also achieved to certain extent economic union by applying some common macro economic policies, the main one being the agricultural policy. However, the European Community, still not being able to solve the problems of having a common monetary and fiscal policy, is far from the ideal form of economic union seen in United States and Federal Republic of Germany.
In this study the impact of the relations between the EEC and the TRNC on the economic structure of the TRNC economy will be evaluated. Definitely this does not involve an economic union with the member states. Labor and capital movement is still restricted between Cyprus and European Community. Thus what is left behind is the customs union level of integration or below. So, the empirical study here will try to assess the impact of forming a free trade area with the EEC on the economic structure of the TRNC. Specifically it will assess the impact of the financial aid and trade concessions given to the TRNC.

4.4 Other Related Studies

As Greece joined the EEC in 1981, it is possible to find quite a number of empirical studies carried out to assess the impact of Greece joining the EEC on all the sectors of the economy or on manufacturing sector only. As the interest here is to capture the effects on the whole economy, those studies which involved an economy wide econometric models in assessing the effects of joining the EEC on the Greek economy are examined more closely. Besides, similar studies on Turkey, building up economy wide econometric models in order to examine the effects of various policy measures have been useful. In this section some of these studies will be summarized.

Haralambos Kostakopoulos building an economy wide econometric model tried to assess the trade effects of
customs union of Greece with the EEC in his Ph. D. thesis⁵. His model consisted of 166 equations of which 68 were behavioural and 98 identities with 78 exogenous variables. For the annual data covering the period of 1953-1975 he used Limited Information Iterative Instrumental Variables method to estimate his model. His model disaggregates trade into categories, first with respect to the country of origin i.e. trade with EEC, Centrally Planned Economies and rest of the world and second with respect to the nature of the commodity i.e. agricultural commodities, raw materials, and manufactured commodities. His main conclusions were that the trade effects of the association had been positive (1963-1975) and full membership of Greece to the EEC would be beneficial to the Greek economy.

Another study carried out by Dimitrios Giannaros also tries to assess the structural changes of the Greek economy resulting from its integration with the EEC by building an economy wide econometric model⁶. In the first part of his


study, Giannaros using single equations with dummy variables tried to investigate if there had been any structural changes during the association period which lasted 22 years (1959-1981). His results, although could not be explained totally by the association effect, showed a significant structural change in imports, exports, investment and production. In the second section he built up two economy wide econometric models, one Classical (supply determined) and other Keynesian (demand determined), and estimated them by using OLSQ and 2SLS methods. Comparing backward and forward simulation performances of these models, he concluded that 2SLS estimation method did not improve the performances of any of Classical or Keynesian models. As far as performances of the Classical and Keynesian models are concerned there was no clear superiority of one on the other. In the final section in assessing the effects of the association, Giannaros compared the simulation results obtained from the two models, one with dummy variables included, representing the present case and the other one without the dummy variables, representing the alternative case of the development of the economy without the EEC connection. He attributed the positive developments in the macro economic variables solely to the EEC connection but did not mention any other factor that might have contributed. Besides, the implementation of the two models with the presence and the absence of the dummy variables and the difference in the simulation results can be questioned if they really represent the structural difference between the two periods, live aside the effects of the association.
The other study which had been quite helpful in giving insights in model building, simulation and policy analysis belongs to Ercan Uygur. In his book Uygur gave a good summary of all the past studies carried out in building an econometric model for Turkey. Some of these studies are obtained, examined and are given in the Bibliography. Uygur's model is dynamic, simultaneous, non-linear in variables and contains 20 behavioural equations and 20 identities with 40 endogenous, 42 exogenous and 16 lagged endogenous variables. He used both single equation estimation methods, OLSQ and Generalized Least Squares (GLS) in cases of serial correlations among the error terms, and system equation estimation methods, Non-Linear Three Stage Least Squares (NL-3SLS) for the simultaneous equations and Seemingly Unrelated Equations (SUR) for the equations where there was no simultaneity. Both models are simulated backwards and forwards by using Gauss Seidel method and compared. For the sample period (1971-1984) backward simulations of OLSQ - GLS method gave slightly better results while NL-3SLS - SUR method was slightly better in ex-post forecasts for 1985 and ex-ante forecasts for 1986 and 1987. In the model 42 exogenous variables were consisted of 15 outside (foreign) and 15 policy variables whose 7 were controlled by the government directly. For 5 of these policy variables (real public sector investment, official exchange rate, rate of discount, wheat support

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price, and nominal public sector expenditures) dynamic multipliers were calculated and recorded for some target endogenous variables. The same policy and target variables are used for scenario analysis for 1987. In the final section Uygur carried out ex-ante forecasts for the years 1986 and 1987 by using both single and system estimation methods and compared his results with the results obtained by the State Planning Organization (SPO) and the Organisation of Economic Cooperation and Development (OECD).

4.5 TRNC Economy

In this section rather than examining all aspects of the TRNC economy, only the macro economic variables relevant to the study will be analysed. Past developments of gross national product (GNP), imports and exports, and foreign aid will be given in tables and briefly commented.

4.5.1 Gross National Product

Developments in current and real GNP, with real growth rate and per capita income are given in table 4.1. Examining the level of current GNP a steady increase observed can not hide the fluctuations in real GNP. A drastic fall in the growth rate in 1980 to 0.9% and to -7.5% in the next year was followed by a growth rate of 11.2%. Growth rate seems to follow a relatively steady path after 1984, an average of
6.4%, achieving a current GNP of 289,106 m. TL. in 1987 which is 5,684 m. TL. in fixed prices of 1977.

Real GNP per capita also gained a steady pace after 1984 and increased up to 34,441 TL. in 1987 which is 1,751,768 TL. in current prices. This amount makes 2,009 US. $.

Fluctuations in GNP after 1974 till the end of the decade can be due to the organisation of the economy with a limited number of experts in management and in technical areas. Rehabilitation of 60 thousand Turkish Cypriots coming from the Southern Cyprus was another important involvement of the TRNC Government which may be given as another explanation to the unsettled economy.

Rehabilitation of 60 thousand Turkish Cypriots coming from the Southern Cyprus was another important involvement of the TRNC Government which may be given as another explanation to the unsettled economy. It was after the First Five Years Development Plan (1978-1982) that the required investments for steady growth started to be based on dependable savings.

4.5.2 Trade and Its Origins

TRNC has a liberal trade, with no restrictions on imports and exports, and with a very low level of bureaucracy. It is possible to import any commodity with no quota restriction applied and exports are encouraged.

Table 4.1 Developments in Gross National Product (1977–1987)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Y</th>
<th>YREAL</th>
<th>GR</th>
<th>YPH</th>
<th>YPHR</th>
<th>YPHUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>3811</td>
<td>3811.000</td>
<td>-.-</td>
<td>26.379</td>
<td>26.379</td>
<td>1.449</td>
</tr>
<tr>
<td>1978</td>
<td>5281</td>
<td>4031.298</td>
<td>5.8</td>
<td>35.964</td>
<td>27.454</td>
<td>1.462</td>
</tr>
<tr>
<td>1979</td>
<td>8504</td>
<td>4209.901</td>
<td>4.4</td>
<td>57.266</td>
<td>28.350</td>
<td>1.556</td>
</tr>
<tr>
<td>1980</td>
<td>17542</td>
<td>4248.486</td>
<td>0.9</td>
<td>116.727</td>
<td>28.270</td>
<td>1.554</td>
</tr>
<tr>
<td>1981</td>
<td>24525</td>
<td>3929.722</td>
<td>-7.5</td>
<td>161.259</td>
<td>25.839</td>
<td>1.427</td>
</tr>
<tr>
<td>1982</td>
<td>34148</td>
<td>4369.490</td>
<td>11.2</td>
<td>222.841</td>
<td>28.514</td>
<td>1.360</td>
</tr>
<tr>
<td>1983</td>
<td>47040</td>
<td>4440.375</td>
<td>1.6</td>
<td>302.467</td>
<td>28.551</td>
<td>1.305</td>
</tr>
<tr>
<td>1984</td>
<td>73938</td>
<td>4725.228</td>
<td>6.4</td>
<td>468.009</td>
<td>29.910</td>
<td>1.274</td>
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<tr>
<td>1985</td>
<td>126874</td>
<td>5080.386</td>
<td>7.5</td>
<td>791.543</td>
<td>31.696</td>
<td>1.498</td>
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<tr>
<td>1986</td>
<td>195143</td>
<td>5324.110</td>
<td>4.8</td>
<td>1199.580</td>
<td>32.728</td>
<td>1.757</td>
</tr>
<tr>
<td>1987</td>
<td>289106</td>
<td>5684.092</td>
<td>6.8</td>
<td>1751.786</td>
<td>34.441</td>
<td>2.009</td>
</tr>
</tbody>
</table>

Key: Y current GNP (m. TL.)
YREAL real GNP (m. TL.)
GR growth rate
YPH current GNP per head (thousand TL.)
YPHR real GNP per head (thousand TL.)
YPHUS GNP per head in US $ (thousand US. $)

For imports, a list of goods is announced by the Government and the Government provides foreign currency to anyone who imports these goods. Such a list contains goods related to education, health, food, capital, and raw materials for manufacturing. Those goods which are not included in the
list are imported with its foreign currency being provided by the importer.

Exports are directed mainly to third countries for their foreign currency. As an incentive at least 10% of the foreign currency obtained from exports are left to the exporters. For exports whose inputs are not imported with the foreign currency provided by the Government, the exporters are allowed to keep up to 70% of the foreign currency or transfer it to anyone they chose.

In order not to face a foreign currency bottle-neck in the foreign trade, TRNC encourages imports from Turkey and exports to the EEC and ROW. This is one of its basic foreign trade policies.

Total goods and services imported and exported for the years 1977 – 1987 are given in table 4.2. As it is seen, TRNC consistently had a deficit in the goods balance rising up to 2,847.3 m. TL. (fixed prices, 1977) in 1987. On the other hand, a consistent services trade surplus could not prevent TRNC from a deficit in the current account balance in every year. In 1987 with a deficit of 2,847.3 m. TL. on goods balance and a surplus of 2,492.8 m. TL. on services balance, TRNC has a current account deficit of 354.5 m. TL.

Origin of imports and exports of goods and services are given in table 4.3. The statistics support the basic foreign trade policy of importing as much as possible from
Turkey and exporting as much as possible to third countries in order to avoid any foreign currency bottle-neck. As far as the exports are concerned about 82% of it goes to EEC,

Table 4.2 Total Goods and Total Services Trade (m. TL. fixed Prices, 1977)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TGE</th>
<th>TGM</th>
<th>GB</th>
<th>TSE</th>
<th>TSM</th>
<th>SB</th>
<th>GTB</th>
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<tbody>
<tr>
<td>1977</td>
<td>452.51</td>
<td>491.05</td>
<td>-1038.53</td>
<td>1476.67</td>
<td>892.43</td>
<td>584.23</td>
<td>-454.30</td>
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<td>1978</td>
<td>398.38</td>
<td>1085.97</td>
<td>-687.59</td>
<td>1111.44</td>
<td>680.65</td>
<td>422.79</td>
<td>-264.80</td>
</tr>
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<td>1979</td>
<td>417.37</td>
<td>1057.48</td>
<td>-640.11</td>
<td>1091.74</td>
<td>703.43</td>
<td>388.31</td>
<td>-251.80</td>
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<td>1980</td>
<td>566.96</td>
<td>1200.95</td>
<td>-633.99</td>
<td>1073.22</td>
<td>747.14</td>
<td>326.08</td>
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<td>1981</td>
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<td>1677.08</td>
<td>-1082.54</td>
<td>1361.56</td>
<td>675.40</td>
<td>686.16</td>
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</tr>
<tr>
<td>1982</td>
<td>827.11</td>
<td>2512.51</td>
<td>-1685.40</td>
<td>2079.01</td>
<td>989.02</td>
<td>1089.99</td>
<td>-595.41</td>
</tr>
<tr>
<td>1983</td>
<td>906.32</td>
<td>3209.54</td>
<td>-2303.22</td>
<td>2866.18</td>
<td>1276.39</td>
<td>1589.79</td>
<td>-713.42</td>
</tr>
<tr>
<td>1984</td>
<td>897.23</td>
<td>3171.25</td>
<td>-2274.02</td>
<td>2927.42</td>
<td>1340.57</td>
<td>1586.85</td>
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</tr>
<tr>
<td>1985</td>
<td>980.09</td>
<td>3024.60</td>
<td>-2044.51</td>
<td>2671.75</td>
<td>1106.56</td>
<td>1565.20</td>
<td>-479.31</td>
</tr>
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<td>1986</td>
<td>968.44</td>
<td>2852.17</td>
<td>-1883.73</td>
<td>2563.52</td>
<td>1081.88</td>
<td>1481.64</td>
<td>-402.09</td>
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<td>1987</td>
<td>945.68</td>
<td>3793.01</td>
<td>-2847.33</td>
<td>3666.77</td>
<td>1173.95</td>
<td>2492.83</td>
<td>-354.51</td>
</tr>
</tbody>
</table>

Key: TGE total goods exported  
TGM total goods imported  
GB balance of goods trade  
TSE total services exported  
TSM total services imported  
SB balance of services trade  
GTB current account balance
13% goes to Turkey and 5% goes to ROW. For imports, EEC has a share of around 46%, Turkey has 41% and ROW 13% over the concerned years. In 1987 exports of total goods and services rose up to 4,612.5 m. TL. and imports up to 4,967.0 m. TL. leaving TRNC with a current account deficit of 354.5 m. TL.

Tables showing exports and imports of goods and services separately with a similar breakdown as in table 4.3 are given in tables 8.16 and 8.17 in the Appendix.

Table 4.3 Origin of Total Goods and Services Trade (m. TL., Fixed Prices, 1977)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>EEC %</th>
<th>Turkey%</th>
<th>ROW %</th>
<th>Total</th>
<th>EEC %</th>
<th>Turkey%</th>
<th>ROW %</th>
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<tbody>
<tr>
<td>1977</td>
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<td>12</td>
<td>4</td>
<td>1774.62</td>
<td>46</td>
<td>41</td>
<td>13</td>
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<td>1509.11</td>
<td>84</td>
<td>14</td>
<td>2</td>
<td>1760.91</td>
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<td>46</td>
<td>10</td>
</tr>
<tr>
<td>1980</td>
<td>1640.17</td>
<td>83</td>
<td>13</td>
<td>4</td>
<td>1948.09</td>
<td>43</td>
<td>46</td>
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<tr>
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<td>1956.10</td>
<td>80</td>
<td>14</td>
<td>6</td>
<td>2352.48</td>
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<td>38</td>
<td>13</td>
</tr>
<tr>
<td>1982</td>
<td>2906.12</td>
<td>79</td>
<td>16</td>
<td>5</td>
<td>3501.53</td>
<td>51</td>
<td>36</td>
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<td>1983</td>
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<td>13</td>
<td>6</td>
<td>4485.92</td>
<td>47</td>
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<td>5</td>
<td>4511.82</td>
<td>46</td>
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<td>15</td>
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<td>3651.84</td>
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<td>5</td>
<td>4131.16</td>
<td>46</td>
<td>41</td>
<td>13</td>
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<td>1986</td>
<td>3531.96</td>
<td>79</td>
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<td>6</td>
<td>3934.05</td>
<td>44</td>
<td>40</td>
<td>16</td>
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<tr>
<td>1987</td>
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<td>14</td>
<td>4</td>
<td>4966.96</td>
<td>41</td>
<td>39</td>
<td>20</td>
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</tbody>
</table>

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Goods and services trade with EEC, Turkey, and ROW are given on separate tables, table 4.4, 4.5, and 4.6, respectively.

Examining the goods exports and imports of the TRNC, TRNC has been giving deficits in every year in its goods trade with all the concerned parties. In 1987 goods trade deficit arising from its trade with EEC is 525.2 m. TL., from Turkey 1,482.9 m. TL., and from ROW 839.3 m. TL., making a total of 2,847.3 m. TL. Turkey has the highest share in TRNC’s goods trade deficit (52.1%), compared to EEC (18.4%), and ROW (29.5%), it is almost 3 times of EEC (1,482.9 / 525.2 = 2.8) and twice of ROW (1,482.9 / 839.3 = 1.8).

Services trade balances of the TRNC with EEC, Turkey and ROW do not follow the same pattern as in the case of goods trade balance. With the EEC, TRNC has a surplus all throughout the concerned period, while Turkey and ROW cause a deficit in early years which turns out to be surplus after 1983. In 1987 TRNC has a surplus of 2,492.8 m. TL. in services trade balance whose 2,268.0 m. TL. (91%) is accounted by its trade with EEC, 206.0 m. TL. (8.3%) by Turkey and 18.9 m. TL. (0.7%) by ROW. EEC’s contribution to this surplus is about 11 times more than the Turkey’s contribution.

Considering the current account balance with each party, TRNC has a consistent surplus over EEC and deficits in Turkey’s and ROW’s cases all throughout 1977 - 1987. In 1987 TRNC has a surplus of 1,742.8 m. TL. arising from its goods and services trade with the EEC. On the other hand
Turkey and ROW contribute with a deficit of 1,276.9 m. TL. and 820.4 m. TL. respectively resulting in a current account deficit of 354.5 m. TL.

Table 4.4 Goods and Services Trade with EEC (m. TL., fixed Prices, 1977)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>GE</th>
<th>GM</th>
<th>GB</th>
<th>SE</th>
<th>SM</th>
<th>SB</th>
<th>GTB</th>
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</thead>
<tbody>
<tr>
<td>1977</td>
<td>296.33</td>
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<td>996.16</td>
<td>368.22</td>
<td>627.93</td>
<td>445.06</td>
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<tr>
<td>1979</td>
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<td>445.73</td>
<td>-142.68</td>
<td>959.17</td>
<td>323.75</td>
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<td>520.23</td>
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<td>1981</td>
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<td>472.11</td>
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<td>512.81</td>
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<td>-674.82</td>
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<tr>
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<td>-570.35</td>
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<td>774.44</td>
<td>1491.16</td>
<td>1114.77</td>
</tr>
<tr>
<td>1986</td>
<td>645.37</td>
<td>955.77</td>
<td>-310.40</td>
<td>2159.44</td>
<td>759.74</td>
<td>1399.70</td>
<td>1089.30</td>
</tr>
<tr>
<td>1987</td>
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<td>1237.45</td>
<td>-525.19</td>
<td>3078.08</td>
<td>810.09</td>
<td>2267.99</td>
<td>1742.80</td>
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</tbody>
</table>

Key: TGE goods exported
TGM goods imported
GB balance of goods trade
TSE services exported
TSM services imported
SB balance of services trade
GTB current account balance
Table 4.5 Goods and Services Trade with Turkey (m. TL., fixed Prices, 1977)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TGE</th>
<th>TGM</th>
<th>GB</th>
<th>TSE</th>
<th>TSM</th>
<th>SB</th>
<th>GTB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
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<td>336.26</td>
<td>-183.56</td>
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</tr>
<tr>
<td>1978</td>
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<td>432.72</td>
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<td>100.79</td>
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<td>-195.06</td>
<td>-546.37</td>
</tr>
<tr>
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<td>455.39</td>
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<td>119.75</td>
<td>355.21</td>
<td>-235.46</td>
<td>-603.12</td>
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<tr>
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<td>527.97</td>
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<td>-236.75</td>
<td>-686.91</td>
</tr>
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<tr>
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<td>302.50</td>
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<td>523.47</td>
<td>317.51</td>
<td>205.96</td>
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</tr>
</tbody>
</table>

Key: TGE  total goods exported  
      TGM  total goods imported  
      GB   balance of goods trade  
      TSE  total services exported  
      TSM  total services imported  
      SB   balance of services trade  
      GTB  current account balance
Table 4.6 Goods and Services Trade with ROW (m. TL., fixed Prices, 1977)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TGE</th>
<th>TGM</th>
<th>GB</th>
<th>TSE</th>
<th>TSM</th>
<th>SB</th>
<th>GTB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
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<td>286.20</td>
<td>-249.96</td>
<td>19.97</td>
<td>32.66</td>
<td>-12.68</td>
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<td>199.58</td>
<td>-153.41</td>
<td>14.50</td>
<td>24.58</td>
<td>-10.08</td>
<td>-163.50</td>
</tr>
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<td>1979</td>
<td>26.59</td>
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</tr>
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<td>37.14</td>
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</tr>
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<td>97.83</td>
<td>937.10</td>
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<td>65.22</td>
<td>46.34</td>
<td>18.88</td>
<td>-820.39</td>
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</table>

Key: TGE = total goods exported
      TGM = total goods imported
      GB = balance of goods trade
      TSE = total services exported
      TSM = total services imported
      SB = balance of services trade
      GTB = current account balance
4.5.3 Financial Aid and Credits

Financial aid given by Turkey and the EEC play an important role in testing the various hypotheses formulated in chapter 6. Thus the financial aid and credits given to the TRNC by Turkey and other countries are given on table 4.7. It is important to indicate here that in spite of making a difference between the aid and the credits given by Turkey, actually the credits given by Turkey, after a period of time they are written off. Thus the sum of the credits and the aid given by Turkey and expressed under the column "TC" should be considered as totally aid. In this respect the importance of Turkey for the TRNC is far beyond compare. It provides every year about 91% of the total aids given to the TRNC. The rest of the aid is given by the EEC, United Nations High Commission for Refugees (UNHCR), and Saudi Arabia. The big jump in "other countries' aid" to the TRNC in 1985 from 51.6 m. TL. to 103.7 m. TL. is due to the contributions of Saudi Arabia. Starting from 1985, for each consecutive year Saudi Arabia contributed 52.9 m. TL. (fixed prices, 1977) (2.5 m. US. $), 74.5 m. TL. (4.0 m. US. $), and 116.6 m. TL. (6.8 m. US. $).

For a better assessment of the financial aid given by the EEC to both communities in Cyprus, table 4.8 has been prepared. It shows how and on which projects the aid given in the First and Second Financial Protocols are spent. Out of 30 m. ECU. given in the First Financial Protocol only 6.0 m. ECU. is given to the TRNC which was totally spent on
Nicosia Sewerage Project.

The rest of the money is given to the Greek Cypriot Administration (GCA) and spent on the Vasilikos-Pendaskinos Water Project and Electricity Authority Project. It is important to point that not only the TRNC is given a small

Table 4.7 Financial Aid and Credits Given to TRNC (m. TL., Fixed Prices, 1977)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>T</th>
<th>TCC</th>
<th>%</th>
<th>TCA</th>
<th>%</th>
<th>TC</th>
<th>%</th>
<th>AO</th>
<th>%</th>
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<td>418.87</td>
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<td>81</td>
<td>142.30</td>
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Key: T total aid and credits given to the TRNC
TCC credits given by Turkey
TCA aid given by Turkey
TC total aid and credits given by Turkey
AO aid given to the TRNC by other countries
share of the aid, but also the aid is directed to infrastructure which will not increase the productive capacity of the economy. On the other hand, the aid given to the Greek Cypriot Administration is directed to the projects which will directly increase their productivity. One other aspect is that the projects which were financed by the EEC are supposed to comply with the principle of "communality". That is, it would serve for the benefit of both communities. It is very difficult to say that any one of the projects which are totally in the Southern Part of the Island, in total control of the Greek Cypriots serving for them meet this requirement.

Examining the allocation of the financial aid given in the Second Financial Protocol, it is seen that out of 44 m. ECU., 40 m. ECU. is spent and 4 m. ECU. more is to be spent. This amount is totally a grant and it is anticipated that it will be spent on Nicosia Master Plan, improving the inner parts of Nicosia, on both the Greek and the Turkish Cypriot Sectors.

It is very disappointing to see that only 1.13 m. ECU. has been given to the TRNC out of 40 m. ECU. The rest of the money is spent on the Southern Conveyor Water Project and Electricity Authority Project in the Southern Part of the Island.
### Table 4.8 First and Second Financial Protocols Between Cyprus and EEC (m. ECU.)


<table>
<thead>
<tr>
<th>Projects</th>
<th>Grants GCA</th>
<th>TRNC</th>
<th>Loans GCA</th>
<th>TRNC</th>
<th>Total GCA</th>
<th>TRNC</th>
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<td>9.0</td>
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<td>13.5</td>
<td></td>
</tr>
<tr>
<td>Nicosia Sewerage Project</td>
<td></td>
<td>4.5</td>
<td>1.5</td>
<td>1.5</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1.5</td>
<td>4.5</td>
<td>22.5</td>
<td>1.5</td>
<td>24.0</td>
<td>6.0</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Projects</th>
<th>Grants GCA</th>
<th>TRNC</th>
<th>Loans GCA</th>
<th>TRNC</th>
<th>Total GCA</th>
<th>TRNC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vasilikos</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Project</td>
<td>3.4</td>
<td></td>
<td>30.2</td>
<td></td>
<td>33.6</td>
<td></td>
</tr>
<tr>
<td>Electricity Authority Project</td>
<td>0.2</td>
<td></td>
<td>2.6</td>
<td></td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>Nicosia Sewerage Project</td>
<td>2.14</td>
<td>0.26</td>
<td>0.33</td>
<td>0.87</td>
<td>2.47</td>
<td>1.13</td>
</tr>
<tr>
<td>Total</td>
<td>5.74</td>
<td>0.26</td>
<td>33.13</td>
<td>0.87</td>
<td>38.87</td>
<td>1.13</td>
</tr>
</tbody>
</table>

Source: London Office of the Greek Cypriot Administration.
CHAPTER 5. A MACRO ECONOMIC MODEL FOR the TRNC ECONOMY

In this chapter, after a brief explanation of the macro econometric models for developing countries, a model for the TRNC will be specified. This model will be finalised by using OLSQ estimation method. Other estimation methods will also be used to estimate the same model. Two stage least squares and non-linear two stage least squares estimation methods will be used in order to prevent the simultaneity bias in the model. Non-linear least squares estimation will be used because the model built for the TRNC economy is non-linear in variables. Performances of these estimation methods will be assessed comparatively with respect to their predictive powers in backward and forward simulations. Graphs that will be drawn for each estimation method for each endogenous variable of the model will enable a better comparison of the estimation methods. Two models selected from this analysis for their better performances will be used to calculate the dynamic multipliers of government expenditure, exports, exchange rates, and interest rates for the TRNC economy.

5.1 Macroeconomic Models for Developing Countries

Econometric models were first built and seriously applied in Holland, USA and Canada. This led similar efforts by UK, Japan, India, Israel, Turkey, Greece and other countries many of which were developing countries. Japanese applied...
almost the same models established by USA as far as its parametric structure of equations and definitions of variables were concerned. They were not successful and long lasting. This was due to the differing economic structure of the Japanese economy.¹

Likewise Latin American, African and Socialist countries each having different economic structures should have their own models developed rather than using an econometric model developed for other countries. For example, Israel in spite of being a developed country should also develop an original model for its own economic structure which is quite different than the other developed countries. A model for Israel in order to be successful should include and give weight to population growth, through immigration and natural increase, unilateral international transfers, military expenditures for defence and domestic capital formation.

Thus a model which will be built for the TRNC economy should reflect its economic structure rather than taking and applying a model developed for other countries with the same parameters and definitions of its variables.

As the aim of this study is not to find a solution to all of the problems of TRNC economy, a small size econometric model is thought to be sufficient and suitable for the purpose.

Besides, it can be argued that the explanatory power and the forecasting accuracy of an econometric model does not increase with its size, as some model builders do not seem to believe. On the other hand it is widely unacceptable that an economy can adequately be analysed with a very small model containing only some macro variables, the key ones being the monetary variables.

5.2 Specification of the Model

In building up a model for the TRNC economy Klein’s Model for developing countries is taken as a starting point and it is modified for the economic structure of the TRNC. The equations of the modified model are given in table 5.1:

The main differences of the below modified model from the Klein’s original model for developing countries are as follows:

1. In the modified model imports are taken with respect to the origin of country i.e. from EEC countries,

---


3 For a better comparison, Klein’s Model for developing countries is given in table 8.20 in the Appendix.
### Table 5.1 Klein's Modified Model for the TRNC Economy

<table>
<thead>
<tr>
<th>Equation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$C = a_0 + a_1 \frac{(Y-T_c-T_r)}{P} + a_2 C(-1) + u_1$</td>
</tr>
<tr>
<td>2.</td>
<td>$I = b_0 + b_1 \frac{(Y/P)(-1)}{Y/P} + b_2 K(-1) + b_3 R(-1) + u_2$</td>
</tr>
<tr>
<td>3.</td>
<td>$M_e = c_0 + c_1 \frac{(Y/P)}{P} + c_2 M_e(-1) + ER + u_3$</td>
</tr>
<tr>
<td>4.</td>
<td>$M_t = d_0 + d_1 \frac{(Y/P)}{P} + d_2 M_t(-1) + ER + u_4$</td>
</tr>
<tr>
<td>5.</td>
<td>$M_r = e_0 + e_1 \frac{(Y/P)}{P} + e_2 M_r(-1) + ER + u_5$</td>
</tr>
<tr>
<td>6.</td>
<td>$T_c = f_0 + f_1 Y + u_6$</td>
</tr>
<tr>
<td>7.</td>
<td>$T_r = g_0 + g_1 Y + u_7$</td>
</tr>
<tr>
<td>8.</td>
<td>$(Y/P) = h_0 + h_1 L + h_2 K + u_8$</td>
</tr>
<tr>
<td>9.</td>
<td>$P = i_0 + i_1 ER + u_9$</td>
</tr>
<tr>
<td>10.</td>
<td>$W = j_0 + j_1 P + u_{10}$</td>
</tr>
<tr>
<td>11.</td>
<td>$N = k_0 + k_1 (N-L) + k_2 W + u_{11}$</td>
</tr>
<tr>
<td>12.</td>
<td>$(M/P) = l_0 + l_1 \frac{(Y/P)}{Y/P} - l_2 R + u_{12}$</td>
</tr>
<tr>
<td>13.</td>
<td>$(Y/P) = C + I + G + (E_e - M_e)$</td>
</tr>
<tr>
<td>14.</td>
<td>$I = K - K(-1)$</td>
</tr>
<tr>
<td>15.</td>
<td>$M_a = M_e + M_t + M_r$</td>
</tr>
</tbody>
</table>

### Endogenous Variables of the model:

- **C**: Real private expenditures
- **Y**: Gross National Product (in current prices)
- **T_c**: Total direct and indirect taxes
- **T_r**: Transfer payments
- **P**: Domestic price index (GNP deflator)
- **I**: Real private investment
- **K**: Real capital stock
- **M**: Money supply
- **M_e**: Real total imports
- **M_t**: Real imports from EEC countries
Turkey and from ROW., while in Klein's model they are taken as a whole. Thus as a result of this application the modified model has a balance equation for imports (equation 15) in addition which Klein's model does not have.

2. In the modified model transfer payments are also explained by an additional equation rather than taken as
exogenously determined outside the model. In Klein’s model transfer payments are not explained in the model.

3. In the modified model relative prices are kept outside the import functions. This is not due to ruling out their effects but due to the unavailability of the import price index to form a relative price index with the domestic price index. Instead of the relative prices, exchange rates are introduced as a proxy to relative prices in the import functions.

4. Exports are taken as exogenous in the modified model while they are endogenous in Klein’s model. In most small economies it is difficult to find explanatory variables to explain the variations in exports and thus they are taken as exogenous to the model.

5. In the modified model the price level is determined by exchange rates rather than the proportion of income paid to all employed, and relative prices i.e. import price index over domestic price index. This is a normal expectation about a small economy where import dominated commerce is relatively important and devaluations are continuous.

6. In the modified model wage level is determined by domestic price level (index) while in Klein’s model rate of change in wage rates are explained by the rate of change in domestic prices and the rate of unemployment.
This is due to the fact that salaries and wages are adjusted to price changes in the economy in every three months by the government.

7. In the modified model labour force is determined by the level of unemployment and nominal wages rather than the level of unemployment and real wage rates as in the case of Klein’s model.

8. Export price index is excluded from the modified model as the exports are taken as exogenous to the system. In Klein’s model they are explained by the domestic price index.

5.3 Finalisation of the Model

In this section each behavioural equation of the modified model are estimated by using ordinary least squares method. After a series of trials with different explanatory variables, best forms of the behavioural equations are selected for the final model. In selecting the best form of the behavioural equations following statistics which are given along the estimated equations are used:

4It is important to note the existence of another approach in determining the acceptance or rejection of an explanatory variable in an equation. This approach is explained in table 8.22 in the Appendix.
i. t-statistics: They are given under the estimated parameters in parenthesis and are used to decide about the significance of the variable.\\n
ii. $R^2$, Coefficient of Determination: This is the square of the correlation coefficient between the actual value and the estimated value of the dependent variable. The more it is close to 100% the better is the fit. For equations containing more than one explanatory variable adjusted $R^2$ is used so that $R^2$ does not automatically increase as explanatory variables are added to the equation.\\n
iii. D-W, Durbin-Watson Statistic: This statistic is used to test the presence of first order serial correlation in equations where there is no lagged dependent variable among the explanatory variables. Existence of a linear relationship among the disturbance terms results in inefficient coefficient estimates. On the other hand if lagged dependent variables are included on the right hand side of the equation then DW statistics are biased. Thus in case of the existence of lagged dependent variable among the explanatory variables, adjusted $R^2$ is used so that $R^2$ does not automatically increase as explanatory variables are added to the equation.

---

5Tables including the relevant critical values used in t-tests, $R^2$-tests, D-W-tests and F-tests are given in table 8.23 in the Appendix.

variables Durbin's h-statistics is used instead of DW statistics.

iv. **F-statistic:** This statistic tests the overall performance of the equation and it is obtained by taking the ratio of the explained to unexplained variance and multiplying it by the relevant degrees of freedoms.

v. **Correlation Coefficient:** This statistic is used to measure the strength of the linear relationship between the explanatory variables. Existence of a correlation between the two variables above 85% is considered as a serious problem causing multicollinearity. Multicollinearity, in spite of giving unbiased coefficient estimates, it increases the standard error, thus reducing the calculated t-value and resulting the rejection of an explanatory variable which actually may be significant.

Estimating various forms of behavioural equations following results are obtained:

<table>
<thead>
<tr>
<th>I. CONSUMPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>( R^2 )</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>( C = 463.09 + 0.605 (Y_{t} - T_{t})/P )</td>
</tr>
<tr>
<td>( (0.866) )</td>
</tr>
</tbody>
</table>
2®*. \( C = 683.92 + 0.553 \frac{(Y-T_{t-1}-T_{t})}{P} \)
\( \bar{r} = 1.051 \quad (3.845) \)

3. \( C = 206.74 + 0.316 \frac{(Y-T_{t-1} - T_{t})}{P} + 0.506 \, C(-1) \)
\( (0.348) \quad (1.510) \quad (1.680) \quad 72\% \quad 1.51 \quad 12.76 \)

4®. \( C = 1041.4 + 0.448 \frac{(Y-T_{t-1} - T_{t})}{P} + 0.067 \, C(-1) \)
\( (0.430) \quad (1.934) \quad (0.117) \quad 48\% \quad 1.75 \quad 2.77 \)

Corr\(( (Y-T_{t}+T_{t})/P, C(-1)) = 0.80 \)

@ Estimated by AR1 method (corrected for autocorrelation)

* Selected equation

II. INVESTMENT

\begin{tabular}{lrrr}
 & \( \bar{r}^2 \) & D-W & F-Stat \\
1®. \( I = -407.40 + 0.215 \frac{(Y/P)}{(-1)} \) & 67\% & 2.23 & 16.05 \\
& ( -1.706 ) & ( 4.007 ) \\
2. \( I = -54.980 + 0.109(Y/P)(-1) + 9.896 \, R(-1) \) & 66\% & 2.38 & 9.75 \\
& ( -0.158 ) & ( 1.152 ) & ( 1.346 ) \\
\end{tabular}

Corr\(( (Y/P), R ) = 0.87 \)

* Selected equation
III. IMPORTS

A. Imports from EEC

<table>
<thead>
<tr>
<th></th>
<th>( \Delta e ) =</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1045.6 + 0.725 YDIF</td>
<td>23%</td>
<td>0.82</td>
<td>2.34</td>
</tr>
<tr>
<td></td>
<td>(7.909)</td>
<td></td>
<td>(1.530)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>306.63 + 0.337 YDIF + 0.724 ( \Delta e ) (-1)</td>
<td>51%</td>
<td>1.34</td>
<td>5.70</td>
</tr>
<tr>
<td></td>
<td>(1.050)</td>
<td></td>
<td>(0.878)</td>
<td>(2.689)</td>
</tr>
<tr>
<td>3</td>
<td>-574.79 + 0.383 (Y/P)</td>
<td>51%</td>
<td>0.90</td>
<td>9.55</td>
</tr>
<tr>
<td></td>
<td>(-1.015)</td>
<td></td>
<td>(3.090)</td>
<td></td>
</tr>
<tr>
<td>4*</td>
<td>-352.95 + 0.335 (Y/P)</td>
<td>35%</td>
<td>1.43</td>
<td>4.84</td>
</tr>
<tr>
<td></td>
<td>(-0.504)</td>
<td></td>
<td>(2.214)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>-352.27 + 0.198 (Y/P) + 0.556 ( \Delta e ) (-1)</td>
<td>54%</td>
<td>1.28</td>
<td>6.23</td>
</tr>
<tr>
<td></td>
<td>(-0.563)</td>
<td></td>
<td>(1.112)</td>
<td>(1.664)</td>
</tr>
<tr>
<td>6*</td>
<td>-180.88 + 0.241 (Y/P) + 0.275 ( \Delta e ) (-1)</td>
<td>14%</td>
<td>1.77</td>
<td>1.65</td>
</tr>
<tr>
<td></td>
<td>(-0.132)</td>
<td></td>
<td>(0.942)</td>
<td>(0.211)</td>
</tr>
</tbody>
</table>

where, 

\[ \text{YDIF} = Y - Y(-1) \]

\[ \text{Corr}((Y/P), \Delta e(-1)) = 0.69 \]

\* Estimated by ARI method (corrected for autocorrelation)

\* Selected equation
B. Imports from Turkey

<table>
<thead>
<tr>
<th>Equation</th>
<th>R²</th>
<th>D-W</th>
<th>F-Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ( M_t = 1415.4 + 1.396 \text{ YDIF} )</td>
<td>19%</td>
<td>0.66</td>
<td>1.90</td>
</tr>
<tr>
<td>2. ( M_t = 213.5 - 0.116 \text{ YDIF} + 0.961 M_t(-1) )</td>
<td>75%</td>
<td>0.89</td>
<td>14.22</td>
</tr>
<tr>
<td>3. ( M_t = -2310.7 + 0.869 (Y/P) )</td>
<td>59%</td>
<td>0.71</td>
<td>13.11</td>
</tr>
<tr>
<td>4. ( M_t = -751.35 + 0.526 (Y/P) )</td>
<td>14%</td>
<td>0.92</td>
<td>1.20</td>
</tr>
<tr>
<td>5. ( M_t = -114.45 + 0.096 (Y/P) + 0.872 M_t(-1) )</td>
<td>75%</td>
<td>0.81</td>
<td>14.33</td>
</tr>
<tr>
<td>6. ( M_t = -506.27 + 0.088 (Y/P) + 0.634 M_t(-1) )</td>
<td>42%</td>
<td>1.18</td>
<td>3.85</td>
</tr>
</tbody>
</table>

Corr((Y/P), M_t(-1)) = 0.81

@ Estimated by AR1 method (corrected for autocorrelation)
* Selected equation

C. Imports from ROW

<table>
<thead>
<tr>
<th>Equation</th>
<th>R²</th>
<th>D-W</th>
<th>F-Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ( M_t = 377.5 + 0.541 \text{ YDIF} )</td>
<td>22%</td>
<td>0.85</td>
<td>2.21</td>
</tr>
<tr>
<td>2. ( M_t = -9.376 + 0.044 \text{ YDIF} + 1.204 M_t(-1) )</td>
<td>65%</td>
<td>1.20</td>
<td>9.42</td>
</tr>
</tbody>
</table>
Considering the relatively unsatisfactory performance of the selected import equations for the model, it is worth mentioning the results obtained in trying to improve the import equations. As expressed in the modified model, import functions are tried with the exchange rates included in order to provide a proxy for relative prices. When exchange rates are included with the real income as explanatory variables, not only it could not increase the explanatory power but also resulted with insignificant positive coefficients. Considering the possibility that a trend effect might have been distorting the results, first difference equations are tried. That is the rate of change of imports are regressed on the real income and the rate of

\[ \text{Corr}(\text{Y/P}, M_e(-1)) = 0.86 \]

* Estimated by AR1 method (corrected for autocorrelation)

The results of other imports equations mentioned here are given in table 8.24 in the Appendix.
change of exchange rates. These equations also failed, with insignificant coefficients and poor explanatory powers.

Another set of import equations included the number of tourists visiting TRNC throughout the year. Total number of tourists as a variable not only had insignificant and negative coefficients but also did not improve the performance of the import equations.

The last set of import equations were very satisfactory. They included total foreign aid as an explanatory variable next to the real income. All the coefficients, of both real income and total foreign aid were highly significant with positive signs and the explanatory powers were very high. For imports from Turkey, $R^2$ increased up to 91%, for imports from the EEC up to 81%. It was very encouraging to find such results as the imports equations of the model were very significant for the hypothesis to be tested. It is unfortunate that when these successful import equations are included in the model they did not contribute to the backward and forward simulation performance of the model and on the contrary they had a negative (spoiling) effect. Thus they are kept outside the model in spite of their good performances in single equations.
IV. TAX AND TRANSFER PAYMENTS

\[ r^2 \quad \text{D-W} \quad \text{F-Stat} \]

<table>
<thead>
<tr>
<th>Equation</th>
<th>( r^2 )</th>
<th>D-W</th>
<th>F-Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ( T_c = -1233.3 + 0.160Y )</td>
<td>99%</td>
<td>1.94</td>
<td>675.2</td>
</tr>
<tr>
<td>2. ( T_c = -1088.4 + 0.134Y )</td>
<td>100%</td>
<td>0.55</td>
<td>3547</td>
</tr>
<tr>
<td>3* ( T_c = -999.41 + 0.135Y )</td>
<td>100%</td>
<td>1.51</td>
<td>2025</td>
</tr>
</tbody>
</table>

\* Estimated by AR1 method (corrected for autocorrelation)

V. PRODUCTION FUNCTIONS

\[ r^2 \quad \text{D-W} \quad \text{F-Stat} \]

<table>
<thead>
<tr>
<th>Equation</th>
<th>( r^2 )</th>
<th>D-W</th>
<th>F-Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ( \frac{Y}{P} = 90.02 + 0.080L )</td>
<td>85%</td>
<td>0.65</td>
<td>49.60</td>
</tr>
<tr>
<td>2. ( \frac{Y}{P} = -138.6 + 0.085L )</td>
<td>87%</td>
<td>1.54</td>
<td>49.20</td>
</tr>
<tr>
<td>3. ( \frac{Y}{P} = 2244.1 + 0.324K )</td>
<td>90%</td>
<td>1.08</td>
<td>81.56</td>
</tr>
<tr>
<td>4. ( \frac{Y}{P} = 2199.4 + 0.332K )</td>
<td>85%</td>
<td>1.77</td>
<td>48.91</td>
</tr>
<tr>
<td>5. ( \frac{Y}{P} = 4489.1 - 0.079L + 0.634K )</td>
<td>90%</td>
<td>1.76</td>
<td>44.88</td>
</tr>
</tbody>
</table>

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Considering the results obtained above, it has been decided not to include any one of the equations in the model. High correlation between the explanatory variables (0.99 and 0.96) prevented including both of them in the equation. Including a production function with one explanatory variable into the model is not expected to promote the performance of the model. This is mainly because gross national product is already determined in the balance equation (13), capital in the investment equation (2), labour in employment equation (11), and exports are determined exogenously. This decision is proved when backward simulations are carried out with the production functions included in the model. Thus they are excluded from the model.
VI. PRICES

<table>
<thead>
<tr>
<th>Equation</th>
<th>R²</th>
<th>D-W</th>
<th>F-Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ( P = -1.460 + 0.037 \ln )</td>
<td>99%</td>
<td>0.95</td>
<td>2060</td>
</tr>
<tr>
<td>(9.59) (45.395)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ( P = -1.115 + 0.036 \ln )</td>
<td>99%</td>
<td>1.53</td>
<td>1101</td>
</tr>
<tr>
<td>(1.479) (35.505)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. ( P = -0.902 + 0.001 \frac{W*L}{Y/P} )</td>
<td>98%</td>
<td>1.90</td>
<td>529</td>
</tr>
<tr>
<td>(9.946) (23.002)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. ( P = -1.406 + 0.226 \frac{W*L}{Y/P} + 0.304 \ln )</td>
<td>99%</td>
<td>0.73</td>
<td>1063</td>
</tr>
<tr>
<td>(2.880) (1.133)</td>
<td></td>
<td>(5.264)</td>
<td></td>
</tr>
<tr>
<td>5. ( P = -1.163 + 0.0002 \frac{W*L}{Y/P} + 0.030 \ln )</td>
<td>99%</td>
<td>1.70</td>
<td>551</td>
</tr>
<tr>
<td>(1.476) (1.674)</td>
<td></td>
<td>(8.347)</td>
<td></td>
</tr>
</tbody>
</table>

Corr \((\frac{W*L}{Y/P}), \ln\) = 0.99

* Estimated by AR1 method (corrected for autocorrelation)

VII. WAGES

<table>
<thead>
<tr>
<th>Equation</th>
<th>R²</th>
<th>D-W</th>
<th>F-Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ( W = 35.576 + 66.383 P )</td>
<td>99%</td>
<td>2.33</td>
<td>918.7</td>
</tr>
<tr>
<td>(0.759) (30.311)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ( WR = 0.322 + 7.095 UR )</td>
<td>6%</td>
<td>1.80</td>
<td>0.50</td>
</tr>
<tr>
<td>(1.061) (0.709)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. \( WR = 0.048 + 0.971 \text{ PR} \)  
\( (0.305) \ (3.303) \)

4. \( WR = -0.088 + 5.046 \text{ UR} + 0.950 \text{ PR} \)  
\( (-0.354) \ (0.726) \ (3.121) \)

Where, \( WR = \frac{W-W(-1)}{W(-1)} \)

\( UR = \frac{N-D}{N} \)

\( PR = \frac{P-P(-1)}{P(-1)} \)

* Selected equation

---

**VIII. EMPLOYMENT**

<table>
<thead>
<tr>
<th></th>
<th>( R^2 )</th>
<th>D-W</th>
<th>P-Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>N = 51877 + 5.575 W</td>
<td>80%</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td>(38.789) (6.037)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2*</td>
<td>N = 51202 + 4.134 W</td>
<td>93%</td>
<td>1.13</td>
</tr>
<tr>
<td></td>
<td>(12.852) (3.353)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>N = 54632 - 1.532 (N-L) + 5.309 W</td>
<td>76%</td>
<td>0.53</td>
</tr>
<tr>
<td></td>
<td>(9.032) (-0.468) (4.768)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>N = 49666 + 0.984 (N-L) + 4.207 W</td>
<td>91%</td>
<td>0.97</td>
</tr>
<tr>
<td></td>
<td>(10.325) (0.684) (3.272)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>N = 29870 + 411.44 (W/P)</td>
<td>30%</td>
<td>0.38</td>
</tr>
<tr>
<td></td>
<td>(2.129) (1.985)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>N = 72733 - 9.387 (N-L)</td>
<td>27%</td>
<td>0.73</td>
</tr>
<tr>
<td></td>
<td>(8.433) (-1.808)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>N = 47326 - 6.261 (N-L) + 302.80 (W/P)</td>
<td>25%</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>(2.297) (-1.141) (1.346)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

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IX. MONEY

<table>
<thead>
<tr>
<th></th>
<th>R²</th>
<th>D-W</th>
<th>F-Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. (M/P) = -1704.6 + 0.655 (Y/P) - 17.138 R</td>
<td>80%</td>
<td>1.86</td>
<td>20.71</td>
</tr>
<tr>
<td>2. (M/P) = -1658.8 + 0.644 (Y/P) - 16.784 R</td>
<td>77%</td>
<td>1.93</td>
<td>17.47</td>
</tr>
</tbody>
</table>

* Estimated by ARl method (corrected for autocorrelation)

Selected equation

The model adopted for the TRNC economy from Klein’s model for developing countries given in table 5.2, is a small model with 11 behavioural equations and 3 balance equations. It is simultaneous and non-linear in variables. It has 14 endogenous and 4 exogenous variables. Out of this four exogenous variables three of them are policy variables (government expenditures, interest rates and exchange rates) and one being determined outside the control of the government (exports).

Reliable data on the TRNC economy is available after 1977. The study covers a period of 11 years from 1977 to 1987. Thus the behavioural equations of the model are estimated by using 11 observations. Complete model with both the behavioural and balance equations are given in table 5.2.
Table 5.2 Klein's Adopted Model for the TRNC Economy (OLSQ)

<table>
<thead>
<tr>
<th>Equation</th>
<th>Description</th>
<th>$R^2$</th>
<th>D-W</th>
<th>F-Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $C = 683.92 + 0.553 \frac{(Y-T_e-T_l)}{P}$</td>
<td>74%</td>
<td>1.32</td>
<td>24.70</td>
<td></td>
</tr>
<tr>
<td>2. $I = -407.40 + 0.215 \frac{Y}{P}(-1)$</td>
<td>67%</td>
<td>2.23</td>
<td>16.05</td>
<td></td>
</tr>
<tr>
<td>3. $M_e = -352.95 + 0.335 \frac{Y}{P}$</td>
<td>35%</td>
<td>1.43</td>
<td>4.84</td>
<td></td>
</tr>
<tr>
<td>4. $M_t = -751.35 + 0.526 \frac{Y}{P}$</td>
<td>14%</td>
<td>0.92</td>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td>5. $M_r = -1132.8 + 0.352 \frac{Y}{P}$</td>
<td>75%</td>
<td>1.35</td>
<td>27.05</td>
<td></td>
</tr>
<tr>
<td>6. $T_e = -1233.3 + 0.160 Y$</td>
<td>99%</td>
<td>1.94</td>
<td>675.2</td>
<td></td>
</tr>
<tr>
<td>7. $T_l = -999.41 + 0.135 Y$</td>
<td>100%</td>
<td>1.51</td>
<td>2025</td>
<td></td>
</tr>
<tr>
<td>8. $P = -1.115 + 0.036 ER$</td>
<td>99%</td>
<td>1.53</td>
<td>1101</td>
<td></td>
</tr>
<tr>
<td>9. $W = 35.576 + 66.383 P$</td>
<td>99%</td>
<td>2.33</td>
<td>918.7</td>
<td></td>
</tr>
<tr>
<td>10. $N = 51202 + 4.134 W$</td>
<td>93%</td>
<td>1.13</td>
<td>31.03</td>
<td></td>
</tr>
<tr>
<td>11. $(M/P) = -1704.6 + 0.655 \frac{Y}{P} - 17.138 R$</td>
<td>80%</td>
<td>1.86</td>
<td>20.71</td>
<td></td>
</tr>
<tr>
<td>12. $(Y/P) = C + I + G + (E_a - M_a)$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. $I = K - K(-1)$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. $M_a = M_e + M_t + M_r$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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5.4 Other Estimation Methods

In this study the equations of the above model have been estimated by using four different estimation methods. These are as follows:

i. Ordinary Least Squares (OLSQ)
ii. Non-Linear Least Squares (LSQ)
iii. Two Stage Least Squares (2SLS)
iv. Non-Linear Two Stage Least Squares (NL-2SLS)

Ordinary least squares method is used because it is one of the basic methods of estimation and that even the most sophisticated models have been estimated by using this estimation method. On the other hand non-linear method of estimation was essential as the model is non-linear in variables. Of course the variables are linearised before using OLSQ method and thus one may avoid estimating the model by using LSQ method but the essence of estimating the model by using LSQ method is in its power of examining the effects of a change in one variable out of the composite group of explanatory variables in which it appears.

Two stage least squares and non-linear two stage least squares methods have been used in order to prevent the simultaneity bias in the estimations of the parameters of the model. When the dependent variable in one equation appears as an explanatory variable in some other equation, the model formed is called a simultaneous equations system.
or model. Using OLSQ method to estimate the behavioural equations of such a model results in biased and inconsistent parameter estimates 8.

More sophisticated estimation methods such as system estimation methods (Three Stage Least Squares and Maximum Likelihood Estimation) could not be applied to the above model developed for the TRNC economy as the number of the endogenous variables (14) are more than the number of observations (11) used in estimating the behavioural equations.

Before giving the results of the estimations of the behavioural equations of the model it is important to note that due to the linearity of the parameters of the behavioural equations the results of linear (OLSQ & 2SLS) and non-linear (LSQ & NL-2SLS) estimations are exactly the same except in the equations corrected for autocorrelation. In the new version of TSP (TSP V. 4.1) the method used to estimate autocorrelated equations leaves one observation out in order to improve the efficiency of the method 9. Thus OLSQ and LSQ estimates on one hand and 2SLS and NL-2SLS estimates on the other hand yield different estimates for equations corrected for autocorrelation. The results of the


estimations of the parameters of the model with LSQ, 2SLS and NL-2SLS methods are given in tables 5.3, 5.4 and 5.5, respectively. In order to avoid repetition in the case of non-linear estimations (LSQ and NL-2SLS) only the results of the equations corrected for autocorrelation are given.

Table 5.3 Autocorrelated Equations of the Modified Model Estimated by LSQ Method

<table>
<thead>
<tr>
<th>Equation</th>
<th>Parameters</th>
<th>R²</th>
<th>D-W</th>
<th>F-Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1⁰. C = 968.54 + 0.499 (Y-Tᶜ-T_r)/P</td>
<td>(0.868)</td>
<td>81%</td>
<td>1.40</td>
<td>-</td>
</tr>
<tr>
<td>2⁰. Mₑ = -430.75 + 0.349 (Y/P)</td>
<td>(-0.390)</td>
<td>65%</td>
<td>1.22</td>
<td>-</td>
</tr>
<tr>
<td>3⁰. M_tC = 6534.4 - 0.111 (Y/P)</td>
<td>(-0.390)</td>
<td>80%</td>
<td>0.90</td>
<td>-</td>
</tr>
<tr>
<td>4⁰. T_r = -1757.7 + 0.137 Y</td>
<td>(-2.165)</td>
<td>100%</td>
<td>2.06</td>
<td>-</td>
</tr>
<tr>
<td>5⁰. P = -1.788 + 0.037 ER</td>
<td>(-2.000)</td>
<td>100%</td>
<td>1.74</td>
<td>-</td>
</tr>
<tr>
<td>6⁰. N = 62931 + 2.036 W</td>
<td>(10.451)</td>
<td>99%</td>
<td>1.99</td>
<td>-</td>
</tr>
</tbody>
</table>

Estimated by AR1 method (corrected for autocorrelation)
<table>
<thead>
<tr>
<th>Equation</th>
<th>Description</th>
<th>( R^2 )</th>
<th>D-W</th>
<th>F-Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>[ C = 561.03 + 0.576 \left( \frac{Y-T_e-T_r}{P} \right) ]</td>
<td>73%</td>
<td>1.29</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>[ I = -407.40 + 0.215 \left( \frac{Y}{P} \right)(-1) ]</td>
<td>67%</td>
<td>2.23</td>
<td>16.05</td>
</tr>
<tr>
<td>3.</td>
<td>[ M_e = -638.41 + 0.389 \left( \frac{Y}{P} \right) ]</td>
<td>19%</td>
<td>1.32</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>[ M_e = -1147.8 + 0.596 \left( \frac{Y}{P} \right) ]</td>
<td>3%</td>
<td>0.91</td>
<td>-</td>
</tr>
<tr>
<td>5.</td>
<td>[ M_l = -1273.2 + 0.380 \left( \frac{Y}{P} \right) ]</td>
<td>77%</td>
<td>1.33</td>
<td>26.35</td>
</tr>
<tr>
<td>6.</td>
<td>[ T_e = -1419.4 + 0.161 Y ]</td>
<td>99%</td>
<td>2.00</td>
<td>593.5</td>
</tr>
<tr>
<td>7.</td>
<td>[ T_r = -1119.1 + 0.135 Y ]</td>
<td>100%</td>
<td>1.48</td>
<td>-</td>
</tr>
<tr>
<td>8.</td>
<td>[ P = -1.432 + 0.037 ER ]</td>
<td>99%</td>
<td>1.55</td>
<td>-</td>
</tr>
<tr>
<td>9.</td>
<td>[ W = 45.054 + 66.091 P ]</td>
<td>99%</td>
<td>2.37</td>
<td>765.5</td>
</tr>
<tr>
<td>10.</td>
<td>[ N = 52778 + 4.093 W ]</td>
<td>97%</td>
<td>1.38</td>
<td>-</td>
</tr>
<tr>
<td>11.</td>
<td>[ \left( \frac{M}{P} \right) = -1910.3 + 0.704 \left( \frac{Y}{P} \right) - 18.821 R ]</td>
<td>77%</td>
<td>2.13</td>
<td>15.99</td>
</tr>
</tbody>
</table>

Table 5.4 Modified Model Estimated by 2SLS Method

\( \theta \) Estimated by AR1 method (corrected for autocorrelation)
Table 5.5 Autocorrelated Equations of the Modified Model
Estimated by NL-2SLS Method

<table>
<thead>
<tr>
<th>Equation</th>
<th>[ C = 347.59 + 0.499 \left( \frac{Y-T_c-T_r}{P} \right) ]</th>
<th>[ R^2 ]</th>
<th>D-W</th>
<th>F-Stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(^{st})</td>
<td>[ C = 347.59 + 0.499 \left( \frac{Y-T_c-T_r}{P} \right) ]</td>
<td>81%</td>
<td>1.40</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(0.883) (2.201)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2(^{nd})</td>
<td>[ H_e = -430.75 + 0.349 \left( \frac{Y}{P} \right) ]</td>
<td>65%</td>
<td>1.22</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(-0.390) (1.542)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3(^{rd})</td>
<td>[ H_c = 6534.4 - 0.111 \left( \frac{Y}{P} \right) ]</td>
<td>80%</td>
<td>0.90</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(-0.390) (-0.177)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4(^{th})</td>
<td>[ T_r = -1757.8 + 0.137 Y ]</td>
<td>100%</td>
<td>2.06</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(-2.165) (43.026)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5(^{th})</td>
<td>[ P = -1.788 + 0.037 ER ]</td>
<td>100%</td>
<td>1.74</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(-2.001) (31.994)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6(^{th})</td>
<td>[ N = 62924 + 2.037 W ]</td>
<td>99%</td>
<td>1.99</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(10.459) (2.154)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( \text{\&} \) Estimated by AR1 method (corrected for autocorrelation)

5.5 Performance of the Different Estimation Methods

In this section in order to evaluate the performance of the model and compare the different estimation methods, backward and forward (ex-post forecast) simulations are carried out for each estimation method. Backward simulations are provided with graphs as well.
5.5.1 Backward Simulations

In order to assess the performance of the model and the estimation methods dynamic backward simulations are carried out as an alternative to static simulations. In a dynamic simulation in place of actual realized lagged endogenous variables earlier solved values of the lagged endogenous variables are used. The solution method used is the Gauss-Seidel's method where the iteration does not stop at a singular point and a generalized inverse is used i.e. one or more variables are temporarily excluded from the model and are held constant for the iteration\(^\text{10}\).

For a better evaluation of the tracing performance (backward simulation) of the four estimation methods, simulation results are provided with the following statistics:

i. **Correlation Coefficient**: This is the measure of the existence of a linear relationship between the actual and the simulated values. It is considered the best as its value gets closer to plus one.

ii. **Regression Coefficient**: This is the coefficient of the regression of actual values on the simulated values. It is considered the best the more it is closer to one.

iii. **Root Mean Square Error**: As its name implies this

---

statistic is calculated by first taking the difference between the actual and the simulated values, squaring this value, taking its average first and then the square root. It is important to note that its value depends on the unit of measurement and thus it can not be used in comparing two variables with different unit of measurements. Here it is used to compare the actual and the simulated values and a smaller "root mean square error" implies a better simulation.

iv. Mean Absolute Error: This is a similar statistic to root mean square error. It is the average of the absolute differences between the two variables. Its value also depends on the unit of measurement. In our case this statistic is calculated for the actual and the simulated values and the tracing performance of the model is said to be better the closer this statistic is to zero.

It is important to indicate that both the original Klein's model and the modified model for the TRNC economy are non-linear in variables. Thus such a non-linear model can be simulated without any difficulty only if the behavioural equations are estimated by non-linear estimation methods i.e. LSQ and NL-2SLS. Otherwise, if the behavioural equations are to be estimated by linear estimation methods such as OLSQ and 2SLS, simulation of the model is not possible unless additional balance equations are included. Thus for the simulation of the models estimated by linear
methods, following balance equations have to be added to the model:

1. \( Y^F = (Y/P) \)
2. \( M^F = (M/P) \)
3. \( Y^d = (Y - T^t + T^r) \)

Where \( Y^F \) is the gross national product in 1977 prices
\( M^F \) is the money supply in 1977 prices
\( Y^d \) is the disposable income

Thus the model estimated by linear estimation methods (in order to be used in backward and forward simulations), with the additional balance equations, turns out to be a total of 17 equations with 17 endogenous variables. The additional endogenous variables are \( Y^F \), \( Y^d \) and \( M^F \). All throughout the analysis in order to provide the uniformity with the non-linear estimation methods the values of these additional endogenous variables will not be given.

Backward simulation results of the model obtained by OLSQ, 2SLS, LSQ and NL-2SLS estimation methods are given in tables 5.6, 5.7, 5.8 and 5.9, respectively.

5.5.2 Graphs of Backward Simulations of Four Estimation Methods

Backward simulation values of the four estimation methods with the actual values are plotted against the years,
1978-1987. These graphs are expected to give a better understanding of the performance of each estimation method. A graph for each endogenous variable is plotted and presented in graphs 5.1 - 5.14.

Table 5.6 Backward Simulation Results of OLSQ Estimation Method

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Consumption</td>
<td>0.846</td>
<td>0.854</td>
</tr>
<tr>
<td>2. Investment</td>
<td>0.616</td>
<td>0.532</td>
</tr>
<tr>
<td>3. Current GNP</td>
<td>0.996</td>
<td>0.991</td>
</tr>
<tr>
<td>4. GNP Deflator</td>
<td>0.998</td>
<td>1.031</td>
</tr>
<tr>
<td>5. Total Imports</td>
<td>0.968</td>
<td>1.224</td>
</tr>
<tr>
<td>6. Imports - EEC.</td>
<td>0.916</td>
<td>1.152</td>
</tr>
<tr>
<td>7. Imp. - Turkey</td>
<td>0.961</td>
<td>1.491</td>
</tr>
<tr>
<td>8. Imports - ROW.</td>
<td>0.968</td>
<td>0.872</td>
</tr>
<tr>
<td>9. Total Tax</td>
<td>0.996</td>
<td>1.004</td>
</tr>
<tr>
<td>10. Trans. Payments</td>
<td>0.993</td>
<td>0.998</td>
</tr>
<tr>
<td>11. Capital Stock</td>
<td>0.997</td>
<td>0.956</td>
</tr>
<tr>
<td>12. Money Wages</td>
<td>0.992</td>
<td>1.025</td>
</tr>
<tr>
<td>13. Labour Force</td>
<td>0.944</td>
<td>1.051</td>
</tr>
<tr>
<td>14. Money Supply</td>
<td>0.981</td>
<td>0.934</td>
</tr>
</tbody>
</table>

Table 5.7 Backward Simulation Results of 2SLS Estimation Method

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Consumption</td>
<td>0.727</td>
<td>0.861</td>
</tr>
<tr>
<td>2. Investment</td>
<td>0.611</td>
<td>0.574</td>
</tr>
<tr>
<td>3. Current GNP</td>
<td>0.996</td>
<td>0.998</td>
</tr>
<tr>
<td>4. GNP Deflator</td>
<td>0.998</td>
<td>1.020</td>
</tr>
<tr>
<td>5. Total Imports</td>
<td>0.962</td>
<td>1.241</td>
</tr>
<tr>
<td>6. Imports - EEC.</td>
<td>0.905</td>
<td>1.128</td>
</tr>
<tr>
<td>7. Imp. - Turkey</td>
<td>0.953</td>
<td>1.527</td>
</tr>
<tr>
<td>8. Imports - ROW.</td>
<td>0.968</td>
<td>0.894</td>
</tr>
<tr>
<td>9. Total Tax</td>
<td>0.996</td>
<td>1.004</td>
</tr>
<tr>
<td>10. Trans. Payments</td>
<td>0.993</td>
<td>1.004</td>
</tr>
<tr>
<td>11. Capital Stock</td>
<td>0.997</td>
<td>0.941</td>
</tr>
<tr>
<td>12. Money Wages</td>
<td>0.992</td>
<td>1.020</td>
</tr>
<tr>
<td>13. Labour Force</td>
<td>0.960</td>
<td>1.004</td>
</tr>
<tr>
<td>14. Money Supply</td>
<td>0.983</td>
<td>0.984</td>
</tr>
</tbody>
</table>
Table 5.8 Backward Simulation Results of LSQ Estimation Method

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Consumption</td>
<td>0.792</td>
<td>0.923</td>
<td>248.00</td>
<td>166.67</td>
</tr>
<tr>
<td>2. Investment</td>
<td>0.612</td>
<td>0.633</td>
<td>106.82</td>
<td>92.17</td>
</tr>
<tr>
<td>3. Current GNP</td>
<td>0.997</td>
<td>1.028</td>
<td>7852.43</td>
<td>5954.74</td>
</tr>
<tr>
<td>4. GNP Deflator</td>
<td>0.998</td>
<td>1.015</td>
<td>0.91</td>
<td>0.81</td>
</tr>
<tr>
<td>5. Total Imports</td>
<td>0.968</td>
<td>1.157</td>
<td>340.18</td>
<td>263.05</td>
</tr>
<tr>
<td>6. Imports - EEC.</td>
<td>0.921</td>
<td>1.219</td>
<td>133.70</td>
<td>109.37</td>
</tr>
<tr>
<td>7. Imp. - Turkey</td>
<td>0.955</td>
<td>1.166</td>
<td>215.35</td>
<td>179.25</td>
</tr>
<tr>
<td>8. Imports - ROW.</td>
<td>0.970</td>
<td>1.066</td>
<td>62.01</td>
<td>50.69</td>
</tr>
<tr>
<td>9. Total Tax</td>
<td>0.996</td>
<td>1.040</td>
<td>1444.21</td>
<td>1200.46</td>
</tr>
<tr>
<td>10. Trans. Payments</td>
<td>0.994</td>
<td>1.027</td>
<td>1333.25</td>
<td>1066.49</td>
</tr>
<tr>
<td>11. Capital Stock</td>
<td>0.998</td>
<td>0.968</td>
<td>119.14</td>
<td>98.60</td>
</tr>
<tr>
<td>12. Money Wages</td>
<td>0.992</td>
<td>0.985</td>
<td>130.63</td>
<td>87.18</td>
</tr>
<tr>
<td>13. Labour Force</td>
<td>0.993</td>
<td>1.010</td>
<td>649.38</td>
<td>499.01</td>
</tr>
<tr>
<td>14. Money Supply</td>
<td>0.985</td>
<td>1.065</td>
<td>3691.60</td>
<td>2231.21</td>
</tr>
</tbody>
</table>

Table 5.9 Backward Simulation Results of NL-2SLS Estimation Method

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Consumption</td>
<td>0.741</td>
<td>0.760</td>
<td>281.33</td>
<td>191.99</td>
</tr>
<tr>
<td>2. Investment</td>
<td>0.498</td>
<td>0.412</td>
<td>142.06</td>
<td>127.15</td>
</tr>
<tr>
<td>3. Current GNP</td>
<td>0.994</td>
<td>0.988</td>
<td>10157.78</td>
<td>7526.46</td>
</tr>
<tr>
<td>4. GNP Deflator</td>
<td>0.998</td>
<td>1.014</td>
<td>0.91</td>
<td>0.81</td>
</tr>
<tr>
<td>5. Total Imports</td>
<td>0.966</td>
<td>1.328</td>
<td>432.38</td>
<td>365.77</td>
</tr>
<tr>
<td>6. Imports - EEC.</td>
<td>0.890</td>
<td>1.017</td>
<td>152.20</td>
<td>120.69</td>
</tr>
<tr>
<td>7. Imp. - Turkey</td>
<td>0.862</td>
<td>1.669</td>
<td>453.07</td>
<td>379.28</td>
</tr>
<tr>
<td>8. Imports - ROW.</td>
<td>0.934</td>
<td>0.733</td>
<td>130.83</td>
<td>105.21</td>
</tr>
<tr>
<td>9. Total Tax</td>
<td>0.997</td>
<td>1.020</td>
<td>1205.52</td>
<td>1004.77</td>
</tr>
<tr>
<td>10. Trans. Payments</td>
<td>0.991</td>
<td>1.008</td>
<td>1625.69</td>
<td>1229.04</td>
</tr>
<tr>
<td>11. Capital Stock</td>
<td>0.995</td>
<td>1.039</td>
<td>291.14</td>
<td>241.84</td>
</tr>
<tr>
<td>12. Money Wages</td>
<td>0.992</td>
<td>1.014</td>
<td>130.28</td>
<td>88.97</td>
</tr>
<tr>
<td>13. Labour Force</td>
<td>0.993</td>
<td>0.991</td>
<td>654.12</td>
<td>489.42</td>
</tr>
<tr>
<td>14. Money Supply</td>
<td>0.962</td>
<td>0.993</td>
<td>5600.93</td>
<td>3714.94</td>
</tr>
</tbody>
</table>
Graph 5.9 Tax

Graph 5.10 Transfer Payments
5.5.3 Forward Simulation Results

Performance of a model in forward simulation is as important as its performance in backward simulation. Thus four methods of estimation are also assessed with respect to their performance in forward simulations (ex-post forecast) for 1988. In table 5.10 the actual values of the endogenous variables are given with the forecasting errors of each estimation method. Simulation values for 1988 for each estimation method with the actual values of the endogenous variables are also given in table 8.25 in the Appendix.

5.5.4 Comparison of the Performance of the Estimation Methods

In this section performance of each estimation method will be compared by using the statistics given in tables 5.6-5.10 and graphs presented in graphs 5.1-5.14. At the end of these evaluations two methods will be selected and all further analysis will be carried out by these two methods.

Comparing OLSQ and 2SLS methods it is seen that OLSQ has better statistics for consumption and imports while 2SLS method has slightly better results in labour force and money supply. On the whole 2SLS may be slightly better but not enough to come to a conclusion that the simultaneity in the model is at a stage to effect the efficiency of OLSQ method.
Table 5.10 Ex-post Forecasting Errors of the Four Estimation Methods

<table>
<thead>
<tr>
<th></th>
<th>X1</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>3986.600</td>
<td>0.033</td>
<td>-0.008</td>
<td>-0.002</td>
<td>-0.007</td>
</tr>
<tr>
<td>02</td>
<td>780.400</td>
<td>0.046</td>
<td>0.046</td>
<td>0.046</td>
<td>0.046</td>
</tr>
<tr>
<td>03</td>
<td>485898.000</td>
<td>0.153</td>
<td>0.140</td>
<td>0.122</td>
<td>0.158</td>
</tr>
<tr>
<td>04</td>
<td>79.859</td>
<td>0.135</td>
<td>0.141</td>
<td>0.145</td>
<td>0.145</td>
</tr>
<tr>
<td>05</td>
<td>5357.941</td>
<td>0.011</td>
<td>0.002</td>
<td>0.030</td>
<td>-0.014</td>
</tr>
<tr>
<td>06</td>
<td>2037.050</td>
<td>-0.167</td>
<td>-0.172</td>
<td>-0.178</td>
<td>-0.169</td>
</tr>
<tr>
<td>07</td>
<td>2327.294</td>
<td>0.127</td>
<td>0.116</td>
<td>0.204</td>
<td>0.069</td>
</tr>
<tr>
<td>08</td>
<td>993.596</td>
<td>0.055</td>
<td>0.044</td>
<td>-0.031</td>
<td>0.076</td>
</tr>
<tr>
<td>09</td>
<td>70168.398</td>
<td>0.243</td>
<td>0.233</td>
<td>0.212</td>
<td>0.251</td>
</tr>
<tr>
<td>10</td>
<td>50394.898</td>
<td>0.398</td>
<td>0.385</td>
<td>0.376</td>
<td>0.411</td>
</tr>
<tr>
<td>11</td>
<td>10820.900</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
<td>0.003</td>
</tr>
<tr>
<td>12</td>
<td>3690.000</td>
<td>0.493</td>
<td>0.496</td>
<td>0.523</td>
<td>0.500</td>
</tr>
<tr>
<td>13</td>
<td>68641.000</td>
<td>0.140</td>
<td>0.141</td>
<td>0.076</td>
<td>0.072</td>
</tr>
<tr>
<td>14</td>
<td>85600.000</td>
<td>0.236</td>
<td>0.156</td>
<td>0.101</td>
<td>0.214</td>
</tr>
</tbody>
</table>

Key: X1 actual values of macroeconomic variables for 1988
      01 consumption  02 investment  03 current GNP
      04 GNP deflator  05 total imp.  06 EEC imports
      07 Turkey imports  08 ROW imports  09 tax
      10 transfers  11 capital st.  12 money wages
      13 labor force  14 money supply

F1 OLSQ forecasting error  F2 2SLS forecasting error
F3 LSQ forecasting error  F4 NL-2SLS for. error

Forecasting errors are obtained from: (a2-a1)/(a2+a1)/2, where, a1 is the actual and a2 is the forecasted value.
On the other hand LSQ method seemed to trace the past better than OLSQ method with the exception of only one endogenous variable, consumption. In all other endogenous variables LSQ method has better results.

NL-2SLS method compared with other methods seemed to have the least efficient results. It has very poor statistics for tracking investment and other variables, mainly imports. It ranks behind OLSQ method.

Considering forward simulation results in table 5.10, on the whole NL-2SLS has more variables with forecasting errors greater than the others. In this respect LSQ method again ranks at the first place and 2SLS method in the second place as it performed slightly better than OLSQ method.

With regard to the above assessment LSQ method is found to be the best in both tracing the past and making an ex-post forecast. Thus LSQ estimation method will be used in all the further analysis. The second method chosen is OLSQ method. This is because 2SLS method is only slightly better (in some of the variables) and that OLSQ method is a widely used method. It is a well known fact that even the most sophisticated and big models are estimated by using OLSQ method.
5.6 Dynamic Multipliers

5.6.1 Dynamic Multipliers

Dynamic simulation techniques are carried out to see the effects of changes in exogenous variables, in parameter estimates and even in the specification of the behavioural equations on the endogenous variables. Some of the exogenous variables can be controlled by the government and some are determined outside its control. Those variables which can be controlled by the government are called policy variables. In this section all of the exogenous variables whether controlled by government or not will be given values different than their historical values and the simulation results will be evaluated.

Policy simulation analysis can be carried out in two ways. First, the policy variables are given values which are different than their historical values in the same proportion i.e. 10% or 10 m. TL. increase in every year. This is called a "sustained impulse" on the exogenous variable. Secondly, the value of the exogenous variable is changed only once. This is called an "unsustained impulse" on the exogenous variable. The simulation results that are based on the historical values of the exogenous variables are called "base simulations" or "control simulations". Comparing the simulation results of sustained impulse on the exogenous variable and the base simulations is called a "sustained impulse simulation analysis". Likewise the
comparison of the simulation results of unsustained impulse on the exogenous variable with the base simulation is called "unsustained impulse simulation analysis". In this study sustained impulse simulation analysis will be carried out.

Comparing the magnitudes of the endogenous variables obtained by base simulations and disturbed (sustained or unsustained) simulations are called "scenario analysis". Dynamic multiplier analysis carries the scenario analysis one step further by calculating the dynamic multipliers, using base and disturbed simulations. A Dynamic multiplier gives the amount of change in the concerned endogenous variable in response to a unit change in the exogenous variable and it is calculated as follows:

\[ \frac{(Y_d - Y_b)}{(X_p - X_h)} \]

Where, \( Y_d \) is the simulation value of the endogenous variable under consideration, \( Y_b \) is the base simulation value of the same endogenous value, \( X_p \) is the value of the exogenous variable with an impulse and \( X_h \) is the historical value of the exogenous variable used in the base simulation.

In this study by calculating the dynamic multipliers of government expenditures, exports, interest rates and exchange rates their effectiveness (or ineffectiveness) on the endogenous variables and the magnitude of their effects will be evaluated. At this stage "varying parameter" problem in the time of simulation will not be discussed.
Neither the differing effects of the same policies in different states of the economy. It will be assumed that the economy will not have drastic changes in forward simulation analysis and did not have as far as backward simulations are concerned. It is important to note that scenario and multiplier analysis are highly dependent on this assumption.

5.6.2 Dynamic Multipliers for the TRNC Economy

Multipliers for government expenditures are the first set of dynamic multipliers calculated. Compared with the other exogenous variables government expenditures seems to be the most influential policy tool available to the government. But it is essential to note that about at least 50% of the budget is covered by the financial aid received from Turkey (see chapter 6.1). Thus increasing or decreasing government expenditures as a part of the fiscal policy, one has to keep this fact in mind.

In order to calculate the dynamic government expenditure multipliers, a sustained 10% decrease in government expenditures is introduced to the model and the model is simulated for this new level of government expenditures. Using the formula given above, government expenditure multipliers calculated for the endogenous variables are given in table 5.11.
Second set of dynamic multipliers are calculated for exports. Exports are exogenous to the model and they are beyond the control of the government. That is, it is not a policy variable. Its importance lies in the political situation of the Island. It is a well known fact that the Greek Cypriot Administration in the Southern Cyprus is applying an effective, massive economic embargo on the TRNC economy. Thus this set of multipliers will show the effects that could have been achieved had there not been such an economic embargo and thus the exports would have increased. For the calculation of the export multipliers a 10% increase in the exports is assumed. The export multipliers obtained for the endogenous variables are given in table 5.12.

Exchange rate is another exogenous variable on which the government has no control. As the TRNC is using Turkish Lira (TL.) as its unit of currency and that TL. is an official currency of Turkey, it has to accept all the policy measures taken by the Turkish Government in Turkey related with TL. Money supply and exchange rate policies followed by the Turkish Government reflects itself on the TRNC economy. Thus it is important to see what the effects would have been if the Government of the TRNC had the power to control the exchange rates. In calculating the dynamic multipliers for the exchange rates a sustained 10% depreciation of TL. is assumed. The results are given in table 5.13.

Another exogenous variable of the model is the interest rate. This is the only exogenous variable that government
can control and have quite a number of options. In the past
government had been always reluctant (even now, but not as
much as before) to increase the interest rates which were
quite below the inflation rates and the interest rates
offered in Turkey. This caused savings to be kept away from
the TRNC economy or deposited in banks in foreign currency.
Thus it is important to see the effects of an increase in
the interest rates on the economy. In calculating the
dynamic multipliers for the interest rates a sustained 10% increase in the interest rates is assumed and the results
are given in table 5.14.

The dynamic multipliers of government expenditures, exports,
exchange rates and interest rates given in tables 5.11-5.14 are calculated by using the model estimated with OLSQ
method. The same calculations are carried out with the
model estimated by LSQ method. These multipliers are given
in tables 8.26-8.29 in the Appendix.

5.6.3 Evaluation of the Dynamic Multipliers

As expected from the structure of the model a change in the
government expenditures effected all of the endogenous
variables except the price level. A 100 units of increase in
government expenditures is expected to increase
consumption by around 41 units, investments 14 units, total
imports 85 units, real money supply 46 units and real GNP
Table 5.11 Government Expenditure Multipliers

<table>
<thead>
<tr>
<th>Year</th>
<th>CONS</th>
<th>Y</th>
<th>TAX</th>
<th>TRNS</th>
<th>INV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>0.36348</td>
<td>0.67883</td>
<td>0.10876</td>
<td>0.09170</td>
<td>0.00000</td>
</tr>
<tr>
<td>1979</td>
<td>0.40759</td>
<td>1.36727</td>
<td>0.21906</td>
<td>0.16470</td>
<td>0.12244</td>
</tr>
<tr>
<td>1980</td>
<td>0.42891</td>
<td>3.89273</td>
<td>0.62369</td>
<td>0.52585</td>
<td>0.18274</td>
</tr>
<tr>
<td>1981</td>
<td>0.41266</td>
<td>5.10743</td>
<td>0.81311</td>
<td>0.68994</td>
<td>0.14713</td>
</tr>
<tr>
<td>1982</td>
<td>0.41732</td>
<td>6.78741</td>
<td>1.08747</td>
<td>0.91687</td>
<td>0.14611</td>
</tr>
<tr>
<td>1983</td>
<td>0.41687</td>
<td>8.22808</td>
<td>1.31828</td>
<td>1.11149</td>
<td>0.14689</td>
</tr>
<tr>
<td>1984</td>
<td>0.41208</td>
<td>11.62193</td>
<td>1.66204</td>
<td>1.56994</td>
<td>0.13369</td>
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<tr>
<td>1985</td>
<td>0.41931</td>
<td>16.89269</td>
<td>2.70653</td>
<td>2.28195</td>
<td>0.13358</td>
</tr>
<tr>
<td>1986</td>
<td>0.41628</td>
<td>24.78913</td>
<td>3.97168</td>
<td>3.34646</td>
<td>0.14526</td>
</tr>
<tr>
<td>1987</td>
<td>0.41325</td>
<td>35.62994</td>
<td>5.70858</td>
<td>4.81308</td>
<td>0.13691</td>
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</table>

<table>
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<tr>
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<th>IMPA</th>
<th>K</th>
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<td>0.21701</td>
<td>0.74752</td>
<td>0.00000</td>
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<tr>
<td>1979</td>
<td>0.23152</td>
<td>0.36395</td>
<td>0.24915</td>
<td>0.85732</td>
<td>0.12244</td>
</tr>
<tr>
<td>1980</td>
<td>0.24396</td>
<td>0.38350</td>
<td>0.25667</td>
<td>0.80412</td>
<td>0.33298</td>
</tr>
<tr>
<td>1981</td>
<td>0.23661</td>
<td>0.37195</td>
<td>0.24894</td>
<td>0.85750</td>
<td>0.45932</td>
</tr>
<tr>
<td>1982</td>
<td>0.23681</td>
<td>0.37227</td>
<td>0.24915</td>
<td>0.85823</td>
<td>0.59506</td>
</tr>
<tr>
<td>1983</td>
<td>0.23656</td>
<td>0.37167</td>
<td>0.24889</td>
<td>0.85732</td>
<td>0.72068</td>
</tr>
<tr>
<td>1984</td>
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<td>0.36759</td>
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<td>0.84746</td>
<td>0.76683</td>
</tr>
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<td>0.23794</td>
<td>0.37404</td>
<td>0.25034</td>
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</tr>
<tr>
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</tr>
<tr>
<td>1987</td>
<td>0.23450</td>
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</tbody>
</table>

<table>
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<th>P</th>
<th>N</th>
<th>MS</th>
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</thead>
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<td>0.00000</td>
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</tr>
<tr>
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<td>-0.20551</td>
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</tr>
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<td>0.00000</td>
<td>0.14656</td>
<td>4.45297</td>
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<td>0.10914</td>
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<td>7.61156</td>
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<td>1985</td>
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</tr>
<tr>
<td>1986</td>
<td>0.26249</td>
<td>0.00000</td>
<td>1.08521</td>
<td>16.23517</td>
</tr>
<tr>
<td>1987</td>
<td>0.37163</td>
<td>0.00000</td>
<td>1.53642</td>
<td>23.33530</td>
</tr>
</tbody>
</table>

by 70 units. 85 units of increase in total imports is

11As explained in section 5.5.1 (p.181) OLSQ estimation method required additional balance equations for simulations. These balance equations enabled the calculation of real GNP, real money supply and disposable income, and are not given in the tables to preserve the symmetry of presentation.
Table 5.12 Export Multipliers

<table>
<thead>
<tr>
<th>Year</th>
<th>CONS Y</th>
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shared by Turkey, EEC and ROW as 37, 23 and 25 units respectively. Endogenous variables expressed in current terms tends to increase through years while the variables expressed in real terms, if not constant, tend to change within a very small range.
### Table 5.13 Exchange Rate Multipliers

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Export multipliers have very similar results as government expenditure multipliers. They have no effect on prices and have almost the same values for all the endogenous variables. This is due to the fact that both of them enter to the model through the income balance equation and do not appear anywhere else in the model.
Table 5.14 Interest Rate Multipliers

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Exchange rate affects the model through its positive relation with the prices. Increase in exchange rates will increase the prices and increasing prices will pull the real income down thus effecting all of the endogenous variables in the model. It is important to note that for real variables this effect is quite high in early years in 1978-79 while it falls almost to zero in 1987. A 100 units
of exchange rate increase is expected to have a constant effect over the price increase with 3.6 units.

Interest rates appearing only in the money supply equation and that money supply not effecting any other variable in the model, interest rates effect only the money supply. An increase in interest rates has a constant effect on real money supply. That is a unit of increase in interest rates is expected to increase the real money supply by 17 units.

At this stage it is essential to comment on the multipliers calculated by using LSQ method in comparison with the above findings. As far as the government and export multipliers are concerned LSQ method resulted in lower multipliers than OLSQ method. Besides it did not show any effect of government expenditures or exports on wages and labour force. It is interesting to note that exchange rate multipliers calculated by LSQ method like OLSQ method had negative effects on many variables in the first years but unlike OLSQ results after 3 or four years it had positive effects on these variables. Interest rate multipliers of LSQ method for nominal money supply is smaller than the ones calculated by OLSQ method except in 1987.

12Dynamic multipliers calculated by LSQ method for government expenditures, exports, exchange rates and interest rates are given in tables 8.26-8.29 in the Appendix.
CHAPTER 6. TRNC ECONOMY AND ITS RELATIONS WITH THE EEC

In this section various questions related with the past and the future developments of the TRNC economy will be answered by simulating the model built in the previous chapter. By simulating the model backwards, the development path will be retraced in the absence of aid from the EEC and from Turkey. The results obtained will be analysed comparatively. In forward simulations the effects of the various assumed levels of financial aid and trade concessions given by the EEC on the TRNC economy will be evaluated.

In carrying out the above analysis the model estimated by OLSQ and LSQ methods will be used in both backward and forward simulations.

6.1 Government Expenditures and Foreign Aid

Before analysing the effects of foreign aid on the TRNC economy it is essential to examine their proportion in the government expenditures throughout 1977-1987. The figures are given in table 6.1. Examining the table it is seen that at least 45-50% of the government expenditures are financed by foreign aid all throughout the concerned period. Under these circumstances government expenditures are more dependent and more flexible to the amount of the foreign aid received from abroad rather than the internal revenues. Thus although it is hard to distinguish how much of an
increase in the government expenditures are financed by internal and foreign aid, it is obvious that only a very small portion comes from internal sources. As far as the fiscal policy is concerned the case of the TRNC economy is quite different than a country where the increase in government expenditures are financed by the internal sources.

Considering the fact that almost 50% of the government expenditures are financed by foreign aid, it will not be wrong to identify any increase or decrease in government expenditures with the amount of the foreign aid received. Thus in the model the amount of the financial aid received or cut will be reflected in the increase or decrease in the government expenditures, as all the foreign aid goes to the government and none goes to private sector directly. That is in assessing the past economic performance in the absence of any specific foreign aid, the amount of the foreign aid given will be deducted from the government expenditures and the model will be simulated for that level of government expenditures. Likewise, in forward simulations any assumed financial aid given to the TRNC will be added on to the projected government expenditures and the model will be simulated with this new level of government expenditures.

In this study, the financial aid given by the EEC and Turkey is assumed to obey the additionality assumption rather than the substitution. This could be justified by the huge amount of total financial aid required by the TRNC economy in order to close the gap between the Southern Greek Cypriot economy.
Table 6.1 Government Expenditures and Their Sources (m. TL., fixed prices, 1977)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>G</th>
<th>LR</th>
<th>FA</th>
<th>IB</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>1186.1</td>
<td>627.7</td>
<td>469.6 (40%)</td>
<td>88.8 (7%)</td>
</tr>
<tr>
<td>1978</td>
<td>1095.3</td>
<td>610.3</td>
<td>428.0 (39%)</td>
<td>57.0 (5%)</td>
</tr>
<tr>
<td>1979</td>
<td>1185.3</td>
<td>627.6</td>
<td>540.5 (46%)</td>
<td>17.2 (1%)</td>
</tr>
<tr>
<td>1980</td>
<td>1019.5</td>
<td>482.5</td>
<td>529.7 (52%)</td>
<td>7.3 (0%)</td>
</tr>
<tr>
<td>1981</td>
<td>1156.8</td>
<td>552.8</td>
<td>604.0 (52%)</td>
<td>0.0 (0%)</td>
</tr>
<tr>
<td>1982</td>
<td>1240.0</td>
<td>503.4</td>
<td>656.6 (53%)</td>
<td>0.0 (0%)</td>
</tr>
<tr>
<td>1983</td>
<td>1536.2</td>
<td>815.5</td>
<td>720.7 (47%)</td>
<td>0.0 (0%)</td>
</tr>
<tr>
<td>1984</td>
<td>1723.2</td>
<td>841.0</td>
<td>882.2 (51%)</td>
<td>0.0 (0%)</td>
</tr>
<tr>
<td>1985</td>
<td>1833.5</td>
<td>860.8</td>
<td>822.4 (45%)</td>
<td>150.3 (8%)</td>
</tr>
<tr>
<td>1986</td>
<td>1922.8</td>
<td>908.0</td>
<td>889.7 (46%)</td>
<td>125.1 (7%)</td>
</tr>
<tr>
<td>1987</td>
<td>2085.4</td>
<td>1160.2</td>
<td>925.2 (44%)</td>
<td>0.0 (0%)</td>
</tr>
</tbody>
</table>

Key: G government expenditures
     LR local revenues
     FA foreign aids
     IB internal borrowings

6.2 Performance of the TRNC Economy Without the Past Aid

It is interesting to see the performance of the TRNC economy had there not been any EEC or Turkey connection. That is what would have been the level of major macro economic variables of the TRNC economy in the absence of the EEC's
and Turkey's financial aid and other concessions, such as the preferential import taxes and lower or no quota restrictions to the commodities originating from the Northern Cyprus. In answering this question for EEC, all the aid given by the EEC between 1977 and 1987 are extracted from the government expenditures for each corresponding year. Besides, the export concessions given by the EEC through reducing quotas and tariffs are assumed to increase the exports of the Northern Cyprus to the EEC by 10%, and this amount is deducted from total amount of exports for every year. Thus the model built for the TRNC economy is simulated backwards with the new levels of government expenditures and export levels for the years 1978-1987.

In assessing the importance of Turkey's financial aid and trade concessions, financial aid given to the TRNC is extracted from the government expenditures for the years concerned. As far as trade concessions are concerned it is assumed that about 40% of the exports to Turkey are due to the trade concessions given to the TRNC and it should be extracted from the total amount of exports of the TRNC. Thus the model is simulated backwards under the new levels of government expenditures and total exports for the endogenous variables for the years 1978-1987.

As noted before the analysis has been carried out by both of the models estimated with OLSQ and LSQ methods. It is important to note here that LSQ estimation method enables to implement another assumption that the aid given to the TRNC
is either tied to imports from the originating country or
given in terms of commodities and written down in the
financial aid. For the EEC this amount is assumed to be 20% 
of the annual (average) aid which is 2.250 m. TL. (fixed
prices, 1977). Annual average amount of financial aid was
13.8 m. TL. for the years 1977-1987. Thus 2.250 m. TL. of
imports is subtracted from the imports from the EEC, as this
amount would not have been imported had there not been any
financial aid or import concessions from the EEC. In LSQ
estimation method this can be implemented by assigning a
value to the constant term of the imports from the EEC
function obtained by LSQ method, 2.250 m. TL. less its
actual value.

In case of Turkey the amount of financial aid tied to
imports or given in commodity is assumed to be 50% of the
annual (average) financial aid. Annual average aid received
from Turkey between 1977 - 1987 is 655.5 m. TL. (fixed
prices, 1977) and 50% of it is 327.8 m. TL. Thus the
imports from Turkey function entered to the model with a
constant term of 327.8 m. TL. less than the actual value
obtained.

Thus the results obtained by the two models (OLSQ and LSQ)
will differ not only due to the different method of
estimation but also due to the fact that LSQ method is
implementing an extra assumption that "part of the financial
aid is tied the imports or the aid given is in terms of
commodities".
6.2.1 The Case of EEC

In assessing the effects of financial aid and trade concessions obtained from the EEC, the model is simulated backwards with the historical values for the government expenditures and exports and the results for the endogenous values obtained are recorded only for the year 1987. This has been done in order to form a base for the comparison of the values that will be obtained under various assumptions. The model then simulated backwards with the new government expenditures and export levels reflecting the absence of any financial aid and concessions. Differences in value and percentage differences between the two sets of results are computed and are given in table 6.2 for OLSQ method. For LSQ method the results are given in table 6.3.

As expected all the values of the macro economic variables except GNP deflator, capital stock and labour force (which have not changed due to the structure of the model) felt as the financial aid and the trade concessions given by the EEC is extracted from the model. Had there not been any financial aid trade concessions given by the EEC to the TRNC between the years 1977 - 1987, in 1987 GNP would have fallen from 302,692.0 to 299,757.5 m. TL. (current prices) by 2,934.5 m. TL. (1.0%), consumption would have fallen from 3,976.9 to 3,942.9 m. TL. by 34.0 m. TL. (0.9%), investment from 711.1 to 699.0 m. TL. by 12.1 m. TL. (1.7%) and the total imports would have fallen from 4,978.0 to 4,908.0 m. TL. by 70.0 m. TL. (1.4%).
Comparing the above results obtained from the model estimated with OLSQ method with the results of LSQ estimation method, it is seen that the fall in macro economic variables are less in LSQ method than OLSQ method. This is due to not only the difference in the estimation methods but also due to the implementation of the additional assumption in the LSQ method and reducing the imports from EEC. The results show that in the absence of the financial aid and the trade concessions given by EEC to the TRNC, in 1987 GNP would have fallen from 289,632.2 to 287,383.6 m. TL. (current prices) by 2,248.6 m. TL. (0.8%), consumption from 3,806.7 to 3,780.7 m. TL. by 26.0 m. TL. (0.7%), investment from 679.9 to 670.7 m. TL. by 9.2 m. TL. (1.4%) and the total imports would have fallen from 5,063.1 to 4,990.4 m. TL. by 72.8 m. TL. (1.4%).

6.2.2 The Case of Turkey

As in the case of the EEC, in Turkey’s case financial aid and trade concessions obtained from Turkey for each year are extracted from each years’ government expenditures and from the total exports and the model is simulated backwards with these exogenous values. The results obtained are compared with the simulation values obtained from the model where the exogenous variables entered with their historical values. The results for OLSQ method is given in table 6.4 and for LSQ method in 6.5.
Table 6.2 Performance of the TRNC Economy without the Financial Aid and Trade Concessions given by the EEC (OLSQ)

<table>
<thead>
<tr>
<th>EV.</th>
<th>Actual</th>
<th>Hist. Sim.</th>
<th>No Aid</th>
<th>Dif.</th>
<th>% Dif.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3976.917</td>
<td>3942.881</td>
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</tr>
<tr>
<td>02</td>
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<td>711.129</td>
<td>699.008</td>
<td>-12.121</td>
<td>-1.719</td>
</tr>
<tr>
<td>03</td>
<td>289106.000</td>
<td>302692.000</td>
<td>299757.468</td>
<td>-2934.531</td>
<td>-0.974</td>
</tr>
<tr>
<td>04</td>
<td>50.862</td>
<td>50.878</td>
<td>50.878</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
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<td>4978.005</td>
<td>4908.009</td>
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<td>-1.416</td>
</tr>
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<td>-1.185</td>
</tr>
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<td>-1.286</td>
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<td>-2.132</td>
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<td>10030.491</td>
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<td>0.000</td>
</tr>
<tr>
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<td>63621.171</td>
<td>0.000</td>
<td>0.000</td>
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<tr>
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<td>69661.570</td>
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<td>-2.797</td>
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</tbody>
</table>

Key: EV codes for the endogenous variables of the model
- 01 consumption
- 02 investment
- 03 current GNP
- 04 GNP deflator
- 05 total imp.
- 06 EEC imports
- 07 Turkey imports
- 08 ROW imports
- 09 tax
- 10 transfers
- 11 capital st.
- 12 money wages
- 13 labor force
- 14 money supply
Table 6.3 Performance of the TRNC Economy without the Financial Aid and Trade Concessions given by the EEC (LSQ)

<table>
<thead>
<tr>
<th>EV</th>
<th>Actual</th>
<th>Hist. Sim.</th>
<th>No Aid</th>
<th>Dif.</th>
<th>% Dif.</th>
</tr>
</thead>
<tbody>
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<tr>
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<tr>
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<td>60429.281</td>
<td>58956.597</td>
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<td>-2.467</td>
</tr>
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</table>

Key: EV codes for the endogenous variables of the model
01 consumption  02 investment  03 current GNP
04 GNP deflator  05 total imp.  06 EEC imports
07 Turkey imports 08 ROW imports  09 tax
10 transfers   11 capital st.  12 money wages
13 labor force  14 money supply
As noted in the previous sections (section 4.5) financial aid received from Turkey comprises at least 90% of the total financial aid received from outside and the trade concessions are also in line with this. Thus as expected, the results show that, had there not been Turkey's financial aid and trade concessions there would have been a very big negative impact on the TRNC economy. Without the financial aid and trade concessions received from Turkey, in 1987 GNP would have fallen from 302,692.0 to 270,514.0 m. TL. (current prices) by 32,178.0 m. TL. (11.2%), consumption would have fallen from 3,976.9 to 3,603.7 m. TL. by 373.2 m. TL. (9.8%), investment from 711.1 to 556.6 m. TL. by 154.5 m. TL. (24.4%) and the total imports would have fallen from 4,978.0 to 4,210.5 m. TL. by 767.5 m. TL. (16.7%).

The results obtained from the model estimated by using LSQ method, as in the case of EEC showed a milder impact on the economy. With LSQ estimation method, in the absence of Turkey's financial aid and trade concessions, in 1987 GNP would have fallen from 289,632.2 to 273,699.4 m. TL. (current prices) by 15,932.8 m. TL. (5.7%), consumption from 3,806.7 to 3,622.4 m. TL. by 184,252.0 m. TL. (5.0%), investment from 679.9 to 598.0 m. TL. by 81.9 m. TL. (12.8%) and the total imports would have fallen from 5,063.2 to 4,236.3 m. TL. by 826.9 m. TL. (17.8%).
Table 6.4 Performance of the TENC Economy without the Financial Aid and Trade Concessions given by Turkey (OLSQ)

<table>
<thead>
<tr>
<th>EV</th>
<th>Actual</th>
<th>Hist. Sim.</th>
<th>No Aid</th>
<th>Dif.</th>
<th>% Dif.</th>
</tr>
</thead>
<tbody>
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Key: EV codes for the endogenous variables of the model
01 consumption 02 investment 03 current GNP
04 GNP deflator 05 total imp. 06 EEC imports
07 Turkey imports 08 ROW imports 09 tax
10 transfers 11 capital st. 12 money wages
13 labor force 14 money supply

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Table 6.5 Performance of the TRNC Economy without the Financial Aid and Trade Concessions given by Turkey (LSQ)

<table>
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<th>EV.</th>
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<th>Hist. Sim.</th>
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<th>Dif.</th>
<th>% Dif.</th>
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<td>-18.899</td>
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</tbody>
</table>

Key: EV codes for the endogenous variables of the model

01 consumption 02 investment 03 current GNP
04 GNP deflator 05 total imp. 06 EEC imports
07 Turkey imports 08 ROW imports 09 tax
10 transfers 11 capital st. 12 money wages
13 labor force 14 money supply
6.2.3 Comparison of the Impact of Aid Given by the EEC and Turkey

It is important to draw an attention and emphasize the amount of the impact on the TRNC economy had there not been any financial aid and trade concessions by the EEC and Turkey. In order to compare the effects of the financial aid and trade concessions given by the EEC and Turkey tables 6.6 and 6.7 are prepared. These tables simply summarise what the impact on the TRNC economy would have been in 1987 had there not been given any financial aid and trade concessions by the EEC and Turkey over the period of 1977-1987. Differences between the simulation results of the model with financial aid and trade concessions and without financial aid and trade concessions are noted for both the EEC and Turkey. The ratios given next to the differences are obtained by dividing Turkey's to EEC's differences (impacts) and they reflect the number of times the importance of Turkey's financial aid and trade concessions over EEC's.

Considering the results obtained from the model estimated by OLSQ method, it is seen that without the financial aid and trade concessions given by the EEC between 1977-1987, GNP in 1987 would have fallen by 2,934.5 m. TL. (current prices), while it would have fallen by 32,178.0 m. TL. without the financial aid and trade concessions given by Turkey over the same period. When these figures are compared (32,178.0 / 2,934.5) it is seen that the impact of the absence of
Turkey’s financial aid and trade concessions on GNP would have been 11 times more than the impact of EEC’s case. When such a comparison is carried out for consumption, investment and total imports it is seen that the impact is 11.0, 12.8 and 11.0 times more effective on these variables, in favour of Turkey, respectively.

Table 6.6 Comparison of the Effects of Financial and Trade Concessions given by the EEC and Turkey (OLSQ)

<table>
<thead>
<tr>
<th></th>
<th>GNP</th>
<th>CONS</th>
<th>INV</th>
<th>IMPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIF R</td>
<td>DIF R</td>
<td>DIF R</td>
<td>DIF R</td>
<td>DIF R</td>
</tr>
<tr>
<td>EEC</td>
<td>2934.5</td>
<td>34.0</td>
<td>12.1</td>
<td>70.0</td>
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<tr>
<td>TURKEY</td>
<td>32178.0</td>
<td>11.0</td>
<td>12.8</td>
<td>767.5</td>
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</table>

KEY: DIF difference in the performance of the variable in the presence and in the absence of financial aid and trade concessions

R ratio of Turkey to EEC (11.0 = 32178/2934.5)

Table 6.7 gives the results of the above analysis for the model estimated by LSQ method. According to these findings the impact of the absence of any financial aid and trade concessions given by Turkey over the EEC would be relatively less than the findings of the model estimated by using OLSQ method (except total imports).
Turkey's impact on GNP and consumption would be 7.1 times, on investment 8.9 times and on total imports 11.4 times more than the EEC's case.

Table 6.7 Comparison of the Effects of Financial and Trade Concessions given by the EEC and Turkey (LSQ)

<table>
<thead>
<tr>
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<th>CONS</th>
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<th>IMPA</th>
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</thead>
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<td></td>
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<td>R</td>
<td>DIF</td>
<td>R</td>
</tr>
<tr>
<td>EEC</td>
<td>2248.6</td>
<td>26.0</td>
<td>9.2</td>
<td>72.8</td>
</tr>
<tr>
<td>TURKEY</td>
<td>15932.8</td>
<td>7.1</td>
<td>184.3</td>
<td>7.1</td>
</tr>
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</table>

KEY: DIF difference in the performance of the variable in the presence and in the absence of financial aid and trade concessions
R ratio of Turkey to EEC

Above analysis is very important in assessing the relative importance of the financial aid and trade concessions given by both the EEC and Turkey and thus to derive the correct policy implications out of it.
6.3 Projection of the Exogenous Variables

In order to test various hypothesis related with the future of the TRNC economy, it is essential to project the exogenous variables of the model. With the projected exogenous variables introduced into the model a development path will be obtained for each of the endogenous variables for the years 1989-1992 which will form the base in comparing the results of various hypotheses.

Government expenditures, total exports and exports to the EEC are projected as a continuation of the best fitting line of the past (1977-1987) development. Exchange rates and interest rates are recorded with regard to the expectations of the involved experts as in their cases an assumption of a linear increase is not correct. The projected values of the exogenous variables are given in table 6.8.

Table 6.8 Exogenous Variables Projected for 1989-1992
(m. TL., fixed prices, 1977)

<table>
<thead>
<tr>
<th>Years</th>
<th>G</th>
<th>EXPORTS</th>
<th>EXC.RATE (£)</th>
<th>R</th>
<th>GEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>1540.544</td>
<td>5153.915</td>
<td>3650.000</td>
<td>68</td>
<td>821.245</td>
</tr>
<tr>
<td>1990</td>
<td>1573.867</td>
<td>5484.708</td>
<td>4800.000</td>
<td>68</td>
<td>868.322</td>
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<tr>
<td>1991</td>
<td>1607.191</td>
<td>5815.500</td>
<td>6000.000</td>
<td>70</td>
<td>915.399</td>
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<td>1992</td>
<td>1640.510</td>
<td>6146.293</td>
<td>7200.000</td>
<td>70</td>
<td>962.476</td>
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</table>

Key: G government expenditures, GEE goods exports to EEC
6.4 Development with the Existing EEC Connection

In this section the model will be simulated forwards for the years 1989-1992 by using the projected exogenous values given in table 6.8. The projected values of the government expenditures are considered as including the financial aid favoured in the Third Financial Protocol as the previous years' government expenditures also included such a financial aid from the EEC. On the other hand total exports projected are added an extra of 10% of the goods exported to the EEC. This is to account the expected increase in the goods exports to the EEC due to the additional trade concessions given in the Third Financial Protocol which favoured the elimination of the quota on some goods. Exchange rates and the interest rates entered into the model as given in table 6.8. Thus the model simulated with these exogenous variables for the endogenous variables is said to contain all the financial aid and trade concession effects given by the EEC over the concerned years. The values obtained for the endogenous variables under these conditions are expected to be realised if there is no drastic change in internal and external economic conditions. They will form a base in comparing the results obtained with various assumptions.

In simulating for the endogenous variables for the years 1989-1992, both of the models estimated by OLSQ and LSQ are used. The results for OLSQ method are given in table 6.9 and for LSQ method in table 6.10.
OLSQ results show that GNP in 1992 will be 1,860,817.8 m. TL. (current prices) with a consumption of 4,693.3 m. TL., investment 1,080.3 m. TL. and total imports 6,473.9 m. TL. The results obtained in LSQ method for 1992 for the same macro economic variables are 1,745,589.5 m. TL. (current prices) for GNP, 4,373.2 m. TL. for consumption, 974.7 m. TL. for investment and 6,606.2 m. TL. for total imports.

6.5 Development without the EEC Connection

In this section the question of what would be the levels of the major macroeconomic variables of the TRNC economy over the period 1989-1992 if there is no financial aid from the EEC and all the trade concessions given by the EEC are abolished. In answering this question the exogenous variables of the model will be adjusted to reflect the absence of any financial aid and trade concessions. The endogenous variables simulated with these exogenous variables will be compared with the ones obtained in the previous section i.e. development with the existing EEC relationship.

In order to exclude the financial aid in the Third Financial Protocol which is 2 m. US. $ over the 5 years period 1988-1992, average annual amount is extracted from the government expenditures. According to this average annual aid of 0.4 m. US. $ is calculated to be 8 m. TL. with the
Table 6.9 Forward Simulation Results. Existing Financial Aid and Trade Concessions Given by the EEC (OLSQ)

<table>
<thead>
<tr>
<th>YEAR</th>
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<th>Y</th>
<th>P</th>
<th>IMPA</th>
</tr>
</thead>
<tbody>
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<td>903.243</td>
<td>788941.562</td>
<td>125.128</td>
<td>5510.128</td>
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<td>4340.735</td>
<td>950.762</td>
<td>1122567.875</td>
<td>169.722</td>
<td>5822.754</td>
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<tr>
<td>1991</td>
<td>4524.310</td>
<td>1017.346</td>
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<td>6149.561</td>
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<tr>
<td>1992</td>
<td>4693.320</td>
<td>1080.284</td>
<td>1860817.750</td>
<td>259.068</td>
<td>6473.937</td>
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<th>TAX</th>
<th>TRNS</th>
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<td>2667.362</td>
<td>1197.467</td>
<td>178622.843</td>
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<tr>
<td>1991</td>
<td>2009.854</td>
<td>2839.302</td>
<td>1300.404</td>
<td>236399.171</td>
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<tr>
<td>1992</td>
<td>2078.446</td>
<td>2997.711</td>
<td>1397.780</td>
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<th>MS</th>
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<td>87664.953</td>
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<tr>
<td>1990</td>
<td>12674.907</td>
<td>11302.211</td>
<td>99714.820</td>
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<tr>
<td>1991</td>
<td>13692.252</td>
<td>14291.707</td>
<td>111903.601</td>
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<tr>
<td>1992</td>
<td>14772.537</td>
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<td>123910.585</td>
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Table 6.10 Forward Simulation Results. Existing Financial Aid and Trade Concessions Given by the EEC (LSQ)

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<td>889.129</td>
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<td>6271.706</td>
</tr>
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<td>6606.156</td>
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<th>TRNS</th>
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<td>1730.384</td>
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<td>987.762</td>
<td>121484.242</td>
</tr>
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<td>1990</td>
<td>1802.506</td>
<td>3079.801</td>
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<td>170654.296</td>
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<td>1991</td>
<td>1882.577</td>
<td>3261.362</td>
<td>1127.765</td>
<td>223439.031</td>
</tr>
<tr>
<td>1992</td>
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<td>3442.469</td>
<td>1201.238</td>
<td>278442.437</td>
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<th>MS</th>
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</thead>
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<td>1989</td>
<td>11724.144</td>
<td>8676.093</td>
<td>79124.054</td>
</tr>
<tr>
<td>1990</td>
<td>12613.273</td>
<td>11775.478</td>
<td>85704.835</td>
</tr>
<tr>
<td>1991</td>
<td>13542.967</td>
<td>14883.989</td>
<td>92254.164</td>
</tr>
<tr>
<td>1992</td>
<td>14517.697</td>
<td>17939.855</td>
<td>98655.531</td>
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</table>
fixed prices of 1977\(^1\). In excluding the trade concessions, 10% of the goods exported to EEC are extracted from the projected total exports level. Exchange rates and the interest rates entered into the model as given in table 6.8. This is justified by the fact that the exchange rates of TL is controlled by Turkey and not the TRNC, and that the interest rates are more dependant on variables other than the financial aid and trade concessions given to the TRNC. Thus in the forward simulations "no" interaction effect is assumed among the exogenous variables.

The model estimated with OLSQ method is simulated forwards with these exogenous variables and the results are given in table 6.11. These results are compared with the results obtained under the existing EEC relations given in table 6.9 and the differences in value are given in table 6.12 and percentage differences are given in table 6.13. These differences in value and in percentage in the endogenous variables of the two simulations show the effect on the economy if the financial aid and the trade concessions given by the EEC stop over the concerned years.

Thus without the EEC's financial aid and trade concessions,

\(^1\)In calculating this figure, for each year (1989-1992) 0.4 is multiplied with the projected US. $ exchange rate to obtain the current amounts and these are divided by the projected GNP deflator to obtain their fixed values whose average gave 8 m. TL.
the TRNC economy in 1992 will have a GNP of 1,824,203.0 m. TL. (current prices) 36,614.8 m. TL. (2.0%) less than otherwise, 1,860,817.8 m. TL. Consumption will fall from 4,693.3 to 4,609.9 m. TL. by 83.4 m. TL. (1.8%), investment from 1,080.3 to 1,051.3 m. TL. by 29.0 m. TL. (2.7%) and total imports will fall from 6,473.9 to 6,302.4 m. TL. by 171.5 m. TL. (2.6%).

The same analysis is carried out with the model estimated by LSQ method. As before the assumption of some aid being either given in terms of goods or tied to imports is implemented and the coefficient of the imports from EEC function is lowered by 20% of the annual average aid given by the EEC. Thus the intercept of the imports from EEC function is assigned a value of 1.6 m. TL. (8 m. TL. x 20%) less than what it is.

The results of the simulations with LSQ method is given in table 6.14. These results have been compared with the results in table 6.10 and their differences in value and in percentage are recorded in tables 6.15 and 6.16 respectively. According to this model without the financial aid and trade concessions from the EEC, TRNC economy in 1992 will have a GNP of 1,716,591.8 m. TL. (current prices), which is 28,997.8 m. TL. (1.7%) less than otherwise, 1,745,589.5 m. TL. Consumption will fall from 4,373.2 to 4,308.1 m. TL. by 65.1 m. TL. (1.5%), investment from 974.7 to 952.2 m. TL. by 22.6 m. TL. (2.3%) and the total imports from 66,066.2 to 6,428.1 m. TL. by 178.1 m. TL. (2.7%).

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6.5 Financial Aid with Respect to the Population Size

As mentioned in the previous sections, the Third Financial Protocol which covers a period of five years (1988-1992) favours a 69 m. US. $. Turkish side of Cyprus will be given only 2 m. US. $ of this amount during the concerned period.

As could be seen, there is a great imbalance in the way the total amount of financial aid is distributed among the two peoples of the Island. In this section, it will be assumed that the total financial aid being distributed among the two peoples with respect to their populations. That is, it will be assumed that 20% of this financial aid will be given to the TRNC and the effects on the economy will be examined. Exogenous variables will be adjusted according to this new relationship, and the endogenous values obtained from their simulations will be compared with the ones obtained under the existing EEC relations.

In implementing the financial aid being given with respect to the proportion of the population, government expenditures projected for 1989-1992 are added an annual average of the 20% of 69 m. US. $. This amounts to approximately a total of 14 m. US. $, and it turns out to be 56 m. TL. per year with the fixed prices of 1977. Total exports are also adjusted with the thought that the new relations with the

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This figure is calculated in the same procedure as explained in the previous footnote.
Table 6.11 Forward Simulation Results. Without Any Financial Aid and Trade Concessions given by the EEC (OLSQ)

<table>
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<td>1153.084</td>
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<td>140390.593</td>
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<td>2923.313</td>
<td>1347.987</td>
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Table 6.12: Differences Between the Simulation Results.
Existing Financial Aid and Without Any Financial Aid (OLSQ)

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Table 6.13 Percentage Differences Between the Simulation Results. Existing Financial Aid and Without Any Financial Aid (OLSQ)

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Table 6.14 Forward Simulation Results. Without Any Financial Aid and Trade Concessions given by EEC (LSQ)

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Table 6.15 Differences Between the Simulation Results. Existing Financial Aid and Without Any Financial Aid (LSQ)

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Table 6.16 Percentage Differences Between the Simulation Results. Existing Financial Aid and Without Any Financial Aid (LSQ)

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<td>1992</td>
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EEC will increase the goods exported to the EEC countries. Thus an additional 10% of the goods exported to the EEC under the existing relations are added to the total exports. Exchange rates and the interest rates are kept as they are projected and given in table 6.8. With these adjusted exogenous variables the model estimated with OLSQ method is simulated and the results are given in table 6.17. The differences in the endogenous variables simulated under the existing EEC relationships and those simulated with the financial aid being given with respect to the proportion of the population are given in table 6.18. The percentage differences are given in the following table, table 6.19.

With the financial aid being given with respect to the population size TRNC economy will have a GNP of 1,888,689.6 m. TL. (fixed prices of 1977) with an increase of 27,871.9 m. TL. (1.5%) over the existing EEC relationship. Consumption will be 4,756.8 m. TL. with an increase of 63.5 m. TL. (1.4%), investments will be 1,102.7 m. TL. with an increase of 22.4 m. TL. (2.1%) and total imports will be 6,604.5 m. TL. with an increase of 130.6 m. TL. (2.0%).

Above analysis has been carried out with the model estimated by LSQ method and the results are recorded in table 6.20. The differences in value and in percentages are given in tables 6.21 and 6.22 respectively. It should be noted that in carrying out the simulation with LSQ method, imports from EEC is assumed to increase by 30% of the financial aid given (56.0 m. TL. x 30% = 16.8 m. TL.) by the EEC and the
Table 6.17 Forward Simulation Results. Financial Aid and Trade Concessions Given by the EEC with Respect to the Population Size (OLSQ)

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Table 6.18 Differences Between the Simulation Results. 
Existing Financial Aid and Financial Aid Given 
with Respect to the Population Size (OLSQ)

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Table 6.19 Percentage Differences Between the Simulation Results. Existing Financial Aid and Financial Aid Given with Respect to the Population Size (OLSQ)

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Table 6.20 Forward Simulation Results. Financial Aid and Trade Concessions Given by the EEC with Respect to the Population Size (LSQ)

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Table 6.21 Differences Between the Simulation Results.
Existing Financial Aid and Financial Aid Given
with Respect to the Population Size (LSQ)

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Table 6.22 Differences Between the Simulation Results. Existing Financial Aid and Financial Aid Given with Respect to the Population Size (LSQ)

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<tr>
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<td>2.399</td>
<td>1.948</td>
<td>2.309</td>
<td>1.121</td>
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<tr>
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<td>2.260</td>
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<tr>
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<td>0.000</td>
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<td>0.000</td>
<td>3.651</td>
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<tr>
<td>1992</td>
<td>0.299</td>
<td>0.000</td>
<td>3.426</td>
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239
The intercept of this function is forced 16.0 m. TL. above its actual value. The results show that GNP in 1992 will be 1,765,366.8 m. TL. (current prices) with an increase of 19,777.3 m. TL. (1.1%), consumption will be 4,417.6 m. TL. with an increase of 44.4 m. TL. (1.0%), investments will be 990.3 m. TL. with an increase of 15.6 m. TL. (1.6%) and the total imports will be 6,743.3 m. TL. with an increase of 137.2 m. TL. (2.1%).

6.7 Financial Aid with Respect to the Need

In this section it will be assumed that the financial aid given in the Third Financial Protocol to be distributed among the North and South of Cyprus with respect to the needs of the two peoples of the Island. As it is apparent from the comparison of the economies of the two sides in section 3.3, Greek Cypriot economy in the South is well advanced and hardly needs any foreign aid, while the Turkish Economy in the North being relatively less developed needs to be supported with foreign aid in order to increase its productive capacity. Thus, had the EEC’s financial aid been given with respect to the needs of the two sides it would be expected that at least 50% of the financial aid favoured in the Third Protocol to be given to the TRNC. With this assumption 50% of 69 m. US. $ averaged for 5 years which turned out to be 140 m. TL. (fixed prices, 1977) are added to the projected government expenditures. In line with this approach goods exports to the EEC is assumed to increase by
40% more of the projected level. This assumed increase in the goods exported to the EEC is added to the total exports. Interest rates and exchange rates being as projected previously, the model estimated by using OLSQ method is simulated forwards with the above formed government expenditures and total exports.

The results are given in table 6.23. The differences between the endogenous variables simulated with 50% of the EEC’s financial aid and the existing level of aid are given in table 6.24. Table 6.25 contains the percentages of the above differences.

The results show that if the financial aid is given with respect to the need, TRNC economy in 1992 will have a GNP of 1,956,854.9 m. TL. (current prices), with an increase of 96,037.1 m. TL. (5.2%) over GNP which will be attained with the existing EEC relations. Consumption will be 4,912.0 m. TL. with an increase of 218.8 m. TL. (4.7%), investments will be 1,157.1 m. TL. with an increase of 76.8 m. TL. (7.1%) and the total imports will be 6,923.8 m. TL. with an increase of 449.9 m. TL. (6.9%).

The same analysis has been carried out with the model estimated by LSQ method and the results are given in table 6.26. The differences in value and in percentages are given in tables 6.27 and 6.28 respectively. In this analysis goods import from the EEC is assumed to increase by 40% of the financial aid assumed to be given. Thus the intercept
Table 6.23 Forward Simulation Results. Financial Aid and Trade Concessions Given by the EEC with Respect to the Need (OLSQ)

<table>
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Table 6.24 Differences Between the Simulation Results. Existing Financial Aid and Financial Aid Given with Respect to the Need (OLSQ)

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Table 6.25 Percentage Differences Between the Simulation Results. Existing Financial Aid and Financial Aid Given with Respect to the Need (OLSQ)

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Table 6.26 Forward Simulation Results. Financial Aid and Trade Concessions Given by the EEC with Respect to the Need (LSQ)

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<td>79124.054</td>
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<td>11775.478</td>
<td>85704.835</td>
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<td>14863.989</td>
<td>92254.164</td>
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Table 6.27 Differences Between the Simulation Results. Existing Financial Aid and Financial Aid Given with Respect to the Need (LSQ)

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<td>146.498</td>
<td>205.207</td>
<td>81.250</td>
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<td>1991</td>
<td>151.366</td>
<td>216.244</td>
<td>87.727</td>
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<td>1992</td>
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<td>225.552</td>
<td>91.503</td>
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<td>148.696</td>
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Table 6.28 Percentage Differences Between the Simulation Results. Existing Financial Aid and Financial Aid Given with Respect to the Need (LSQ)

<table>
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<td>3.405</td>
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<td>1990</td>
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<td>6.663</td>
<td>7.897</td>
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<th>MS</th>
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<td>1989</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
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<tr>
<td>1990</td>
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of the imports from EEC function is increased by 56.0 m. TL. (140 m. TL. x 40%) over its actual value. Thus with LSQ method TRNC economy in 1992 will have a GNP of 1,814,024.5 m. TL. (current prices), with an increase of 68,435.0 m. TL. (3.9%) over the GNP which will be obtained with the existing EEC relations. The consumption level will be 4,526.6 m. TL. with an increase of 153.6 m. TL. (3.5%), investments will be 1,028.4 m. TL. with an increase of 53.6 m. TL. (5.5%) and the total imports will be 7,078.7 m. TL. with an increase of 472.5 m. TL. (7.2%).

6.8 Graphs

In this section a graph for each endogenous variable of the model will be drawn in order to show the path each one is expected to follow under the various assumptions for the years 1989 - 1992 (graphs 6.1 - 6.14). Graphs are drown only for the results of the model estimated by OLSQ method. This is because the graphs of the results of the model estimated by LSQ method are very similar to the ones drown and their presentation here would have been an unnecessary waste of space.
Graph 6.3 Gross National Product (current)

Graph 6.4 Price (GNP deflator)
Graph 6.5 Total Imports

Graph 6.6 Imports from EEC
Graph 6.7 Imports from Turkey

Graph 6.8 Imports from ROW

252
Graph 6.11 Capital Stock

Graph 6.12 Nominal Wages
CHAPTER 7. CONCLUSIONS

This section summarises the main findings of the study and states the policy implications. The chapter ends with comments on the shortcomings of the study and further research areas related to the study.

7.1 Summary of the Main Results

A summary of the study and the main results will be presented in two sections. In the first section the results obtained through the application of input-output theory will be given and the structure of the TRNC will be analysed. The second part will involve a brief explanation on building the macro economic model for the TRNC economy and will analyse the results obtained in testing various hypothesis related with the accession of the TRNC to EEC.

7.1.1 Economic Structure of the TRNC Economy

In the first section of the study the evolution and the factors causing the declaration of the Turkish Republic of Northern Cyprus is explained in a historical framework, since the first presence of the Turks on the Island in 1571. Cyprus, after the Greek coups of 1963 and 1974 and the counter intervention by Turkey, is now divided into a Turkish North and a Greek South. The TRNC still has not yet
been recognised, except by Turkey, as it has not sought any recognition up to now due to its hopes for a federal solution on the Island. On the other hand, the Greek Cypriot Administration, contradicting and announcing 1960 Constitution as dead and buried, is recognised by the world as the "legitimate government" of the whole Cyprus which provides one of the main obstacles for a solution. Through this recognition, Greek Cypriot Administration has been receiving all the economic aid, low interest-long term loans, developing their trade and tourism and applying an immense, effective economic embargo on the TRNC economy. As long as the Greek Cypriot Administration lacks incentives for a federal solution i.e. they are already the "Cyprus Government", they are already receiving all the financial aid etc., as long as the Greek Cypriot Administration is not prepared to give political equality to the Turkish Cypriot people on the Island, as long as the Greek Cypriot Administration after all it has done between 1963-1974 is not prepared to accept the effective guaranties of the Turkish Government, and as long as the Greek Cypriot Administration is trying to dilute the accepted bi-zonality principle, a federal solution will not be possible on the Island. The only alternative left then is to seek recognition for the TRNC and live with the Greek Cypriot Administration side by side on the Island as two Republics.

The study gives a brief explanation of the input-output theory and explains how it will be used to analyse the economic structure of the TRNC economy. Considering the
importance of the treatment of imports in input-output tables and its consequences in the calculation of gross output for a given set of final demand a great emphasis is given to this issue. It has been stressed that in impact analysis, domestic inputs matrix ought to be used if one wishes to follow the consequences of a given change in domestic final demand. Otherwise, using total inputs matrix overestimates the impact as it will include the demands for the imported inputs as well. The study also gives the formulation of the basic tools of input-output theory which are used in the analysis of the structural interdependencies of the industries in an economy. These are, forward and backward linkage indexes, type I and type II output, income and employment multipliers.

After explaining the format of the two input-output tables (1980 and 1986) obtained from the TRNC, technical coefficients of the two tables are compared for their stability by using Wilcoxon's nonparametric test. Technical coefficients are compared directly and indirectly. In total and row wise direct comparison of the technical coefficient, there is no significant difference between the coefficients of the two tables, while in direct columnwise comparison only in the technical coefficients of the electricity and water industry a significant decrease is found in 1986 input-output table. This indicates lesser use of intermediate and more use of primary inputs by the electricity and water industry in order to produce one unit of output. Indirect comparison of the technical
coefficients of the two tables also concluded the absence of any significant difference between the two sets of coefficients. Thus, with the exception of the electricity and water industry's column coefficients, the technical coefficients of the projected 1986 table and the 1980 table which was constructed through a survey are not significantly different.

The availability of vast amount of statistics in the two input-output tables of the TRNC, enabled a comparative and a descriptive analysis which involved:

(i) Comparison of the TRNC economies in 1980 and 1986
(ii) Comparison of the TRNC economy with the Greek Cypriot economy
(iii) Analysis of the trade structure of the TRNC economy.

In comparing the TRNC economy in 1980 and 1986, gross domestic products and their components derived from 1980 and 1986 tables are compared. It is found that a substantial part of consumption, investment and exports are provided by the imports in both of the tables. In 1980, imports with 7,944.6 m. TL. composed 46% of the GDP which was 17,311.5 m. TL. while in 1986 imports were 130,911.0 m. TL., comprising 69% of the GDP which was 188,737.0 m. TL. As the prices given are in current prices comparison of the percentages of the components of GDP is more meaningful. Thus a rise in the imports had reflected itself on the other components of GDP. The proportion of consumption and
investment in GDP raised from 76% to 98% and 17% to 27% respectively, while the share of exports in GDP fell from 53% to 44%.

Comparing the two economies on the Island, the Turkish economy in the North and the Greek Cypriot economy in the South, it can easily be seen that there exists a big economic gap between the two economies in favour of the Greek Cypriot economy. When the two gross national products (GNP) of the two economies are put together, Greek Cypriot’s share in this total GNP, 3,402.0 million US. $, is 92% while the Turkish Cypriots get only 8%. Considering that Turkish Cypriots comprise 23% and Greek Cypriots 77% of the total population on the Island (710,676) in 1986, it shows how much uneven the income is distributed between the North and the South. As a result of these uneven income distribution between the two communities of the Island, GNP per head in the South is 3.3 times greater than the North with 5,694 US. $ in the South and 1,730 US. $ in the North. The huge difference in the economies of North and South emerged due to political reasons which had great economic consequences. Greek Cypriot Administration is recognised as the "legitimate government" of the Island since 1963, while Turkish Cypriot Administration has not been recognised. Economic consequences of this political appearance have been as follows:

(i) A vast amount of money is injected into the Greek Cypriot economy through various donations i.e.
donations made to refugee fund, loans i.e. low interest-long term borrowings from the World Bank and from other international institutions, spendings of United Nations soldiers since 1963, most of which were denied to the Turkish Cypriot Administration.

(ii) Trade and tourism resulting from recognition contributed to the development of Greek Cypriot economy to a very large extent.

(iii) An immense economic embargo applied to the TRNC by the Greek Cypriot Administration prevented the development of the foreign trade and tourism of the Northern Cyprus as much as otherwise would have been.

(iv) A greater labour productivity is achieved by the Greek Cypriot economy due to a greater amount of capital used in their production.

In analysing the trade structure of the TRNC economy, trade statistics extracted from the 1986 input-output table shows that 46% of the total intermediate inputs (90,184 m. TL.) and 28% of total final demand (319,648 m. TL.) are actually imported. Thus imports for intermediate use (41,540 m. TL.) and for final demand use (89,369 m. TL.) make the total imports of 130,909 m. TL. Imports of the products of manufacturing industry for intermediate use alone accounts 86% (35,647/41,540) of the total imports for intermediate use and imports of its products for final demand use account
87% (78,005/89,369) of the imports final demand use. Thus, the total imports of the products of manufacturing industry turns out to be 86% (113,652/130,909) of the total imports of the TRNC. These statistics can be seen as an indication of the relative weakness of the manufacturing industry in the economy.

Considering the industries with respect to the amount of the imports for intermediate input use in their own production, commerce with 69% (6,982/10,103) of its total inputs being imported products, ranks at the first place. Manufacturing industry with 48% of its inputs being imported ranks at the sixth position, and it accounts for 36% (14,804/41,542) of the total imports for intermediate use.

As far as the exports of the TRNC is concerned, manufacturing, commerce, agriculture, and hotels and restaurants industries have the highest share with 41%, 23%, 15% and 12% of the total exports of 83,662.0 m. TL. (122.6 m. US. $), respectively. A further examination of the manufacturing industry shows that 75% (25,711/34,077) of the exports of manufacturing industry is actually imported products, while only 25% (8,366/34,077) are domestically produced. This imported exports of the manufacturing industry explains 31% (25,711/83,662) of the total exports and 20% (25,711/130,909) of the total imports. TRNC economy with total imports as high as 69% of GDP and exports 44% of GDP resulting in a trade deficit of 47,247.0 m. TL. (69.2 m. US. $) can be considered as quite open to foreign trade.
Inter-industry relations are examined by forward and backward linkages calculated by using Rasmussen's formulations.

Industries with backward linkages greater than one are expected to effect the structure of the economy more than the others through their purchases from other industries as a result of an increase in their final demand. Manufacturing (2.739), agriculture (1.185), commerce (1.313) and professional services (1.002) are the industries with backward linkages greater than one. The industries whose forward linkages are greater than one are building (1.299), manufacturing (1.293), animal husbandry (1.279), agriculture (1.101), and transportation (1.056). These industries are expected to provide an inducement to those industries which use their products as inputs. Considering that manufacturing has the highest backward and second highest forward linkages, it has a significant place in the economy. But one has to consider the high proportion of the imported input requirements (48%) of the industry before choosing manufacturing as a leading sector of the economy.

In calculating type I and type II multipliers of output, income and employment, domestic input matrix is used. In constructing the augmented matrix for the closed model, private consumption as an additional column and total value added as an additional row are included into the technology matrix. This implementation was unavoidable due to the lack of the required data. In input-output tables general
application is that only household consumption and the household income as a part of total value addeds are included into the technology matrix. At the other extreme all the final demand categories and the total value added are included into the technology matrix thus making the model "totally" closed.

Calculating type I and type II output multipliers, animal husbandry industry is found to have the highest type I and type II output multipliers with 1.618 and 3.864 respectively. Manufacturing and building industries ranking at the second and third places with their type I output multipliers, 1.384 and 1.301 respectively, appeared at 10th and 13th places with their type II multipliers, 3.192 and 3.069 respectively, because of their low levels of induced effects. House ownership, financial institutions and public services which ranked at the bottom with their type I output multipliers, 1.163, 1.098, and 1.000 respectively, took the 2nd, 4th and 5th places with their type II output multipliers due to their high induced effects. Hotels and restaurants industry showed a consistency in appearing at the 4th and 3rd places with its type I and type II output multipliers of 1.281 and 3.707 respectively.

Due to the existence of a constant relationship between type I and type II income multipliers, the rankings of the industries with respect to either criteria have been the same. The constant relationship between the two income multipliers (type II / type I) is 1.623. This is exactly
the same as the consumption multiplier obtained from the inverse of \((I-D^*)\) matrix, given by the \((n+1, n+1)'\)th element. Calculating type I and type II income multipliers, animal husbandry industry has the highest type I and type II income multipliers of 1.838 and 2.981 respectively. This industry is followed by the manufacturing (1.436 and 2.330), building (1.402 and 2.274), and hotels and restaurants (1.246 and 2.021) industries. These industries as given in the above order are expected to generate the highest income in the economy given a unit increase in their incomes. It is also important to know the amount of total income generated by each industry in response to a unit increase in their final demands. In this respect the first five industries are public services (1.622), financial institutions (1.590), household ownership (1.577), personal and professional services (1.547), and hotels & restaurants (1.512). An increase of 1,000 TL of demand in public services is expected to generate a total income of 1,622 TL in the economy.

Although type I and type II employment multipliers ranked the industries in different places, restaurants and hotels (1.912 and 4.161), manufacturing (2.107 and 3.768), commerce (1.198 and 2.895), finance (1.137 and 2.188), and building (1.275 and 2.041) industries are the leading ones in generating the highest employment in the economy given a unit increase in their employment levels. As important as the type I and type II multipliers is the ranking of industries with respect to the total employment they
generate in response to a unit increase in their final demands. Putting it in another way, the amount of sales they have to make to final demand in order to increase the employment level in the economy by one unit is also quite important. In this respect the industries which took the first five places are electricity and water (840), animal husbandry (827), personal and professional (650), public services (623), and agriculture industry (620). Thus an increase in the expenditure of 1 bil. TL. to the final demand of electricity and water industry is expected to generate a total employment of 840 in the economy.

In the final section of the structural analysis of the TRNC economy, sources of output, income, employment and imports for each industry with respect to final demand categories are calculated. In this section also, the total and average output, income, employment and imports generated by each category of final demand are calculated and analysed. Examining the source of output by final demand categories for each industry, it is found that manufacturing, commerce and public services sectors all together explain more than 50% of the total output generated in the economy each with a share of 22%, 16% and 13% respectively. As far as final demand categories are concerned, total consumption generated 57%, investments 18%, and exports 25% of the total output in the economy. These shares are almost the same as their shares in the actual expenditures on final demand. Calculating unit output generating (average) expenditures of each final demand category, it is found that investments
have the highest output generation per unit of expenditure (1.289). Total consumptions (1.197) rank second and exports (1.190) third.

Sources of income by final demand categories for each industry show that public services is the major sector in generating income in the economy. It accounts for 31% of the total income (188,824 m. TL.) generated in the economy. Building, commerce, and manufacturing industries comprise 18%, 16% and 10% of the total income generated in the economy respectively. Comparing the total income generated in the economy by the final demand categories, it is seen that 40% is explained by the expenditures on exports, 37% by the expenditures on government consumptions and 23% by the expenditures on investments. High share of income generated by the exports appears to be the result of its high proportion in the actual expenditures on final demand. On the other hand high percentage of income generated by the expenditures on government expenditures appear to be the result of its high average income generation. Average income generated in the economy per unit expenditure on government consumptions, exports, and investments are 1.563 TL, 1.316 TL and 1.127 TL respectively.

As far as the employment generation in the economy is concerned, not surprisingly, public services rank at the first place with a share of 35% of the total employment generated in the economy (64,097). Public services is followed by building (18%), agriculture (12%), and
manufacturing (9%) industries. These four industries generate 74% of the total employment in the economy. Final demand categories, government consumptions, investments and exports, each generate 41%, 22% and 37% of the total employment in the economy and average employment generated per unit of expenditure on them is 0.588, 0.368 and 0.413 respectively. As in the case of income generation, high share of employment generated in the economy by government consumption appears to be due to its high average employment generation, while the high share of employment generated by exports appear to be due to its high proportion in the total actual expenditures on final demand.

Before calculating the sources of imports by final demand category for each industry, it was essential to know the total competitive imports generated by each industry as a result of a unit increase in their final demands. It is found that building industry generates the highest total competitive imports in the economy for a unit increase in its final demand (0.421). That is, if there is a 1000 TL increase in the expenditures on the final demand of building industry it is expected to generate 42 TL of imports for its intermediate use. The building industry is followed by manufacturing (0.397), agriculture (0.355), electricity water (0.343), and transportation (0.325) industries in order of rank.

Examining the source of imports by final demand categories for each industry, it is found that building industry
generates the highest share of the total competitive imports accounting 31% of the total competitive imports generated (41,567 m. TL.). Manufacturing, commerce, public services and agriculture industries each generate 16%, 16%, 13% and 11% of the total competitive imports respectively. These industries altogether comprises 87% of the total competitive imports generated in the economy. Government consumptions as a final demand category generates the least competitive imports compared with investments and exports. Its share is 19% in the total. While exports and investments have 43% and 38% shares in the total competitive imports generated in the economy. In case of exports, its high share can be explained due to its high proportion in the actual total final demand and in the case of investments it is due to its high average competitive imports generation. Average competitive imports generated by government consumption, investments and exports per unit expenditure on each category is found to be 0.179, 0.478 and 0.309 respectively.

7.1.2 Macro Economic Model and Relations with the EEC

For the TRNC, Klein’s model for developing countries is taken and adopted to the structure of the economy. The model was first estimated by using OLSQ estimation method and then 2SLS, LSQ, and NL-2SLS estimation methods were also used to estimate the same model. 2SLS method was used in order to eliminate the simultaneity bias in the model, while LSQ and NL-2SLS were used because the model was non-linear.
in variables. All of the estimation methods were compared for their performances in backward and forward simulations of the model. A graph was presented for each of the endogenous variable with its actual values (1977-1987) and simulated values, one for each estimation method. LSQ method appeared slightly better than the 2SLS and OLSQ method while NL-2SLS were relatively not as satisfactory as the other estimation methods on the whole. OLSQ and LSQ methods of estimations are used at every stage of the rest of the research and their results are analysed comparatively.

By using sustained impulses on exogenous variables dynamic multipliers for government expenditures, exports, exchange rates and interest rates are calculated by using both OLSQ and LSQ estimation methods. In evaluating government expenditures multipliers, attention has been drawn that a major part (45-50%) of the budget is financed by the financial aid mainly received from Turkey. Thus a 100 units of increase in government expenditures is expected to increase consumption by around 41 units, investments 14 units, total imports 85 units and real gross national product by 70 units. The results of export multipliers are similar to government expenditure multipliers as they both enter to the model through the balance equation. Exchange rates in spite of being a foreign policy variable, it is determined outside the control of the TRNC Government, and it affects all aspects of the economy. A 100 units of increase in the exchange rate of US. $ is expected to
increase the general price level by 3.6 units. Interest rates due to their limited involvement in the model effects only the nominal money supply in the model. It is worth noting that in general the multipliers calculated by using LSQ method are lower than the multipliers calculated by using OLSQ method.

The first set of analysis carried out with the macro econometric model built for the TRNC involves its past development. Had there not been any financial aid and trade concessions given by the EEC and Turkey (separately) between the years 1977-1987, what would have been the development level of the TRNC economy? In answering this question, as financial aid given to the TRNC did not appear in the model, so government expenditures have been used as a proxy variable. Thus any financial aid given or considered as not given is subtracted from the government expenditures and the model is simulated with this level of government expenditures. This implementation is justified by the fact that almost 45-50% of the budget have been financed by foreign aid, mainly by Turkey. Parallel with the level of the financial aid given or extracted, an assumed level of exports and imports are also added or extracted as the model is simulated. In this section, the details of the exports and imports extracted or added will not be given but shortly be mentioned as trade concessions.

It is interesting to find that if all the financial aid and trade concessions given by the EEC in the years 1977 - 1987
had not been given, TRNC in 1987 would have had a GNP of 299,757.5 m. TL. (current prices) rather than 302,692.0 m. TL. with a fall of 2,934.5 m. TL. (1.7%). Consumptions would have fallen from 3,976.9 to 3,942.9 m. TL. by 34.0 m. TL. (0.9%), investment from 711.1 to 699.0 m. TL. by 12.1 m. TL. (1.7%) and the total imports would have fallen from 4,978.0 to 4,908.0 m. TL. by 70.0 m. TL. (1.4%). These results are obtained from the model estimated by OLSQ method.

The results of LSQ method showed a milder effect of the absence of financial aid and trade concessions, as it implemented an additional assumption that "part of the financial aid is tied to the imports or given in terms of commodities". With this analysis results show that in the absence of the financial aid and the trade concessions given by the EEC to the TRNC, in 1987 GNP would have fallen from 289,632.2 to 287,383.6 m. TL. (current prices) by 2,248.6 m. TL. (0.8%), consumption from 3,806.7 to 3,780.7 m. TL. by 26.0 m. TL. (0.7%), investment from 679.9 to 670.7 m. TL. by 9.2 m. TL. (1.4%) and the total imports would have fallen from 5,063.1 to 4,990.4 m. TL. by 72.8 m. TL. (1.4%).

It is obvious that the impact of the absence of the financial aid and trade concessions given by Turkey through the years 1977 - 1987 on the TRNC economy would have been much greater than the EEC's case as the financial aid given by Turkey comprised at least 95% of the total foreign aid given to the TRNC in this period.
Thus without the financial aid and trade concessions received from Turkey, in 1987 GNP would have fallen from 302,692.0 to 270,514.0 m. TL. (current prices) by 32,178.0 m. TL. (11.2%), consumption would have fallen from 3,977.0 to 3,603.7 m. TL. by 373.2 m. TL. (9.8%), investment from 711.1 to 556.6 m. TL. by 154.5 m. TL. (24.4%) and the total imports would have fallen from 4,978.0 to 4,210.5 m. TL. by 767.5 m. TL. (16.7%).

With LSQ estimation method, in the absence of Turkey's financial aid and trade concessions, in 1987 GNP would have fallen from 289,632.2 to 273,699.4 m. TL. (current prices) by 15,932.8 m. TL. (5.7%), consumption from 3,806.7 to 3,622.4 m. TL. by 184,252.0 m. TL. (5.0%), investment from 679.9 to 598.0 m. TL. by 81.9 m. TL. (12.8%) and the total imports would have fallen from 5,063.1 to 4,236.2 m. TL. by 826.9 m. TL.

Comparing the impacts of the absence of the financial aid and trade concessions given by the EEC and Turkey over the period 1977-1987 it is seen that Turkey’s impact on GNP is (32,178.0 / 2,934.5) 11 times more than EEC’s impact. Such impact on consumption, investment and total imports is 11.0, 12.8 and 11.0 times more, respectively.

The results of the above comparative analysis for the model estimated by LSQ method shows that Turkey’s impact on GNP and consumption would be 7.1 times, on investment 8.9 times and on total imports 11.4 times more than the EEC’s case,
had there not been any financial aid and trade concessions given by them.

In order to compare the future developments of the TRNC economy under various assumptions, exogenous variables of the model are projected and adjusted to the financial aid and trade concessions favoured in the Third Financial Protocol. The model which is simulated forwards for the years 1989 - 1992 with these exogenous variables provided a base in comparing the results obtained under various assumptions.

Thus without the EEC's financial aid and trade concessions favoured in the Third Financial Protocol, TRNC economy in 1992 will have a GNP of 1,824,203.0 m. TL. (current prices) 36,614.8 m. TL. (2.0%) less than otherwise, 1,860,817.8 m. TL. Consumption will fall from 4,693.3 to 4,609.9 m. TL. by 83.4 m. TL. (1.8%), investment from 1,080.3 to 1,051.3 m. TL. by 29.0 m. TL. (2.7%) and total imports will fall from 6,473.9 to 6,302.4 m. TL. by 171.5 m. TL. (2.6%).

The same analysis is carried out with the model estimated by LSQ method. According to this model without the financial aid and trade concessions given by the EEC, TRNC economy in 1992 will have a GNP of 1,716,591.8 m. TL. (current prices), which is 28,997.8 m. TL. (1.7%) less than otherwise, 1,745,589.5 m. TL. Consumption will fall from 4,373.2 to 4,308.1 m. TL. by 65.1 m. TL. (1.5%), investment from 974.7 to 952.2 m. TL. by 22.6 m. TL. (2.3%) and the total imports
from 66,066.2 to 6,428.1 m. TL. by 178.1 m. TL. (2.7%).

Considering the imbalance in the distribution of the total financial aid given by the EEC among the two peoples of the Island (Turks getting only 2 m. US. $ and Greeks getting 67 m. US. $ in 5 years period), it is assumed that financial aid should be given with respect to the proportion of the population i.e. 20% of the financial aid favoured in the Third Financial Protocol to be given to the TRNC. Considering this assumption the model simulated showed that TRNC economy in 1992 will have a GNP of 1,888,689.6 m. TL. (fixed prices of 1977) with an increase of 27,871.9 m. TL. (1.5%) over the existing EEC relationship. Consumption will be 4,756.8 m. TL. with an increase of 63.5 m. TL. (1.4%), investment will be 1,102.7 m. TL. with an increase of 22.4 m. TL. (2.1%) and total imports will be 6,604.5 m. TL. with an increase of 130.6 m. TL. (2.0%).

When the analysis is carried out with the model estimated by LSQ method, the results show that GNP in 1992 will be 1,765,366.8 m. TL. (current prices) with an increase of 19,777.3 m. TL. (1.1%), consumption will be 4,417.6 m. TL. with an increase of 44.4 m. TL. (1.0%), investments will be 990.3 m. TL. with an increase of 15.6 m. TL. (1.6%) and the total imports will be 6743.3 m. TL. with an increase of 137.1 m. TL. (2.1%).

Final analysis considers the development levels of the two economies on the Island i.e. Greek Cypriot economy with a GNP per head of 5,694 US. $ and the TRNC economy with 1,730
US. $ in 1986, and assumes that the financial aid favoured in the Third Financial Protocol to be given with respect to the need. Thus it assumes that 50% of 69 m. US. $ to be given to the TRNC economy. Thus with this assumption, financial aid and trade concessions being given with respect to the need, TRNC economy in 1992 will have a GNP of 1,956,854.9 m. TL. (current prices), with an increase of 96,037.1 m. TL. (5.2%) over GNP which will be attained with the existing EEC relations. Consumption will be 4,912.1 m. TL. with an increase of 218.8 m. TL. (4.7%), investments will be 1,157.1 m. TL. with an increase of 76.8 m. TL. (7.1%) and the total imports will be 6,923.8 m. TL. with an increase of 449.9 m. TL. (6.9%).

The same analysis has been carried out with the model estimated by LSQ method and the results show that the TRNC economy in 1992 will have a GNP of 1,814,024.5 m. TL. (current prices), with an increase of 68,435.0 m. TL. (5.5%) over the GNP which will be obtained with the existing EEC relations. The consumption level will be 4,526.6 m. TL. with an increase of 153.6 m. TL. (3.5%), investments will be 1,028.4 m. TL. with an increase of 53.6 m. TL. (5.5%) and the total imports will be 7,078.7 m. TL. with an increase of 472.5 m. TL. (7.2%).

7.2 Policy Implications of the Study

In this section the policy implications that will be derived after analysing the results given in the previous section
will involve only the scope of this study and will be based on the findings of this research making very limited use of any additional information. Policies and suggestions will be expressed in two parts. The first part will include the policies and suggestions related with the economic structure of the TRNC economy, based on the findings of the application of input-output theory. The second set of policies and suggestions are related with the past and future relations of the TRNC with the EEC. It will also refer to the contribution and importance of the relations with Turkey. These policies and suggestions will be based on the findings of the backward and forward simulations of the macro economic model built for the TRNC.

There has been long debates on which sector is to be chosen as the leading sector of the TRNC. The discussion is still going on mostly in favour of the service sectors, while the supporters of the manufacturing sector if not proposing it as a leading sector try to compromise in a balanced growth model for the TRNC. Most of these discussions are carried on without referring to any statistics. Some try to prove their cases by referring to raw statistics which does not involve any statistical methods. Here, manufacturing, agricultural, animal husbandry, restaurants and hotels, and commerce industries will be compared in the light of the findings of the application of input-output theory, in assessing their relative positions in the economy. For this reason table 7.1 has been prepared, giving the total output, income, employment, and imports generated in the economy for a unit increase in the final demands of the industries.
Table 7.1 Total Output, Income, Employment, and Imports Generated in the Economy by 1,000 TL. Expenditure on Final Demand of the Industries

<table>
<thead>
<tr>
<th>Industries</th>
<th>Output R</th>
<th>Income R</th>
<th>Emp.** R</th>
<th>Import R</th>
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<td>1. Manufacturing</td>
<td>3192</td>
<td>1149</td>
<td>337</td>
<td>397</td>
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<tr>
<td>2. Agriculture</td>
<td>3130</td>
<td>1229</td>
<td>620</td>
<td>355</td>
</tr>
<tr>
<td>3. Animal Husb.</td>
<td>3846</td>
<td>1398</td>
<td>827</td>
<td>265</td>
</tr>
<tr>
<td>4. Rest. &amp; Hotels</td>
<td>3707</td>
<td>1512</td>
<td>364</td>
<td>206</td>
</tr>
<tr>
<td>5. Commerce</td>
<td>3251</td>
<td>1353</td>
<td>300</td>
<td>290</td>
</tr>
</tbody>
</table>

* Rank

** Total employment generated in the economy is in response to 1 bil. TL. increase in the final demands of the industries, rather than 1,000 TL.

Taking manufacturing industry, it has the worst record almost in all the criteria. For a 1,000 TL. increase in its final demand it is expected to increase total output in the economy by 3,192 TL., total income by 1,149 TL., employment by 337 persons\(^1\), competitive imports by 397 m. TL. Manufacturing industry not only generates relatively very low output, income, and employment but generates a very high level of competitive imports. In 1986, manufacturing

\(^1\)Total number of employment generated in the economy is in response to 1 bil. TL. increase in the final demands of the industries and not 1,000 TL.
industry contributed to total trade deficit (-47,247 m. TL.), by -79,575 m. TL. In the same year it had imported 48% (14,804/31,118) of its total inputs from various countries. Thus manufacturing industry needs to overcome a lot of disadvantages in order to become a leading sector to the economy. Unavailability of consistent markets and optimum market sizes for the optimum output of manufacturing industry, economic embargo of the Greek Cypriot Administration and the lack of recognition of the TRNC are the main obstacles facing manufacturing sector.

Considering agriculture industry, it generates the least total output and income in the economy but creates relatively high employment, causing relatively lower levels of competitive imports when there is an increase to its final demand. Animal husbandry on the other hand appears to be one of the most successful industries in the economy. It generates the highest total output (3,846 TL.) and employment (827 persons), and second highest total income (1,398 TL.) with second lowest competitive imports (265 TL.).

Hotels and restaurants is the other successful industry in the economy, ranking at first place in two criterias. It generates the highest total income (1,512 TL.) and causes the least competitive imports (206 TL.) for 1,000 TL. increase to its final demand. It ranks in the second and third places in total output (3,707 TL.) and total employment (364 persons) generation in the economy.
Commerce ranks almost in the middle among the industries with these criteria. It ranks in the third position (middle) in three criteria and fifth position in one criteria.

As a result of the above analysis hotels and restaurants and animal husbandry industries appeared to be the most successful industries that can play an important role in the development of the TRNC economy. Of course the success of these industries and thus the economy’s depends on the increase of the final demands of these industries. TRNC being a very small country, with only its domestic market cannot create the necessary and sufficient demand for the products of these industries. Thus foreign markets are essential. Previous experience showed that Middle East markets are inconsistent and unreliable, leaving behind European markets including Turkey.

The tourism industry, providing the main customers to hotels and restaurants, and animal husbandry industries can be provided with incentives for exports and selective credits for investment. It is beyond the scope of this study to analyse the tourism and animal husbandry industries and make suggestions how to make them more efficient in their contributions to the economy. But a few words is in order about the tourism industry which represents the core of the services sector:

1. In recent years, with additional flights to the TRNC via Turkey, the transportation problem seems to have been
overcame. But still there is more to be done. The first is to get direct flights to the TRNC rather than transit via Turkey which adds to the costs in a very competitive market. Transit flights to the TRNC being the result of the economic embargo of the Greek Cypriot Administration, require a great deal of political efforts of the TRNC and encouragement of the economic interests of the other organisations.

2. Flight ticket prices of the Cyprus Turkish Airlines for the tourists can be kept at a level such as to cover only the operating costs, and other airlines can be subsidised within the limits of the available resources.

3. Selective credits can be given to the tourism sector. Government can also encourage tourism in diversified areas, such as golf, water sports, conference tourism.

4. When investments are made in tourism, special attention should be given not to end up with ugly concrete structures just as it happened in Limassol, and Larnaca in the southern part of the Island.

5. In Cyprus there are three universities all of which are established in Northern Cyprus, in Kyrenia, Nicosia, and Famagusta. The Eastern Mediterranean University situated in Famagusta, is the biggest university on the Island with around 3,000 students whose 2,000 are overseas students. In the TRNC the bed capacity is around 4,500.
Assuming that they are 80% full for 5 months, it makes 540,000 beds per year. On the other hand, assuming the overseas students attending the Eastern Mediterranean University stays 10 months, they create 600,000 bed capacity in one year. Considering the fact that the Eastern Mediterranean University has started a three semesters per year system and that it aims to increase its student number to 5,000 in 2 or 3 years time its place not only in hotels and restaurants industry but within the whole economy will be important. The TRNC Government mainly supporting the Eastern Mediterranean University can also support the other two Universities in the North. Financial aid and technical support can be sought from foreign sources apart from Turkey. The Government may start from United Kingdom for such a financial aid and technical assistance, as the House of Commons Foreign Affairs Committee in their reports recommends to their Government that "specific consideration should be given to the support of the new English-Language University of Famagusta".

In analysing the results of macro econometric model and deriving policy conclusions, first, the past financial aid and trade concession given by the EEC and Turkey over the period 1977-1987 and their effects on the TRNC economy will be assessed.

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Before getting into the economic evaluations it is important to emphasize Turkey's and EEC's stand in Cyprus problem very briefly. Turkey is the country that saved the Turkish Cypriots from the Greeks' assassinations twice, in 1963 and in 1974. This is far more important than anything else, leave aside the continuous political, financial, and technical aid she provided to the Turkish Cypriots all throughout this period. Turkey is the only country that recognised the TRNC and exchanged ambassadors with it. The EEC on the other hand not only does not recognize the TRNC and hold official meetings, but also recognises the Greek Cypriot Administration as the "legitimate" government of the whole Cyprus. It holds all the negotiations and makes agreements with the Greek Cypriot Administration which does not have any Turkish representative in it and thus can not represent the TRNC in the North. Nevertheless due to the fifth article in the Association Agreement, the EEC is obliged not to make any discrimination between the two peoples on the Island as far as the rules governing the trade are concerned. As the EEC takes this stand, it puts the TRNC in a situation to recognise the agreements made by the EEC and the Greek Cypriot Administration, and accept the Greek Cypriot Administration indirectly as the "legitimate" government of the whole Cyprus. The attitude of the EEC which contradicts the "equal" treatment of the two Governments on the Island by the SecretaryGeneral of the United Nations, has a negative effect on the negotiations of finding a solution for the Cyprus problem and it is not approved by the Turkish Cypriot people. Of course this
attitude of the EEC which can not be accepted, is the result of the influence of Greece on the member countries. At a time when Europe is almost achieving an economic unity as the first step to political unity, and cooperating quite frequently on political issues and trying to arrive at common political decisions, it is very difficult to expect the EEC not to be biased in its attitude towards the two peoples on the Island.

Considering the above political evaluations, economic developments represent their reflections. Thus the effect of the financial aid and trade concessions given to the TRNC by the EEC from 1977 to 1987 was a cumulative contribution of 1.7% to the gross national product, while Turkey's effect was 11.2% contribution. The calculations show that the contribution of Turkey's financial aid and trade concessions to the economic growth (i.e. GNP) of the TRNC is 11 times more than EEC's contribution.

Looking at the future relations of the TRNC and the EEC and their effects on the economic growth of the economy, it is seen that the present level of financial aid and trade concessions given by the EEC to the TRNC will contribute to gross national product of the TRNC by 2.0% in 1992. If such financial aid and trade concessions are distributed among the two peoples of the Island with respect to their populations, this expected to contribute to the growth of GNP by another 1.5%. This additional percentage rises to 5.2%, if the financial aid and trade concessions are given with respect to the needs of the two peoples of the Island.
As the above statistics show neither the past nor the future financial aid and trade concessions to the TRNC is at the required level. The EEC should abandon its biased attitude to the two peoples of the Island and start to allocate its financial aid with respect to the needs of the two peoples on the Island rather than financing the projects in the South which make no contribution to the economic development of the TRNC. The EEC should see the facts and act accordingly as noted in the Third Report of House of Commons, Foreign Affairs Committee "By most criteria the southern sector of Cyprus, with a relatively high GNP, is no longer really eligible for economic aid at all, while the northern economy demonstrates most of the problems which would justify substantially greater aid than is presently available.... In our view aid should be provided to Cyprus both by multinational agencies and by the British Government, primarily on the basis of economic need". It is also worth quoting the recommendation made in the same report to the EEC, "the member governments of the European Community should make unequivocally clear to the Government of the Republic of Cyprus that no further moves will be made towards the establishment of a Customs Union between Cyprus and the EEC until obstacles to inter-community trade in Cyprus are lifted, and the present measures to impose an embargo on third party trade and communications with north Cyprus are removed". Besides one should never forget that

4Ibid., p. xxxv.
one of the main principles of the regional policies of the EEC aims at reducing the differences existing between the various regions and the backwardness of the less favoured regions⁵.

Considering all the arguments made above, TRNC Government is faced with a very important decision to make on the two options available to them at this moment of time. Either a federal solution is agreed between the two Administrations of the Island or the two Administrations as two Republics exist side by side in peace and try to improve good relations. For a federal solution to be achieved with two partners, it is highly expected that the Greek Cypriot Administration as an indication of its goodwill and sincerity should respect and apply the recommendations made by the House of Commons Select Committee, "The Greek Cypriot Government's policy of seeking to imposing embargo on much of the Turkish Cypriots' trade and communications with the outside world can not contribute to a settlement.... the Greek Cypriot Government should be prepared to permit the restoration of normal postal and telephone services between the two communities, and between northern Cyprus and the outside world; should permit commercial air services into the north of the Cyprus.... and should suspend the threat of legal penalties against ships' masters whose vessels make

use of northern Cypriot harbours.\(^6\)

Unless the Greek Cypriot Administration, accepts the political equality and self-determination rights of the Turkish Cypriots and the effective guarantees of Turkish Government in a federal solution whose main character is bi-communal and bi-zonal, the TRNC Government cannot lose any time and should select the second option which is seeking recognition for their Republic, effectively.

As far as the relations with the EEC are concerned, the present form has a very negligible contribution to the economic development of the TRNC economy. This is mainly due to the lack of official relations between the EEC and the TRNC and due to the fact that the financial aid is given to the projects contributing to the economic development of the southern Cyprus. Thus, considering the economic gap between the north and the south of the Island, and the regional policy principles adopted by the EEC, EEC should review its financial aid policy to Cyprus. Financial aid provided by the Third Financial Protocol should be given with respect to the need. The EEC should establish official relations with the TRNC, and a separate new Association Agreement should be made with the TRNC. The new Association Agreement should specifically take into consideration the economic difficulties of the TRNC economy and should aim to

\(^6\)House of Commons, Foreign Affairs Committee (1987), op. cit., pp. xxxiv.
increase its productive capacity through a well planned financial aid and trade concessions program.

7.3 Shortcomings of the Study

In this section rather than repeating the general shortcomings that result from the theoretical formulations and the assumptions of the input-output tables, shortcomings relevant to the application of input-output model to the TRNC will be discussed. The same principle will apply for the macro economic model built for the TRNC and its applications.

In general, there is always a time lag between date of the data obtained from the input-output tables and the date of application. This is due to the fact that the construction of input-output tables takes a long time, depending on the size of the economy and the availability of the required data. In this study input-output table used (1986) can be considered as fairly recent as the time lag was only one year at the time this research started.

Unfortunately the 1986 input-output table is not constructed through a survey but projected from 1980 input-output table. This is due to the fact that constructing an input-output table through a survey takes a long time and is expensive. Thus, using a projected table, rather than one constructed through survey will induce some errors in its application. Such inevitable errors that might have effected the
calculation of multipliers and sectoral output, income, employment and imports can only be cured by constructing a recent input-output table for the TRNC.

It was unfortunate that it was not possible to obtain an input-output table of another country with a similar economic structure. Thus, the multipliers obtained for the TRNC could not be compared with other economies', which would have provided a better understanding of relative degree of interdependence among the local industries. Turkey did not have a recent input-output table available and the Southern Cyprus has not constructed any input-output tables up to now.

Value added figures (primary inputs) in both of the input-output tables prepared for the TRNC are given as totals and they are not broken down into their components i.e. salaries, wages, profits, rents, interest payments, depreciation and indirect taxes. Thus, unavailability of household incomes obliged a deviation from the theoretically required form in constructing the augmented matrix. That is, the degree of the closedness of the augmented matrix is extended to include other components of the value added rather than only household incomes. As a result of this type II multipliers calculated have to be interpreted keeping this in mind, particularly with respect to their values if not the rankings of the industries.

Data availability is one of the major preconditions of a
successful research. In building a macro economic model for the TRNC economy the data was limited to only 11 observations (1977-1987). This was due to the recent establishment of the TRNC and thus the reliable data on its economy started to be recorded after 1977. Unavailability of more than 11 observations may bring some critiques on the consistency and reliability of the parameters of the model estimated. This inevitable problem in this study is even deeper in some other studies where the number of observations fall down to 8. Due to the limitations of the number of observations, the model could only be estimated by single equation methods i.e. OLSQ, 2SLS, LSQ, and NL-2SLS. More sophisticated estimation methods of three stage of least squares (3SLS) and full information maximum likelihood (FIML) methods could not be used as the number of the parameters including the constant terms in the model were more than the number of observations.

Another data problem raised in the imports function as the import price indexes neither for any group of countries nor as a total were available. This may be one of the main causes of having a low explanatory power in the imports equations. Exchange rates used as a proxy variable for relative prices could not improve the import functions. Foreign aid did contribute to the import equations but distorted the model simulations both forwards and backwards.

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It is hoped that the data problem will be overcame in the future permitting a better explanation of the dependent variables and thus better simulations of the model. What makes model builders optimistic is that building one model is not the end of the research but it is the starting point. Model building is an ongoing process and better models will definitely be built for the TRNC in the future.

7.4 Further Research Areas

One of the research areas is directly related with the research carried out in this study. It involves the estimation of the share of the household income in the value added (primary inputs) for each industry. This can be estimated by three ways:

(i) The proportions of the household incomes in the primary inputs for each industry can be obtained from a previous input-output table and the same proportions can be applied to the primary inputs of each industry to find the shares of household incomes.

(ii) A proportion of household income in the total primary inputs i.e. gross domestic product, can be estimated, and by multiplying the total primary inputs of each industry with this proportion, household income generated in each industry can be obtained.
(iii) Employment statistics for each industry can be divided into skilled, semiskilled and non-skilled categories and these figures are multiplied with the average incomes received by each group in order to find yearly incomes of each group. Adding the incomes of these groups, is expected to give the household income proportion of the primary inputs for each industry.

All of the methods suggested above have their own shortcomings and can be applied under specific assumptions. Unfortunately the first option can not be used for the TRNC's case, as the primary inputs given in the first input-output table of the TRNC (1986) are not separated into their components. Second and third suggestions on the other hand require a further research. It is very unlikely to find ready data and calculate the proportions of household incomes in the primary inputs by using these suggestions. It will require a sample survey.

After estimating the shares of the primary inputs, particularly household incomes, for each industry, not only the augmented matrix will be constructed in its ideal form but also further researches will be possible. It will be possible to calculate the total household incomes, total profits, total rents, and total interest payments generated in the economy in response to a unit change in the final demand of each industry. Further more, this will enable the calculation of total household incomes, profits, rents, and
interest payments generated in the economy for each industry given the actual expenditures on final demand categories, which is very relevant to policy makers.\(^8\)

Another research area involves the population sizes of the two peoples on the Island. Population sizes of the two peoples of the Island are not only important in political aspects i.e. in constitutions for a federal republic, but also it has economic consequences, particularly in the distribution of the financial aid given to both people. Thus a research can be carried out to determine the factors effecting the fertility rates of the Turkish and the Greek Cypriot population on the Island. Main socioeconomic factors effecting fertility are the gross national product per head, female participation in labour force, literacy rate, and the expenditures on health. Besides the socioeconomic factors some demographic factors also affect the fertility rates and they should also be included in the model. These are the life expectancy at birth and crude death rate (or infant mortality rate).\(^9\) Such a model can be estimated separately for each people or for the total population.

\(^8\)Bulmer Thomas, V. (1982), *Input-Output Analysis in Developing Countries: Sources, Methods and Applications*, John Wiley and Sons Ltd., Chichester, pp. 184-187.

population of the Island by using dummy variables. The model estimated for the whole population by using dummy variables will enable to see if there is any significant difference in the parameters estimated for each people. Some of the explanatory variables, particularly gross national product, is expected to have a negative effect on the fertility rate of the Greek Cypriot population, but a positive effect on the Turkish population. At the end of the research, population sizes of the two peoples will be projected and a year will be produced at which the populations of the two peoples on the Island will be equal.

Another comparative research can be carried out to detect the structural differences between the two economies of the Island. The macro econometric model used in this research can be utilised for this purpose. The data for the two economies can be entered into the equations together and using dummy variables, existence of a significant difference in the parameters of the two economies i.e. structural difference can be tested. In case an input-output table for the Greek Cypriot economy can be obtained, above study can be reinforced with the comparison of the technical coefficients of the two input-output tables of the two economies. Wilcoxon's nonparametric test can be used to test the existence of a significant difference in the technical coefficients of the two tables.

Another interesting research may investigate only the Greek Cypriot economy since 1963. It can try to find out the
political and economic reasons behind such a fast economic development after 1974. Greek Cypriot Administration claims that they have left 70% of their gross domestic product in Northern Cyprus, and in spite of this they have achieved a growth rate after 2 or 3 years above what they had just before 1974.

Last but not least, every Turkish Cypriot wants to know how much the Greek Cypriot Administration owes to each one of them since 1963. As it is a well known fact that the Turkish people were forced out of the Cyprus Government by the Greeks and the Greek Cypriot Administration, in contradiction to 1960 Constitution, who occupied the post for 27 years and are still occupying. Cyprus is not totally Greek. It belongs to both the Turkish Cypriots and the Greek Cypriots. Thus all the financial aid taken by the Greek Cypriot Administration in the name of the Cyprus Government, should have been spent for the welfare of both the Turkish and the Greek peoples. More important than the amount of financial aid taken in the name of the Turkish people and not given to them, is the lost opportunities for not being able to use the facilities and the resources provided by the Cyprus Government. During 1963-1974 Turkish people lived aside the facilities of the Cyprus Government, they could not been able to use their own lands for ploughing, and grazing, as they were squeezed into enclaves occupying only 2.5% of the total Cyprus. After 1974, still the Greek Cypriot Administration claims to the Government of the whole Island, makes agreements on behalf of all the
Cypriots and receives large sums of financial aid, large sums of long term loans with very low interest rates. In all these, Turkish Cypriots have shares and have lost opportunities. This research at the end will produce a list of debts owed to the Turkish Cypriot people by the Greek Cypriot Administration.
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311
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Key:
- **TCC**: credits given by Turkey
- **TCA**: aid given by Turkey
- **TC**: total aid and credits given by Turkey
- **AO**: aid given to the TRNC by other countries
Table 8.19 Financial Aid and Credits Given to the TRNC

(Current Prices, m. TL.)

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Key:  
T total aid and credits given to the TRNC  
TCC credits given by Turkey  
TCA aid given by Turkey  
TC total aid and credits given by Turkey  
AO aid given to the TRNC by other countries
Table 8.20 Klein's Model for Developing Countries

\[ C = a_0 + a_1 \left( Y - T_t - T_r \right)/P + a_2 C(-1) + u_1 \]
\[ I = b_0 + b_1 \left( Y/P \right)(-1) + b_2 K(-1) + b_3 R(-1) + u_2 \]
\[ M_a = c_0 + c_1 \left( \Delta Y/P \right) + c_2 M_a(-1) + c_3 \left( P_m/P \right) + u_3 \]
\[ E_a = d_0 + d_1 T_w + d_2 \left( P_e/P \right) + u_4 \]
\[ T_e = f_0 + f^1 Y + u_5 \]
\[ (Y/P) = h_0 + h_1 L + h_2 K + u_6 \]
\[ \Delta W/W = j_0 + j_1 \frac{(N-L)}{N} + j_2 \left( \Delta P/P \right) + u_7 \]
\[ N = k_0 + k_1 (N-L) + k_2 (W/P) + u_8 \]
\[ (N/P) = l_0 + l_1 \left( Y/P \right) - l_2 R + u_9 \]
\[ P_e = m_0 + m_1 P + u_{10} \]
\[ (Y/P) = C + I + G + (E_a - M_a) \]
\[ I = K - K(-1) \]

Where, $P_m$ is the price of exports (index)

$P_e$ is the price of exports (index)

$T_w$ is the volume of the world trade

and all other variables are as indicated before.
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Table 8.21 Data Used in Building a Model for TRNC Economy
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<td>142.300</td>
<td>750.910</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TT</th>
<th>YT</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>90.640</td>
<td>7.350</td>
<td>97.990</td>
</tr>
<tr>
<td>1978</td>
<td>104.738</td>
<td>8.172</td>
<td>112.910</td>
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<td>1979</td>
<td>95.115</td>
<td>13.286</td>
<td>108.401</td>
</tr>
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<td>69.808</td>
<td>14.703</td>
<td>84.511</td>
</tr>
<tr>
<td>1981</td>
<td>62.660</td>
<td>15.474</td>
<td>78.134</td>
</tr>
<tr>
<td>1982</td>
<td>65.018</td>
<td>20.611</td>
<td>87.629</td>
</tr>
<tr>
<td>1983</td>
<td>76.467</td>
<td>20.467</td>
<td>98.934</td>
</tr>
<tr>
<td>1984</td>
<td>93.413</td>
<td>19.905</td>
<td>113.318</td>
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<tr>
<td>1985</td>
<td>103.791</td>
<td>21.284</td>
<td>125.075</td>
</tr>
<tr>
<td>1986</td>
<td>105.729</td>
<td>25.763</td>
<td>131.492</td>
</tr>
<tr>
<td>1987</td>
<td>147.965</td>
<td>36.372</td>
<td>184.337</td>
</tr>
</tbody>
</table>

Key for Additional Variables

ER  Exchange rate for pound sterling
GEUS Goods exported in m. US. $
US  Exchange rate for US. $
TIND Index for total imports
TFA  Total foreign financial aid (fixed prices, m. TL.)
NFA  Non-Turkish financial aid (fixed prices, m. TL.)
YFA  Turkish financial aid (fixed prices, m. TL.)
TT  Total number of tourist (thousand)
YT  Non-Turkish tourists (thousand)
TT  Turkish tourists
Table 8.22 Sum of Squares Approach in Determining the Inclusion of a Variable in a Regression

Sum of squares approach is an alternative method in determining whether to include or exclude a variable from the regression. It considers the additional contribution made by the additional variable to the explanatory power of the regression. This contribution after being divided with the proper D.F., it is tested against the F-value from the table.

The test is straightforward. Assuming that a third variable's inclusion is to be tested. Tables A, B, and C will be constructed and the F-value computed in table C will be tested for its significance.

Table A. Analysis of Variance for a Multiple Regression Using $x_1$ and $x_2$

<table>
<thead>
<tr>
<th>Source</th>
<th>D.F.</th>
<th>S.S.</th>
<th>M.S.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>2</td>
<td>$F_2$</td>
<td>$F_2/2$</td>
<td>$(F_2/2)/[R_g/(n-3)]$</td>
</tr>
<tr>
<td>Residual</td>
<td>$(n-3)$</td>
<td>$R_g$</td>
<td>$R_g/(n-3)$</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$(n-1)$</td>
<td>$\sum(y_j-\bar{y})^2$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table B. Analysis of Variance for a Multiple Regression Using $x_1$, $x_2$, and $x_3$

<table>
<thead>
<tr>
<th>Source</th>
<th>D.F.</th>
<th>S.S.</th>
<th>M.S.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>3</td>
<td>$F_3$</td>
<td>$F_3/3$</td>
<td>$(F_3/3)/[R_g/(n-4)]$</td>
</tr>
<tr>
<td>Residual</td>
<td>$(n-4)$</td>
<td>$R_g$</td>
<td>$R_g/(n-4)$</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$(n-1)$</td>
<td>$\sum(y_j-\bar{y})^2$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table C. Analysis of Variance Combining the Information from the previous two Regressions

<table>
<thead>
<tr>
<th>Source</th>
<th>D.F.</th>
<th>S.S.</th>
<th>M.S.</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>2</td>
<td>$F_2$</td>
<td>$F_2/2$</td>
<td>$F_2/2/[R_g/(n-4)]$</td>
</tr>
<tr>
<td>Extra Infor. in $x_3$</td>
<td>1</td>
<td>$F_3-F_2$</td>
<td>$F_3-F_2$</td>
<td>$(F_3-F_2)/[R_g/(n-4)]$</td>
</tr>
<tr>
<td>Residual</td>
<td>$(n-4)$</td>
<td>$R_g$</td>
<td>$R_g/(n-4)$</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$(n-1)$</td>
<td>$\sum(y_j-\bar{y})^2$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


324
### Table 8.23 Critical Values for t, DW and F Tests

#### t-TEST

<table>
<thead>
<tr>
<th>Sig. Level</th>
<th>Two Tailed Test</th>
<th>One Tailed Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>20%</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>t(8)</td>
<td>1.397</td>
<td>1.860</td>
</tr>
<tr>
<td>t(9)</td>
<td>1.383</td>
<td>1.833</td>
</tr>
<tr>
<td>t(10)</td>
<td>1.372</td>
<td>1.812</td>
</tr>
</tbody>
</table>

Where, $t(df) = n-k$ and $n$ is the number of observations, $k$ is the number of variables including the intercept.

#### DW-TEST

<table>
<thead>
<tr>
<th>k, n</th>
<th>5% Sig. Level</th>
<th>1% Sig. Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$d_L$</td>
<td>$d_U$</td>
</tr>
<tr>
<td>2, 10</td>
<td>0.879</td>
<td>1.320</td>
</tr>
<tr>
<td>2, 11</td>
<td>0.927</td>
<td>1.324</td>
</tr>
<tr>
<td>3, 10</td>
<td>0.697</td>
<td>1.641</td>
</tr>
<tr>
<td>3, 11</td>
<td>0.758</td>
<td>1.604</td>
</tr>
</tbody>
</table>

#### F-TEST

<table>
<thead>
<tr>
<th>F(k-1, n-k), $df = [(k-1), (n-k)]$</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>5% Sig. Level</th>
<th>1% Sig. Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F(2,7)$</td>
<td>4.740</td>
</tr>
<tr>
<td>$F(1,9)$</td>
<td>5.120</td>
</tr>
<tr>
<td>$F(2,9)$</td>
<td>4.260</td>
</tr>
<tr>
<td>$F(2,8)$</td>
<td>4.460</td>
</tr>
</tbody>
</table>
Table 8.24 Import Equations

i. Exchange Rate Equations

<table>
<thead>
<tr>
<th>Equation</th>
<th>Coefficients</th>
<th>R^2</th>
<th>DW</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ( M_a = -2040.3 + 1.098 \frac{Y}{P} + 0.715 \text{ER} )</td>
<td>(0.316) (0.874) (0.322)</td>
<td>54%</td>
<td>0.72</td>
<td>6.78</td>
</tr>
<tr>
<td>2. ( M_a = 2734.5 - 0.112 \frac{Y}{P} + 3.613 \text{US} )</td>
<td>(0.347) (-0.056) (0.883)</td>
<td>57%</td>
<td>0.73</td>
<td>7.68</td>
</tr>
</tbody>
</table>

Where, \( M_a \) is the total imports

ER is the pound exchange rate for TL.

US is the US dollar exchange rate for TL.

ii. First Difference Equations

<table>
<thead>
<tr>
<th>Equation</th>
<th>Coefficients</th>
<th>R^2</th>
<th>DW</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ( \Delta M_a = 0.226 -0.0001 \frac{Y}{P} -0.188 \text{ERD} )</td>
<td>(0.334) (-0.061) (-0.678)</td>
<td>-21%</td>
<td>1.07</td>
<td>0.23</td>
</tr>
<tr>
<td>2. ( \Delta M_a = -0.015+0.0002 \frac{Y}{P} +0.065 \text{USD} )</td>
<td>(-0.018) (0.110) (0.157)</td>
<td>-28%</td>
<td>0.92</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Where \( \Delta M_a = \frac{[M_a - M_a(-1)]}{M_a(-1)} \)

ERD = \( \frac{[\text{ER} - \text{ER}(-1)]}{\text{ER}(-1)} \)

USD = \( \frac{[\text{USD} - \text{USD}(-1)]}{\text{USD}(-1)} \)

iii. Tourist Equations

<table>
<thead>
<tr>
<th>Equation</th>
<th>Coefficients</th>
<th>R^2</th>
<th>DW</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ( M_e = -884.07 + 0.551 \frac{Y}{P} - 4.080 \text{TT} )</td>
<td>(-1.293) (2.328) (-0.840)</td>
<td>44%</td>
<td>1.16</td>
<td>4.96</td>
</tr>
<tr>
<td>2. ( M_t = -3026.7 + 1.258 \frac{Y}{P} - 9.445 \text{TT} )</td>
<td>(-2.333) (2.799) (-1.024)</td>
<td>55%</td>
<td>1.03</td>
<td>7.11</td>
</tr>
<tr>
<td>3. ( M_r = -1045.7 + 0.305 \frac{Y}{P} + 1.149 \text{TT} )</td>
<td>(-2.713) (2.284) (0.419)</td>
<td>69%</td>
<td>1.22</td>
<td>12.37</td>
</tr>
</tbody>
</table>

Where \( M_e \) is the imports from EEC

\( M_t \) is the imports from Turkey

\( M_r \) is the imports from ROW

TT is the total number of tourists
iv. Foreign Aid Equations

1. \[ M_t = -614.07 + 0.224 \left( \frac{Y}{P} \right) + 1.157 \text{ TFA} \quad 81\% \quad 2.54 \quad 22.09 \]
   \[ (-1.819) \quad (2.697) \quad (4.162) \]

2. \[ M_t = -1573.1 + 0.682 \left( \frac{Y}{P} \right) - 5.377 \text{ NFA} \quad 54\% \quad 1.70 \quad 6.92 \]
   \[ (-1.942) \quad (3.129) \quad (-1.611) \]

3. \[ M_t = -2394.3 + 0.531 \left( \frac{Y}{P} \right) + 2.462 \text{ TFA} \quad 91\% \quad 2.41 \quad 52.71 \]
   \[ (-4.947) \quad (4.454) \quad (6.179) \]

4. \[ M_t = -1908.8 + 0.358 \left( \frac{Y}{P} \right) + 2.649 \text{ YFA} \quad 91\% \quad 2.29 \quad 50.99 \]
   \[ (-3.850) \quad (2.619) \quad (6.064) \]

5. \[ M_t = -1146.4 + 0.297 \left( \frac{Y}{P} \right) + 0.402 \text{ TFA} \quad 77\% \quad 1.76 \quad 18.14 \]
   \[ (-4.104) \quad (4.321) \quad (1.749) \]

6. \[ M_t = -1483.5 + 0.457 \left( \frac{Y}{P} \right) - 1.888 \text{ NFA} \quad 72\% \quad 1.56 \quad 13.83 \]
   \[ (-3.071) \quad (3.519) \quad (-0.949) \]

Where TFA is the total foreign aid
YFA is the Turkish foreign aid
NFA is the non-Turkish foreign aid (NFA=TFA−YFA)
Table 8.25 Forward Simulation Results (LSQ)

<table>
<thead>
<tr>
<th>XI</th>
<th>Y1</th>
<th>Y2</th>
<th>Y3</th>
<th>Y4</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>3986.600</td>
<td>4119.553</td>
<td>3953.712</td>
<td>3977.976</td>
</tr>
<tr>
<td>02</td>
<td>780.400</td>
<td>817.003</td>
<td>817.003</td>
<td>817.003</td>
</tr>
<tr>
<td>03</td>
<td>485898.0</td>
<td>566545.000</td>
<td>558897.875</td>
<td>549293.750</td>
</tr>
<tr>
<td>04</td>
<td>79.859</td>
<td>91.461</td>
<td>91.901</td>
<td>92.346</td>
</tr>
<tr>
<td>05</td>
<td>5357.941</td>
<td>5416.404</td>
<td>5368.723</td>
<td>5521.010</td>
</tr>
<tr>
<td>06</td>
<td>2037.050</td>
<td>1723.689</td>
<td>1715.133</td>
<td>1703.303</td>
</tr>
<tr>
<td>07</td>
<td>2327.294</td>
<td>2643.131</td>
<td>2615.122</td>
<td>2854.856</td>
</tr>
<tr>
<td>08</td>
<td>993.596</td>
<td>1049.508</td>
<td>1038.467</td>
<td>962.851</td>
</tr>
<tr>
<td>09</td>
<td>70168.398</td>
<td>89537.672</td>
<td>88690.719</td>
<td>86773.695</td>
</tr>
<tr>
<td>10</td>
<td>50394.898</td>
<td>75466.914</td>
<td>74454.188</td>
<td>73702.219</td>
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<tr>
<td>11</td>
<td>10820.900</td>
<td>10857.504</td>
<td>10857.504</td>
<td>10857.504</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>14</td>
<td>85600.000</td>
<td>108558.859</td>
<td>100064.758</td>
<td>94720.219</td>
</tr>
</tbody>
</table>

Key: X1 actual values of macroeconomic variables for 1988
01 consumption 02 investment 03 current GNP
04 GNP deflator 05 total imp. 06 EEC imports
07 Turkey imports 08 ROW imports 09 tax
10 transfers 11 capital st. 12 money wages
13 labor force 14 money supply

Y1 OLSQ ex-post forecast for 1988
Y2 2SLS ex-post forecast for 1988
Y3 LSQ ex-post forecast for 1988
Y4 NL-2SLS ex-post forecast for 1988
<table>
<thead>
<tr>
<th>YEAR</th>
<th>CONS</th>
<th>Y</th>
<th>TAX</th>
<th>TRNS</th>
<th>INV</th>
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<td>0.12418</td>
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<td>0.33637</td>
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<td>1982</td>
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<td>13.11596</td>
<td>2.10143</td>
<td>1.80170</td>
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<td>19.44175</td>
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<table>
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</table>

<table>
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</tr>
<tr>
<td>1983</td>
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<td>4.06467</td>
</tr>
<tr>
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