FINANCIAL LIBERALIZATION AND CREDIT-ASSET BOOMS AND BUSTS IN EAST ASIA

By

Panicos O. Demetriades[1]

University of Leicester

Summary

This paper presents econometric evidence that sheds new light on the role played by financial liberalization in the Korean and Thai financial crises. Drawing on previous empirical studies, it argues that while the banking systems of both Korea and Thailand supported their remarkable long-run growth performance, they were ill prepared to face the risks emanating from financial liberalization. New evidence is then presented which shows that financial liberalization set in motion a classic credit-asset boom and bust cycle in Thailand and created other weaknesses in the Korean financial system, which made both economies vulnerable to the sentiments of foreign investors and lenders. When capital flows were reversed, the ensuing liquidity crisis triggered a bust that was further magnified by currency depreciations and interest rate hikes.

In the light of this analysis, the paper argues that besides strengthening prudential regulation and accounting standards, there is a need for upgrading management systems and expertise to deal with financial risks and an important need for a more widespread appreciation of the risks associated with financial liberalization. Furthermore, there remain gaps in the international financial architecture that need to be addressed, such as the absence of an effective international lender of last resort. Given that these weaknesses may require a long time to address, it is argued that in the interim period financial restraints can act as a relatively cheap, effective and transparent safety device in safeguarding financial stability.

November 1999

(Revised January 2000)

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[1] Address for correspondence: Professor P.O. Demetriades, University of Leicester, University Road, Leicester LE1 7RH. E-mail: pd28@le.ac.uk. I have benefited from excellent research assistance by Bassam Fattouh. I acknowledge useful comments by participants at the World Bank Conference "The Credit Crunch in East Asia: What do we Know? What Do We Need to Know?" held in Washington D.C. during November 30 – December 1, 1999. I would also like to thank, without implicating, Svetlana Andrianova, Philip Arestis, Andrea Cipollini, Kul Luintel and Zenon Kontolemis for commenting on an earlier version of the paper.

Work for this paper was carried out during a visit to the Development Economics Research Group of the World Bank in the autumn of 1999 as part of a World Bank project entitled "Alleviating the Impact of the Credit Crunch in East Asia". I would like to thank Giovanni Ferri, Patrick Honohan and Jerri Caprio for providing me with this opportunity and, also, for their hospitality. Naturally, all the opinions expressed in this paper are my own and do not reflect those of the World Bank, its executive directors, or the countries they represent.

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1. Introduction

Two years after the Asian financial crisis, the literature on the subject is already voluminous.[2] However, much of it shies away from exploring the weaknesses in the international financial system, focusing instead on the weak financial fundamentals emanating from the Asian Development Model, which is blamed for encouraging moral hazard behavior, corruption and bad lending practices. The main consequence of focusing on the latter is that it entails only marginal improvements in the international financial architecture while policy prescriptions and models that are prescribed en-mass to emerging market economies need not be re-assessed, except perhaps for some provisos concerning prudential regulation, accounting standards and bankruptcy laws. Yet the vulnerabilities that led to the Asian crisis are already appearing elsewhere, in countries that are currently embarking on their own financial liberalization programmes.[3]

A growing number of authors, perhaps on deeper reflection, is however beginning to recognize that weaknesses in the international financial system played a decisive role in both creating the vulnerabilities that led to the Asian crisis and amplifying their magnitude.[4] One important aspect of current international financial arrangements, which this paper focuses on, is their predisposition toward uninhibited movements of capital around the globe. Emerging market economies have been actively encouraged to open up their financial systems to foreign capital, liberalize their interest rates and increase competition in their financial systems, on the understanding that these reforms will increase financial deepening, efficiency and growth.[5] The OECD, the EU and the IMF have been (and continue to be) key players in this regard. The resulting increases in international capital mobility have, however, been followed by increased volatility in financial markets, as well as incidents of financial fragility and crisis. Thus, financial liberalization resulted in high economic and social costs, instead of the increased efficiency predicted by its advocates.[6,7] These developments have exposed important gaps in the international financial system, and are arguably responsible for the return of 'depression economics' (Krugman, 1999). It is therefore vital to analyze the Asian

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[2] For a recent comprehensive overview of most aspects of the crisis see the collection of papers in Hunter, Kaufman and Krueger (1999).

[3] An important current example is the EU accession economies, which are in the process of 'harmonizing' their financial systems. See also footnote 19.

[4] See for example Krugman (1999) and compare with Krugman (1998).

[5] For a good exposition of the financial liberalization thesis see Fry (1997) or Fry (1995).

[6] For an empirical analysis of the correlation between financial liberalization and financial fragility see Demirgüç-Kunt and Detragiache (1998). For a specific example from Latin America see Diaz-Alejandro (1985).

[7] In some sense this is not surprising given that the traditional financial liberalization thesis is based on perfectly competitive models, which predate the economics of information revolution. It, therefore, fails to acknowledge the implications of imperfect information and imperfect competition (see Arestis and Demetriades 1999; Stiglitz, 1994).

crisis from an international perspective, using empirical analysis to examine the mechanisms and vulnerabilities created by financial liberalization. This paper makes a first step in this direction by presenting econometric evidence that sheds light on the role played by financial liberalization in the Korean and Thai financial crises. In the light of this evidence it re-examines the validity of some popular explanations of the crisis and presents new insights on relevant policy issues.

The paper's contents are structured as follows. Section 2 gathers evidence from previous empirical studies which casts doubt on the 'fundamentals' view of the crisis in that both the Korean and Thai financial systems supported the remarkable long-term economic growth performance of their countries. Section 3 presents the results of an econometric analysis of the relationship between financial liberalization, capital flows, domestic credit and stock market prices in Thailand and Korea. These new results demonstrate that financial liberalization set in motion a classic credit-asset price boom and bust cycle in Thailand and increased fragility in the Korean financial system. The same section makes the case that both crises exhibited characteristics of a financial panic, resulting from increased vulnerability to foreign investor sentiments and the absence of an effective international lender of last resort. Section 4 discusses wider policy issues in the light of the empirical evidence. Finally, section 5 summarises and offers some ideas for further research.

2. Weak Financial Fundamentals?

There is widespread agreement that the traditional fundamentals view of 'first-generation' crisis models (e.g. Krugman, 1979) can not adequately explain the origins of the Asian crisis (e.g. Glick, 1999; Demetriades and Fattouh, 1999b). Growth and investment rates were high, budget deficits were non-existent and inflation rates were relatively low. While there was some evidence of growing current account deficits before the crisis – reflecting a slowdown in exports due to real exchange rate appreciation and the stagnation of the Japanese economy – these deficits were generally perceived to be 'benign', as they were covered by capital inflows which funded long-term investment (Glick, 1999).

A new variant of the fundamentals view, however, ascribes the Asian crisis to weak financial fundamentals. In this regard, much has been said about 'bad banking' and the Asian Development Model at the centre of which lie close links between banks, industry and government, as it encouraged "imprudent lending ... and corrupt practices" (IMF, 1997, p.12). Krugman (1998) goes further in stating that "... the Asian crisis ... was mainly about bad banking"[8]. Thus, instead of macroeconomic imbalances, we have structural financial distortions, including directed lending, and disincentives to manage risk effectively because of implicit or explicit government guarantees – the popular moral hazard argument. While there is no doubt that the risks associated with financial liberalization were inadequately managed (see sections 3 and 4), the empirical evidence on bad lending practices before financial liberalization took place is weak. In itself the presence of non-performing loans in the system, on which we have some

[8] Note, however, that Krugman (1999) offers a rather different view, ascribing the crisis to weaknesses in the international financial system.

evidence for (e.g. Caprio and Klingebiel, 1996), is not sufficient to conclude that financial weaknesses were responsible for the crisis. In this regard Demetriades and Fattouh (1999b) show that since the early 1970s a proportion of total credit ranging from 5–11% in Korea was 'unproductive' but that during the 1990s this problem was less severe than during the 1980s. They therefore argue that this weakness alone can not explain the crisis.

As an antidote to the 'bad banking' view, this section offers some long-run time-series evidence for the period 1961–95 that demonstrates that the banking systems of South Korea and Thailand contributed significantly to long-run economic growth, largely through enhancing the average productivity of capital. This evidence is gathered from a number of previous papers, including some written well before the crisis.

Demetriades and Hussein (1996) in their analysis of the long-run relationship between financial development (measured by the ratio of bank deposits or credit to GDP) and economic growth in 16 developing countries over the period 1960–93 find the following:

- In both Korea and Thailand the relationship between financial development and economic growth is bi-directional. That is to say financial development Granger causes economic growth and vice-versa.
- To put the above finding in perspective, in the same sample of countries using the same methods there are seven countries for which the relationship between financial development and economic growth exhibits reverse causality (i.e. economic growth Granger causes financial development but not vice-versa). These countries are Costa Rica, El Salvador, Greece, Pakistan, Portugal, South Africa and Turkey.

In a recent paper Demetriades, Arestis and Fattouh (1999) examine the effects of financial development (measured by the ratio of bank credit to GDP) and financial policies on the average productivity of capital in eight developed economies and six developing ones. Their sample covers the period 1955–95 for developed economies and 1961–95 for developing ones. Both Korea and Thailand are included. Controlling for inputs (capital stock and employment) and fixed effects, they find that financial development in both Thailand and Korea had a positive and significant long-run effect on the average productivity of capital and, consequently, on economic growth. It is very instructive to quantify the implied contribution of the financial sector of these countries and compare it with that of other countries in the same data set. Thus, using the data set and estimates of Demetriades et al, the contributions of financial development and financial policies to economic growth over the same period for the same group of countries are calculated and presented in Table 1.

The evidence presented in Table 1 contradicts the notion that there was something fundamentally wrong with the banking systems of Korea and Thailand. In fact, the contribution of the Thai banking system to growth is the highest of all the countries included in the table (column 3) while the contribution of the Korean banking system is fourth in this ranking, at par with that of the UK. It is worth noting that Germany and the US enjoy the second position in this ranking, closely behind Thailand. It is also

interesting to observe from column 4 of the table that Korea is the country in which financial policies appeared to have contributed most to economic growth (a sizeable half a percentage point per annum) while in Thailand they appear to have had a much smaller positive effect. To put this in perspective, financial policies appear to have had negative effects in seven countries. Note also that these policies for Korea were, on average, of the financial restraint type in that they included interest rate and capital controls.

Table 1. Financial Development and Economic Growth for Selected Countries: 1955–95*

Country	Average Annual Growth Rate	Contribution of:			
		Inputs	Financial Development	Financial Policies	Total Financial Sector
Australia	3.88	3.58	0.11	0.05	0.16
Finland	3.40	3.67	0.17	–0.20	–0.03
France	3.66	2.92	0.00	0.20	0.20
Germany	3.79	2.86	0.90	–0.40	0.50
Greece	3.88	3.99	0.05	–0.16	–0.11
India	4.26	4.56	0.07	–0.07	0.00
Korea	8.16	7.62	0.40	0.50	0.90
New Zealand	2.87	3.10	0.08	–0.50	–0.42
Thailand	7.52	6.38	1.16	0.05	1.21
Philippines	3.83	4.70	0.15	–0.74	–0.59
Sweden	2.67	2.22	0.14	0.25	0.39
UK	2.40	1.76	0.40	0.09	0.49
US	2.75	2.31	0.90	–0.11	0.79

*Source: Demetriades, Arestis and Fattouh (1999); the sample is 1961–95 for developing countries.

The overall contribution of the financial sector to economic growth (the combined contribution of financial development and financial restraints shown in column 5) is the highest in Thailand and second highest in Korea. These results cast considerable doubt on the notion that the banking systems of Korea and Thailand simply functioned to serve the needs of narrow political interests without paying attention to wider efficiency considerations – the currently popular notion of 'crony capitalism'. While relationship banking in Thailand and government controlled banking in Korea may be prime suspects for the crisis, the empirical evidence suggests that the financial systems of Korea and Thailand worked reasonably well prior to financial liberalization, contributing to their remarkable long-term growth performance.

The close relations between government, industry and banks in Thailand and Korea, a feature present also in other Asian banking systems, provides an alternative way of addressing information imperfections in financial markets to the Anglo-Saxon model. The results presented in this section suggest that this alternative method was at least as effective as the Anglo-Saxon approach. The latter relies heavily on good accounting standards, information disclosure and effective prudential regulation to address the agency problems emanating from credit market imperfections. In the presence of close relations between the providers and recipients of financial capital, these institutional

features are not critical for addressing agency problems. This may explain why prior to financial liberalization, the Thai and Korean banking systems made a positive contribution to the long-run growth performance of their countries without having Anglo-Saxon institutional standards. However, under liberalised conditions the absence of these standards became a source of vulnerability, as access to foreign capital was not conditional on close relations between providers and recipients of credit.

A caveat is now in order. International comparisons of the type presented in this section must naturally be interpreted with a healthy degree of caution because of data and methodological limitations. However, in this case this is tempered by the fact that the same methods and data sources are used to obtain all the results presented in Table 1. Specifically, the equations are estimated using SUR analysis, without any restrictions imposed on any of the coefficients, all of which are allowed to vary across countries. Furthermore, the time-series properties of the data are respected by carrying out unit root tests and appropriate estimation methods, which filter out the short-run dynamics from the long-run relationship.[9] Finally, since the results presented in Table 1, are not only plausible (in that they may conform to widely held views concerning the relative efficacy of these systems) but are also consistent with a number of other empirical studies. For example, these results are broadly consistent with the analysis of productivity in South and East Asian economies by Demetriades, Devereux and Luintel (1998). The results on India are also consistent with Demetriades and Luintel (1997) and conform to the widely held view that the Indian financial system is over-regulated and inefficient. The results on Korea are consistent with Demetriades and Luintel (1996), who provide a detailed analysis of the mechanisms through which financial restraints in Korea helped to promote financial development and growth. Finally, note that the implied TFP estimates for Korea and Thailand are comparable to Young's (1995).

The analysis presented in this section allows the following conclusions:

1. There is no long-run evidence to suggest that the banking systems of Korea and Thailand were fundamentally flawed or that they had inherent weaknesses that were responsible for the crisis. Instead, the evidence suggests that they supported their remarkable long-run growth performance.

2. The main 'weakness' in the Thai and Korean banking systems was that their institutional framework, including prudential regulation and accounting standards, was not aimed at addressing the agency problems arising from arms-length relations between creditors and debtors, which was typical of capital inflows. In this sense they were ill prepared to operate under financially liberalized conditions.

To conclude, while the Korean and Thai banking systems appear to have worked well under fairly closed government controlled environments, it is now evident that they lacked both the institutional framework and the expertise to function effectively in an environment of open liberalized financial markets[10]. The mechanisms that exposed and

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[9] The authors use a cointegration estimator with good small sample properties (DOLS: Stock and Watson, 1993).

[10] One analogy is that prior to financial liberalization Asian banks could be thought of as driving locomotives on a track safely laid down by their governments, while watching banks in financially developed economies driving flashy fast cars on a parallel American style 6-lane highway. When liberalization took place, they were encouraged to join this magnificent highway, without being warned

exacerbated these weaknesses, creating the vulnerabilities that led to the financial crisis, are explored in the rest of the paper.

3. Capital Account Liberalization and Boom-Bust Cycles

This section presents new empirical evidence on the underlying causes and mechanisms that led to and amplified the Thai and Korean financial crises. In so doing it uncovers important similarities and differences between the two crises. Specifically, evidence is presented which suggests that:

(i) In both crises financial liberalization played a catalytic role, allowing capital inflows to set in motion mechanisms (reactions?) that created vulnerabilities which allowed the crisis to occur; these mechanisms were not identical in the two cases.

(ii) Both crises have elements of a self-fulfilling bank panic by foreign lenders, which magnified and exacerbated the bust.

(iii) The Thai crisis was a variant of the classic 'credit boom and bust' phenomenon, with capital inflows playing an active role in creating and propagating an asset price boom-bust cycle. Interestingly, domestic bank credit played a relatively passive role in this process while total credit, which includes credit by finance companies, played a more active role.

(iv) The Korean crisis, on the other hand, appears to be very much a case of inadequate management of various risks emanating from capital inflows resulting from financial liberalization.

The main aim of the econometric analysis is to shed new light on the role played by financial liberalization and capital flows in the credit-asset boom and bust cycle. Thus, the following key variables, available on a quarterly frequency for the period 1983 to 1998, are modelled: stock price index (a reasonable proxy for asset prices)[11], real domestic credit, the real stock of foreign liabilities in domestic currency terms, and a summary measure of financial restraints. The latter incorporates controls on interest rates and capital flows[12]. For Korea we are also able to use real GDP, quarterly data for which are also available for the same period. The precise definitions of these variables and the data sources are given in the Data Appendix.

The four financial variables are plotted in Figures 1 and 2 over the whole sample period. It is interesting to note that focusing on a much shorter window as most studies have done (a few months before and after the crisis) tends to mask important long-term trends in the data. Importantly, while there is some evidence of a stock market boom in Korea in 1994, this represents mostly a recovery of stock prices to their 1980's peak level. Stock prices begin a rapid downfall during 1995, culminating in the busts of 1996 and 1997. Similarly, there is hardly any evidence of a domestic credit boom in

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of blind spots, slippery surfaces; moreover, no one ensures that they were acquainted with the safety systems they could install to avoid these dangers.

[11] In Thailand a real estate bubble was an important aspect of the crisis; however, a sufficiently long-run time series for property prices is not available.

[12] For details of this method see Demetriades and Luintel (1996, 1997).

Korea in the 1990s – it is much more of a case of a steady rise – while there is evidence of a collapse in late 1997. As far as Thailand is concerned, however, the graphs clearly show a boom and bust in stock prices; however, as in Korea, the collapse of stock prices began as early as 1996. The domestic credit boom is much less evident, especially when bank credit is examined. Total credit, on the other hand, exhibits more evidence of a lending boom. This is consistent with the well known fact that that in Thailand it was inadequately regulated finance companies that were the main culprits for the credit boom and excessive risky lending, including substantial exposure to the property market[13]. The empirical analysis is, therefore, carried out using both a narrow and a broad credit variable (which includes credit by finance companies).

Econometric Methodology

The empirical investigation is carried out in a Vector Autoregression (VAR) framework, using the maximum likelihood approach of Johansen (1988) to estimate long-run relationships (cointegrating vectors) between the variables in question. This technique allows the identification of multiple long-run relationships and is an efficient method of testing causality (see Toda and Phillips 1993, Hall and Wickens 1993 and Hall and Milne, 1994). The Johansen (1988) method is based on a vector error correction (VECM) representation of a VAR(p) model, which can be written as:

$$?x_t = G_1 ?x_{t-1} + G_2 ?x_{t-2} + ...+ G_{p-1} ?x_{t-p+1} + ?x_{t-p} + ? D_t + u_t \qquad (1)$$

where x is an nx1 vector of the first order integrated [i.e., I(1)] variables, G_1, G_2, ...G_p are nxn matrices of unknown parameters, D is a set of I(0) deterministic variables such as constant, trend and dummies, and u is a vector of normally and independently distributed errors with zero mean and constant variance. The steady-state (equilibrium) properties of equation (1) are characterized by the rank of Π, a square matrix of size n. The existence of a cointegrating vector implies that Π is rank deficient. Johansen (1988) derives the maximal eigenvalue and trace statistic for testing the rank of Π. If ? is of rank r (0<r<n) then it can be decomposed into two matrices α (nxr) and β (nxr) such that:

$$\Pi = \alpha\beta' \qquad (2)$$

The rows of ß are interpreted as the distinct cointegrating vectors whereby $\beta'x$ form stationary processes. The α's are the error correction coefficients which indicate the speeds of adjustment towards equilibrium. Substituting (2) into (1) we get

$$?x_t = G_1 ?x_{t-1} + G_2 ?x_{t-2} + ...+ G_{p-1} ?x_{t-p+1} + a (ß'x_{t-p}) + ? D_t + u_t \qquad (3)$$

This is a basic specification for the test of long-run causality. A test of zero restrictions on the α's is a test of weak exogeneity when the parameters of interest are long-run (Johansen and Juselius, 1992). Hall and Wickens (1993) and Hall and Milne (1994) interpret weak exogeneity in a cointegrated system as a notion of long-run causality. Thus, weak exogeneity tests are employed to examine the issue of long-run causality

[13] Alba, Hernandez and Klingebiel (1999) provide a detailed documentation of the vulnerabilities in the Thai financial system, following financial liberalization, including the role of the finance companies.

between the variables in the system. The null of a=0 is tested by the standard likelihood ratio test.

Unit root tests (not reported here) suggest that all variables are I(1). The variables are therefore analysed using Johansen's (1988) cointegration analysis. Tables 2 and 3 present the results of this analysis for Thailand and Table 4 presents the results for Korea. We first present and discuss the results on Thailand, which are more straightforward to interpret.

Thailand

The results of the cointegration analysis for Thailand using the bank credit variable are presented in Table 2. Pre-testing showed that the financial restraints index was weakly exogenous to the system. Thus, to increase estimation efficiency this variable was not modeled as endogenous in the VAR. Note also that a crisis dummy is also entered in the VAR, which takes the value 1 from 1997Q3 onwards. The lag length of four in the VAR is the minimum lag length that ensures normality and absence of serial correlation in the residuals. The trace statistic suggests the presence of two cointegrating vectors.

The joint significance of each of the four variables in both vectors is tested by the null that both the β coefficients associated with each variable are zero. This hypothesis is strongly rejected in all four cases, confirming that all four variables belong to the system. Following Pesaran and Shin (1994), over-identifying restrictions are imposed on the coefficients of the cointegrating vectors, which help to meaningfully interpret these vectors. Specifically, it is found that the exclusions of (i) bank credit from the first vector and (ii) external liabilities and the financial restraints index from the second vector are accepted by the data. Considering the values and statistical significance of the loading factors, the first vector is normalized on external claims and the second on bank credit. Note, however, that the first vector can also be normalized on the stock market index, given that the latter also shows evidence of error correction with respect to this vector.

The first vector depicts a positive long-run relationship between the external liabilities of Thailand and her stock market index; both these variables are endogenous in this vector, there is therefore feedback between them. In the same vector the financial restraints index is the only exogenous variable. Thus, the interpretation of this vector is straightforward. Given that the financial restraints index declined considerably over a relatively short period of time in the late 1980s and early 1990s, this suggests that financial liberalization triggered an upward cycle of capital inflows and asset price rises. The relationship survives the crisis period (subject to an intercept shift in the VAR) but it is now in a downward spiral. Interestingly, domestic bank credit is absent from this relationship, which seems to suggest that capital inflows found their way directly to the stock market, without being intermediated by the banking system.[14]

[14] One qualification that must be made here is that the bank credit variable relates to deposit money banks; it is well known that in Thailand finance companies played an important role in creating a lending boom. We examine a broader credit aggregate which includes loans by finance companies later.

Table 2: Asset Prices, Lending Booms and Financial Liberalization

Johansen Cointegration Analysis for Thailand: 1983Q4–1998Q4

Rank of cointegration matrix (VAR lag length = 4)

Trace Statistic, H_0: rank = p		
p = 0	p ≤ 1	p ≤ 2
68.24***	19.23**	3.68

***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

Vector 1

Normalised on LEL	LP	LC	FR
Coefficient	-0.236	0.00	1.453
Standard error	0.109	–	0.245

Vector 2

Normalised on LC	LEL	LP	FR
Coefficient	0.00	-0.863	0.00
Standard error	–	0.023	–

Diagnostics: p-values in square parentheses

Test of over-identifying restrictions: chi-square (1) = 0.423 [0.51]

Vector autocorrelation tests: chi-square (9) = 11.118 [0.27]

Vector normality test: chi-square (6): 7.139 [0.31]

Weak Exogeneity Tests

	LEL	LP	LC
Loading (α) of vector 1	-0.111	-0.511	-0.011
t-value	2.114	3.173	0.890
Loading (α) of vector 2	-0.333	0.273	-0.124
t-value	4.939	1.318	7.972

The second vector for Thailand depicts a positive long-run relationship between domestic bank credit and stock market prices. No other variable appears in this relationship. Moreover, the stock market index is weakly exogenous to the second vector. Taken together, the two vectors suggest that the domestic banking system was a relatively innocent follower as far as the formation of the asset price bubble is concerned. It appears that it was asset price rises which fuelled domestic bank credit – presumably through increasing collateral values – and not vice-versa. Thus, while Thailand seems to fit the classic credit boom-bust phenomenon, the cointegration analysis also suggests some interesting unique features, which are worth summarizing:

- The elimination of financial restraints set in motion mechanisms that led to the asset price boom;

- Capital inflows resulting from financial liberalization found their way into the stock market and fuelled stock price increases;
- Asset prices rises encouraged more capital inflows and increased collateral values, allowing domestic bank credit to expand;
- Domestic bank credit was not responsible for fuelling asset price rises but may have encouraged capital inflows further (the latter is not weakly exogenous to the second vector).

It is, however, possible that even though domestic bank credit appears to be a fairly innocent follower of the lending boom-bust cycle, it may have had short-term effects on asset prices. In order to investigate this possibility we specify a dynamic model for asset prices, including lagged first differences of the variables in the system and the lag of the first cointegrating vector (CV1). The latter is included because the evidence from the loading factors suggests that the stock market index is weakly exogenous with respect to the second vector but not to the first. We then run a general-to-specific search, allowing for up to four lags of the dynamic terms. The latter are measured by the first differences of the (logarithms of the) stock market index, domestic bank credit and external liabilities. In the general specification we also allow for a crisis dummy. We report the most parsimonious model below (t-statistics in parentheses):

Dynamic Model for Thai Stock Market Index: 1983Q4-1998Q4

$$\Delta \log(P_t) = \underset{(3.23)}{1.8834} - \underset{(3.12)}{0.2288}\, CV1_{t-1} - \underset{(2.57)}{0.3440}\, \Delta \log(P_{t-1}) - \underset{(3.27)}{1.1176}\, \Delta \log(EL_{t-3})$$

$R^2 = 0.3301$ Durbin-Watson = 1.9397 $F(4,52) = 6.1313$ [0.0003]

The estimation of the dynamic model confirms that domestic bank credit was not a significant factor in fuelling stock market prices even in the short-run. It is also interesting to note that the model explains 33% of the variation of stock market returns. Given that the lags used are quarterly, this allows ample time to forecast future returns and act on these forecasts, indicating a fairly inefficient stock market. Given also the fairly large positive drift term, this model goes some way in explaining the attractiveness of the Thai stock market to foreign investors. The model also indicates why herding behavior may have been rational. If current capital inflows can help foreign investors to predict future returns in the Thai stock market, it is rational for them to watch what every other foreign investor is doing. A profit-making strategy would be buy Thai'when everyone else is also buying and 'sell Thai'when others are (or are about to be) pulling out, irrespective of the underlying fundamentals. More empirical research on this issue using higher frequency data is likely to throw additional light on the ways in which stock market inefficiencies may encourage herding.

Given the apparent 'innocence' of domestic bank credit in the Thai asset price boom it is useful to examine whether a broader domestic credit variable would display the same 'innocence'. The Thai finance companies in particular, which were largely unregulated, are widely thought to be responsible for many of the ills that led to the crisis. It is,

therefore, useful to test this view empirically. For this purpose, we collect data on credit by finance and securities companies and add it to our domestic bank credit variable. We repeat the analysis and report the new set of results in Table 3.

Table 3: Asset Prices, Lending Booms and Financial Liberalization
Broad Domestic Credit variable

Johansen Cointegration Analysis for Thailand: 1983Q4–1998Q4

Rank of cointegration matrix (VAR lag length = 4)

Trace Statistic, H_0: rank = p		
p = 0	P ≤ 1	p≤ 2
58.96***	17.03**	3.33

***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

Vector 1

Normalised on LEL	LP	LCB	FR
Coefficient	-0.372	0.00	1.209
Standard error	0.109	–	0.232

Vector 2

Normalised on LCB	LEL	LP	FR
Coefficient	0.00	-0.966	0.00
Standard error	–	0.029	–

Diagnostics: p-values in square parentheses
Test of over-identifying restrictions: chi-square (1) = 0.11 [0.74]
Vector autocorrelation tests: chi-square (9) = 14.609 [0.10]
Vector normality test: chi-square (6): 11.157 [0.08]

Weak Exogeneity Tests

	LEL	LP	LCB
Loading (α) of vector 1	-0.132	-0.553	-0.030
t-value	2.216	3.073	2.214
Loading (α) of vector 2	-0.271	0.422	-0.094
t-value	4.053	2.053	6.174

The analysis continues to suggest the presence of two cointegrating vectors. The same restrictions as in table 2 are also accepted by the data. The two new cointegrating vectors do not change qualitatively and are normalised on the same variables. However, there are important changes in the significance of the loading factors, which determine long-run causality in the system. In particular, stock prices are no longer weakly exogenous with respect to the second vector and credit (broad) is not weakly exogenous to the first vector. Thus, broad credit plays a much more active role in the credit-asset price cycle than domestic bank credit. Specifically, according to the second

vector, broad credit exhibits a long-run feedback relationship with the stock price index. Moreover, it responds to disequilibrium between stock prices and capital flows, in effect supporting stock price increases when capital flows fail to do so. These findings combined with the results of Table 2, suggest that while domestic bank credit in Thailand played a largely passive role in the credit-asset price relationship, credit by finance companies appears to be have played a much more active role in fuelling the asset price bubble. Given that the same relationship holds during the downward cycle, they also suggest that the closing down of a large number of finance companies following the onset of the crisis, could only magnify the bust, by exacerbating the ensuing credit crunch (Iwasaki, 1999).

Korea

The cointegration analysis for Korea proceeds along similar lines as that of Thailand. However, it is now possible to use an additional variable (real GDP) in the VAR, which complicates the analysis somewhat. Pre-testing shows that besides the financial restraints index, external liabilities also is weakly exogenous to the system. In itself this result already represents an important difference with the findings for Thailand, for which the same variable exhibits a long-run feedback relationship with the stock market index.

In order to improve estimation efficiency, we therefore model these variables as exogenous in the VAR. A crisis dummy is also allowed to enter the VAR; this dummy takes the value 1 from 1997Q3 onwards. The lag length of five in the VAR is the minimum lag length that ensures normality and absence of serial correlation in the residuals. The trace statistic suggests the presence of two cointegrating vectors. Pre-testing shows that none of the variables can be excluded from both cointegrating vectors. Thus, all five variables belong to the system. Once again we impose over-identifying restrictions on the coefficients of the cointegrating vectors, which help us to meaningfully interpret these vectors. Specifically, we find that exclusion of (i) real GDP and financial restraints from the first vector and (ii) stock market index from the second vector is accepted by the data. Considering the values and statistical significance of the loading factors, we normalize the first vector on domestic bank credit and the second on real GDP. Note, however, that the first vector can also be normalized on the stock market index, given that the latter also shows evidence of error correction with respect to this vector.

The first vector depicts a positive long-run feedback relationship between domestic bank credit and stock market prices. This relationship is affected by external liabilities, which enters exogenously. It is not straightforward to interpret this vector, given the endogeneity of both bank credit and stock market prices. One interpretation is that capital inflows into Korea fuelled the domestic credit boom, which in turn fuelled stock market prices, generating an asset price – credit boom cycle. However, strictly speaking this interpretation is not valid. Firstly, the data show a credit boom but not an asset price boom (see Figure 2). In fact, capital inflows themselves are negatively related to stock market prices (this is obvious if the vector is normalised on the stock price index). This is not surprising given that capital flows were on a rising trend when stock prices appear to be on a declining time trend. Also, stock market prices in Korea appeared to have boomed in the mid-late 1980s, falling somewhat in the early 1990s

and recovering by 1994, after which they were on a declining trend. On the other hand, capital inflows rose steadily from the early 1990s up until the onset of the crisis, as did domestic credit.

Table 4: Asset Prices, Lending Booms and Financial Liberalization

Johansen Cointegration Analysis for Korea: 1993Q4-1998Q4

Rank of cointegration matrix (VAR lag length = 5)

Trace Statistic, H_0: rank = p		
p = 0	p ≤ 1	p ≤ 2
41.17***	15.54**	2.56

***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

Vector 1

Normalised on LC	LP	LY	LEL	FR
Coefficient	-0.962	0.00	-0.761	0.00
Standard error	0.065	-	0.112	-

Vector 2

Normalised on LY	LP	LC	LEL	FR
Coefficient	0.00	-0.818	0.00	-0.473
Standard error	-	0.036	-	0.075

Diagnostics: p-values in square parentheses
Test of over-identifying restrictions: chi-square (2) = 0.32 [0.85]
Vector autocorrelation tests: chi-square (9) = 3.19 [0.96]
Vector normality test: chi-square (6): 4.502 [0.61]

Weak Exogeneity Tests

	LP	LC	LY
Loading (α) of vector 1	0.250	-0.067	-0.041
t-value	2.203	2.470	2.016
Loading (α) of vector 2	0.828	0.690	-0.465
t-value	0.689	2.403	2.160

The second vector depicts a long-run positive feedback relationship between real GDP and domestic bank credit. Financial restraints – a weakly exogenous variable – seem to have a positive effect on real GDP and a negative effect on domestic bank credit; this result is clearly consistent with the analysis of economic growth presented in section 2 of the paper.[15]

[15] Financial restraints may address excessive risk-taking as well as oligopolistic practices in the financial system. The former enhances financial stability fostering safe long-term investments (see Stiglitz 1998;

For the sake of completeness, a dynamic model of stock market prices is also estimated for Korea. The results are presented below.

Dynamic Model for Korean Stock Market Index: 1983Q4–1998Q4

$$\Delta \log(P_t) = \underset{(2.33)}{-2.52} + \underset{(2.38)}{0.18}\, CV1_{t-1} + \underset{(1.92)}{1.14}\,\Delta(FR_{t-1}) + \underset{(2.45)}{0.41}\,\Delta \log(EL_{t-1}) - \underset{(3.58)}{0.58}\,\Delta \log(EL_{t-2}) - \underset{(5.84)}{0.95}\,\Delta \log(EL_{t-3})$$

$$- \underset{(1.90)}{0.15}\, \text{crisis dummy}$$

$R^2 = 0.5424$ Durbin-Watson = 1.5982 $F(4,52) = 9.6245$ [0.0000]

These findings confirm the negative long-run relationship between external liabilities and stock market prices. The relationship has an inverse-J shape, however. Initially capital inflows raise stock market returns, with a lag of one quarter, but then reduce them. It is also interesting to note that the financial restraints index enters positively, suggesting that financial liberalization reduced stock market returns. Finally, the model explains more than 54% of the variation in stock market returns, indicating substantial inefficiencies in the Korean stock market. These inefficiencies may, once again, explain both the attractiveness of the market for foreign investors as well as the herding behaviour that was observed during the crisis.

Analysis of Empirical Findings

The findings presented in this section suggest that Thailand fits the credit and asset price boom-bust phenomenon relatively well. Financial liberalization triggered capital flows into Thailand, which fuelled an asset price – capital flows cycle. Domestic bank credit followed asset price rises while credit by finance and securities companies played a more active role, propagating the vicious upward cycle. When capital inflows began to dry up in 1995, asset prices reached a plateau and then embarked on a declining course. A short-lived surge in both credit and capital inflows during the first half of 1997, was not sufficient to prevent the free fall of stock prices, but may have been behind a short-lived blip later that year.

The Korean crisis appears not to fit the asset-credit boom-bust cycle very well. While domestic credit and stock prices exhibit a positive feedback relationship, there is not much evidence of an asset price boom in the data. Furthermore, capital inflows did not play the same role as in Thailand. If anything, there is evidence of a negative relationship between external liabilities and asset prices. If one adds to this the relatively healthy macroeconomic fundamentals of the Korean economy prior to the crisis, the Korean crisis appears almost inexplicable, lending credence to the financial panic view (Chang and Velasco, 1998; Radelet and Sachs, 1998).[16] There are enough well known facts that are consistent with this view. Importantly, capital inflows into Korea were accompanied by a comparable expansion of foreign assets. However, these foreign assets were of dubious quality. Anecdotal evidence suggests they included

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Demetriades, 1998). The latter has implications for financial development and the volume of investment (Arestis and Demetriades, 1997).

[16] For a more detailed exposition and analysis of the Korean macroeconomic fundamentals see Demetriades and Fattouh (1999).

lending to Indonesia and Russian junk bonds (Chote, 1998). Furthermore, while capital inflows were of short-term nature, the assets that were acquired had much longer maturities. This maturity mis-match was a symptom of a much wider weakness, namely the inadequate management of financial risk (i.e. exchange risk, credit risk, interest rate risk, liquidity risk) by Korean financial institutions and other Korean corporations. The built-up of large amounts of foreign liabilities coupled with inadequate management of financial risks made the Korean economy vulnerable to the sentiments of foreign lenders. When foreign lenders became concerned about these weaknesses and consequently decided not to renew or rollover their loans to Korea, this was tantamount to a bank-run on the Korean economy. The collapse of the Won that followed increased the burden of dollar-denominated debts, forcing even viable firms into insolvency, further worsening the quality of banking system assets.[17]

Traditional economic analysis suggests that a bank panic can be prevented if there is an effective lender of last resort. However, the Bank of Korea's ability to act as a lender of last resort was eroded by the presence of massive amounts of assets and liabilities in foreign currency in the domestic financial system. The Bank of Korea can not, by definition, supply infinite amounts of US dollars. Its ability to act as a provider of dollar-liquidity is limited by its foreign exchange reserves. This explains why foreign lenders paid a lot of attention to the foreign exchange position of Korea – and why bad news about this key variable could trigger a panic. Moreover, this is also precisely why when the agreement with the IMF was reached foreign lenders were less inclined to run in the knowledge that the IMF was in essence assuming the role of lender of last resort.

A similar argument can be made for the case of Thailand, even though the source of the vulnerabilities in the financial system was of a different nature. The bursting of the stock market (and property) bubble and the slowdown of capital flows created growing weaknesses in the balance sheets of Thai financial institutions and served to undermine the credibility of the currency peg, all of which resulted in loss of confidence in the Thai economy. This led to an abrupt reversal of capital flows, which was initially counteracted by the Bank of Thailand's attempts to defend the currency. However, soon afterwards foreign exchange reserves were depleted, resulting in a sharp depreciation of the Thai Baht. Together with the high interest rates that were utilised to defend the currency, this exacerbated the bust further, undermining any prospects of a quick recovery. The vicious downward cycle and tight liquidity conditions compelled distressed financial institutions to call in their loans, forcing illiquid but viable companies into insolvency.[18]

There were, therefore, elements of a self-fulfilling bank panic in both cases, which amplified the consequences of the vulnerabilities present in each country. The vulnerabilities in Thailand were clearly more visible much earlier (there was talk of the property bubble in the western press, for example The Economist, well before it burst) which may explain why Thailand was targeted first. The vulnerabilities in Korea were well hidden in the balance sheets of banks and other financial institutions – it took more time for them to surface. However, even if there were no real weaknesses in the

[17] The tight monetary policy that was implemented after the onset of the crisis in order to stabilize the exchange rate exacerbated the bust even further by hitting small and medium enterprises through the credit channel (Domaç and Ferri, 1998).

[18] For a vivid description of the dynamics of the Thai crisis see Iwasaki (1999).

financial system, a panic by foreign lenders could still trigger a crisis, if there is no effective lender of last resort. The very nature of banking entails maturity-mismatches. After all, maturity transformation is one of the most fundamental functions that banks perform, typically borrowing short and lending long. By themselves, the maturity mismatches present in Thai and Korean financial institutions did not represent a source of vulnerability. However, when combined with currency exposures they created fertile ground for self-fulfilling bank panics, precisely because of the absence of an effective international lender of last resort. A bank run can force a solvent but illiquid bank into insolvency, as it is very costly to liquidate assets with long maturities. As the forced sale value of assets is much lower than the full market value, a rumour that a bank's assets are of poor quality may well turn out to be self-fulfilling, particularly if the bank is unable to raise sufficient amounts of liquidity in the money markets. In such cases illiquid but solvent banks usually resort to borrowing from the central bank, who will then act as a lender of last resort. In normal circumstances, the mere knowledge that there is a lender of last resort in the system prevents bank runs from occurring in the first place, ruling out the possibility of self-fulfilling bank panics. In both Korea and Thailand, however, the excessive dependence of the financial system on dollar liquidity eroded the ability of domestic central banks to carry out this vital stability enhancing function. This vulnerability was further enhanced by the dependence of the exchange rate on volatile capital flows. A capital outflow exerts downward pressure on the currency. If devaluation can not be avoided, otherwise sound domestic borrowers may become insolvent because of their increased debt burden, particularly if they did not hedge against unfavourable exchange rate movements. Thus, a rumour concerning 'bad-lending' practices could become self-fulfilling.

In conclusion, while inadequate management of risks created fertile ground for financial panic, by making foreign investors nervous, the stampede could have been avoided had there been an effective international lender of last resort. In its absence, beliefs about bad-lending practices became self-fulfilling, resulting not only in a liquidity crunch but, also, the collapse of exchange rates, which further reduced the quality of assets of financial institutions. Moreover, the attempts to stabilize the currencies using tight monetary policy compounded these problems, feeding the vicious downward cycle, further exacerbating the bust.

4. Policy Issues

This section draws out some policy lessons from the crisis in Thailand and Korea, in the light of the analysis presented so far.

Moral Hazard and Over-Lending

There is no doubt that borrowers including financial intermediaries did not adequately cover themselves against unfavorable exchange rate movements and other financial risks. What is debatable, however, is whether this was intentional behavior. A popular view is that firms, banks and other market participants deliberately took on high levels of risk, because of implicitly or explicitly provided safety nets (by the domestic governments or the IMF in the case of foreign lenders) – a classic case of over-borrowing due to moral hazard behavior (McKinnon and Pill, 1997).

While the moral hazard argument appears quite powerful, it nevertheless does not fit the Korean and Thai experiences very well[19]. To start with, the safety nets appeared to have had many holes in them; many of those who would be hoping to be rescued by them in fact fell through them. In Korea bank shareholders were almost totally wiped out, while many bank managers and troubled chaebol executives found themselves without a job. Even the government itself found itself out of office soon after the crisis! Thus, if one accepts the moral hazard argument then one must also accept a fair amount of imperfect foresight or irrationality. This would of course indicate inconsistent (or even schizophrenic) behavior. One aspect of their behavior suggests that were ultra-rational, greedily working out how to exploit safety nets to their advantage, while another indicates that they were unable to figure out that this behavior by themselves and others would lead to the collapse of the safety nets.

Furthermore, the significant social stigma attached to those found responsible for company failures (which as a cultural factor must have been anticipated), is a factor that surely must have discouraged domestic corporations from gambling their fortunes in the way envisioned by the moral hazard argument.

These arguments do not apply to the same extent to foreign lenders and investors who were hardly 'shamed' by their failures and who at the same time appear to have borne the smallest portion of the burden. Furthermore, it is now evident that foreign lenders incorrectly assumed that Asian corporations would be bailed out by their respective governments, which led them to under-price credit risks (Bonte, 1999). The good macroeconomic fundamentals and prospects of East Asian economies, together with this type of moral hazard, go some way in explaining the willingness of foreign lenders and investors to supply massive amounts of capital to them. In conlusion, while the moral hazard argument may go some way in explaining the 'over-lending' syndrome, on close inspection it is not very good at explaining the 'over-borrowing' syndrome.

Investor Euphoria

The above analysis raises an important question. If the excessive risk-taking of domestic market participants was not a consequence of moral hazard behavior, what was it main cause? The answer has to be that they genuinely under-estimated risks. There are a number of reasons why this may have been the case. The over-optimism of foreign lenders and international organizations concerning the prospects of these economies encouraged domestic participants to be euphoric themselves. To this, one must add the euphoria generated by financial liberalization itself, which contributed to the booming asset markets, which in turn reduced the perceived risks by both financial institutions and domestic investors[20]. Thus, if there is a policy lesson to be learned, it must be that measures that curb the euphoria of market participants could be useful in

[19] See also Chang (1999).

[20] An important current example of the relevance of the need to combat excessive euphoria and the need to educate market participants is that of Cyprus. Many financial analysts and the central bank have labeled the existing financial restraints – under which the country managed to grow at approx. 7% p.a. for thirty years – an 'anachronism', glamourize financial liberalization and fail to acknowledge any increased risks. In expectation of the opening of financial markets, the stock market index rose by approximately 700% during 1999; analysts are encouraging market participants to 'arbitrage' by borrowing in euros (the exchange rate is pegged to the euro) and invest in the stock market.

working against the creation of asset price bubbles. In itself, educating market participants about the risks associated with financial liberalization, as discussed below, may go some way in tempering excessive euphoria.

Tensions Between Exchange Rate Policy and Prudential Regulation

An additional reason why market participants may have under-estimated exchange risk was the policy of maintaining a pegged exchange rate. A credible pegged exchange rate regime requires from time to time announcements by the central bank and/or other signaling that the peg is sustainable. These announcements and signals may 'comfort' market participants excessively, encouraging them to discount the prospect of devaluation. Prudential regulation and supervision should, nevertheless, try to counteract these tendencies, ensuring that market participants understand and manage risks adequately. However, as is frequently the case in many developing countries, the same institution – the central bank – has responsibility for both policies. This creates tension between them. If the central bank emphasizes the need to hedge against unfavourable exchange rate movements, this may be perceived as a signal that a devaluation may be imminent, which is likely to undermine its ability to deliver exchange rate stability. If on the other hand, the credibility of the exchange rate peg is continually emphasized, some market participants are likely to under-estimate exchange risk and choose not to cover their foreign exchange exposures.

If this hypothesis is correct – further research on this would be useful– then the tension can to some extent be eased by creating a separate government agency for prudential regulation that is independent from the central bank. This would allow more degrees of freedom for both the supervisory authority and the central bank. If the supervisory agency is independent from the central bank, it will be better able to ensure that exchange risk is adequately managed without having to be concerned whether its efforts would be fuelling the suspicion of an imminent devaluation. In itself, this would enhance the ability of the central bank to deliver a stable exchange rate.

Prudential Regulation, Accounting Standards and Information Disclosure

One important mechanism for addressing excessive risk taking in the financial system, whatever its source, is of course prudential regulation and supervision of financial institutions. There is widespread recognition among economists and financial practitioners that one of the most important lessons that has emerged from the East Asian financial crisis is that the prudential regulation and supervision of financial intermediaries need to be strengthened before capital account liberalization.[21] While hardly anyone would disagree with this broad conclusion, it is also not difficult to argue that it is too general to be of much use in helping to prevent future crises. After all, it is almost tautological to ascribe a financial crisis to some weakness in prudential regulation. With the benefit of hindsight, there is almost always something that the regulator could have done that would have prevented a crisis. While drawing out the specific lessons of the Asian crisis for prudential regulation and supervision is likely to be a very useful exercise, it will certainly not guarantee that future crises would be

[21] This recognition is, of course, not a new one. World Bank (1989) and the sequencing literature (e.g. McKinnon, 1991) argue forcibly about the need to improve banking regulation and supervision before financial liberalization.

prevented.[22] It is therefore important to recognise that strengthening prudential regulation and supervision, welcome though it may be, has limitations. After all regulators and bank supervisors are public sector employees with imperfect foresight working under conditions of imperfect information[23].

Improving accounting standards and information disclosure, which seems to be an additional lesson from the Asian crisis would help both regulators and market participants to recognize risks sufficiently early. However, it is again important to recognise that imperfect information is inherent in financial transactions and no amount of legislation is likely to fully address this imperfection.

Risk Management Systems and Training

A more generic approach, which would certainly complement better prudential regulation and accounting standards, involves the overhaul of the risk management capabilities of financial institutions in emerging market economies. This does not merely comprise the upgrading of risk management systems, which is often one of the objectives of prudential regulation and supervision. Importantly, it requires the recognition and appreciation of the increased risks that emanate from financial liberalization, including exchange risk, credit risk, liquidity risk, interest rate risk etc, not only by financial institutions and regulators but also by all other market participants (including analysts and financial journalists).[24] This should include an understanding of relatively new concepts in economics, including the role of imperfect information in financial markets[25], recent developments in financial markets, the role of derivatives and hedging instruments, as well as the limitations of financial modelling. This analysis would allow a better appreciation of why information related problems are aggravated when interest rates increase, which usually follows financial liberalization. However, more and better (up-to-date) training can not offer full protection from complex financial risks, even if it allows the implementation of sophisticated hedging strategies. As the example of LTCM demonstrated, financial 'engineering' is based on assumptions that are not always valid; the importance of its limitations must be recognised.

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[22] This is very much like addressing the causes of an air-crash which may allow the strengthening of air-safety regulations to prevent similar crashes from happening in the future; however, different types of failures could occur in the future.

[23] For example, it is now recognized that the 8% risk-weighted capital adequacy requirement may not be sufficient for banks in developing or transition economies. The Basel Committee Working Group on the lessons to be drawn from the Asian Crisis is therefore suggesting that "... at the level of the individual bank, capital requirements can be tailored to the nature and extent of the risks faced by the institution", recognizing that "Such a discretionary approach... places a premium on the independence and skills of supervisors." Bonte (1999) p.39.

[24] The financial liberalization literature has all too often over-emphasized the potential benefits of financial liberalization without acknowledging the risks and dangers from it (see Arestis and Demetriades, 1999).

[25] After all many credit officers, bank supervisors and central bank governors were educated before the economics of information revolution.

International lender of Last Resort

One of the most important implications of the analysis presented in the previous section is that the absence of an effective lender of last resort at the very least amplified the magnitude of the crisis. Suppose for a moment that such an institution existed. By providing sufficient amounts of dollar-liquidity to countries facing the refusal of foreign lenders to roll-over loans and/or the abrupt reversal of capital inflows, exchange rates would not have collapsed to the extent they did and there would have been less need for the investors to run. Many enterprises that failed would have remained solvent, except perhaps for those which were unprofitable to start with. Thus, we would have seen a modest recession instead of a full-blown crisis.

The continued absence of an effective international lender of last resort clearly poses continued threats for the future stability of the international financial system, especially if capital flows continue to move around the globe uninhibited. Critics of the need for an international lender of last resort argue that there would be serious moral hazard associated with such an institution. There is no doubt that there is considerable merit in this criticism. However, moral hazard is a second-order problem when compared to financial instability in the form of frequent self-fulfilling bank runs. If this was not the case, laissez-faire banking without central banks would already have prevailed. It is evidently much more challenging to address the moral hazard problem at the international as opposed to the national level. The most obvious international institution to carry out lender of last resort operations at an international level is clearly the IMF. However, the IMF's ability to raise dollar liquidity is limited, in contrast to the ability of national central banks to print unlimited amounts of the domestic currency. Furthermore, national central banks are able to address the moral hazard of these operations by imposing draconian measures (e.g. replace the board of directors, change the management etc.) and conditions on troubled financial institutions and engage in regular monitoring. It is unlikely that the IMF will ever be granted powers that would allow it to address the moral hazard problem as effectively as national central banks are able to. Thus, its ability to act as an effective international lender of last resort is likely to remain limited, which suggests that the uninhibited movement of capital around the globe could well result in many more financial crises.

Financial Restraints

Institutional strengthening, including improving prudential regulation and accounting standards, implementing major training programs and upgrading the risk management capabilities of financial intermediaries in emerging market economies, are long-term goals and can certainly not be accomplished overnight. Additionally, the weaknesses in the international financial system are still visible and, in spite of the ongoing debate in Washington and elsewhere[26], it is not clear when or how well they will be addressed. Until all these reforms and structural improvements are in place, financial liberalization will likely remain a potentially destabilizing exercise for most emerging market economies. Until then, there is considerable scope for financial restraints, such as selective controls or Chilean type taxes on short-term capital flows and prudential

[26] See for example Hills, Peterson and Goldstein (1999).

controls on domestic interest rates,[27] to play a useful role in promoting domestic and international financial stability.

5. Summary and Concluding Remarks

In spite of the voluminous literature on the Asian financial crisis, there remain aspects of the crisis that are relatively under-researched. One important such aspect is the precise role played by financial liberalization and the policy lessons that could be learned from this. More generally, while there is no shortage of plausible explanations for the crisis little has been done in terms of rigorous empirical testing. Thus, many of these explanations must be seen at best as the basis for formulating testable empirical hypotheses.

This paper goes some way in providing new empirical evidence on these under-researched issues. Specifically, it provides evidence on both the strengths and weaknesses of the Thai and Korean financial systems. In so doing, it argues that while these systems performed well under a variety of financial restraints, they were ill prepared to face the risks and challenges associated with financial liberalization. In Thailand this led to an asset price boom and bust cycle, as massive capital inflows found their way into asset markets. The domestic banking system was very much a passive follower in this vicious cycle while poorly regulated finance companies played a more active role, amplifying the boom and bust cycle. In Korea, there was hardly an asset price boom. Instead capital flows found their way into assets of dubious quality. Along the way they created additional vulnerabilities in the form of currency and maturity mis-matches. These vulnerabilities, coupled with the absence of an effective international lender of last resort, created fertile ground for financial panic. When some foreign investors/lenders ran it was rational for everyone else to follow, as the effects of the run were amplified by the collapse of currencies and pushed even viable firms into insolvency.

The paper also provides a critical overview of some widely discussed policy implications that follow from the Asian crisis and offers some new insights on them. Specifically, it argues that besides strengthening prudential regulation and accounting standards, there is a need for upgrading management systems and expertise to deal with financial risks and an important need for a more widespread understanding of the risks associated with financial liberalization. Furthermore, there remain gaps in the international financial architecture, that need to be addressed such as the need for an effective international lender of last resort to prevent international liquidity crises from triggering deep recessions. Given that these weaknesses may require a long time to address, financial restraints can act as a relatively cheap, effective and transparent safety device in safeguarding financial stability until emerging market economies (and the international financial system) are sufficiently mature to effectively manage the risks associated with financial liberalization.

Closing, I would like to list some unanswered, albeit challenging questions that lend themselves to further empirical testing. These are as follows:

[27] For further details of the prudential effects of interest rate restraints see Demetriades (1998).

1. There is a widespread belief that the inadequate management of risk observed in East Asia following the opening up of financial markets was a symptom of moral hazard behavior. However, there is hardly any empirical evidence on this hypothesis. An alternative hypothesis, put forward in this paper, is that the risks were mis-managed because they were under-estimated (or not fully understood) as a result of: (i) the euphoria which surrounded the macroeconomic performance of these countries and financial liberalization; (ii) the credible pegged exchange rates that were in place before the Asian crisis. While it is not at all obvious or straightforward to device appropriate empirical tests of this hypothesis, its policy implications are so powerful that it is worth investing in new methodologies for doing so.

2. What was the extent of over-shooting of exchange rates in the currency crises and its impact on these economies? Many firms became insolvent after the crisis directly as a result of excessive devaluations, which exacerbated the crisis and prolonged the recovery period. In the presence of an international lender of last resort this could have been avoided; instead of a full-blown financial crisis we may have seen relatively modest recessions.

3. The evidence presented in this paper indicates that stock markets in both Thailand and Korea exhibit important inefficiencies. There is considerable scope for expanding this analysis to include other countries, and to use higher frequency data. It is also possible to test for the presence of specific types of inefficiencies such as bubbles and to test for financial liberalization induced increases in risk (using ARCH-GARCH models). These types of tests are likely to deepen our understanding of the mechanisms that were responsible for the crisis. It may also go some way in explaining the behavior of foreign investors, including herding.

4. A wider issue that surfaces concerns the efficiency and equity implications of correctly sequenced financial liberalization. There are large economies of scale in risk management systems, which may make smaller financial institutions non-viable. Yet smaller, localized, financial institutions are those that are more likely to have informational advantages over larger ones and are, therefore, in a good position to serve the needs of SMEs, local communities and low income households. There is in fact very little research on this issue, which given its importance, ought to be the subject of a major research effort.

Data Appendix

Thailand
External liabilities (LEL)
Data on external assets of international banks in the reporting area[28] vis-à-vis all sectors in Thailand (which correspond to Thailand's external liabilities) were obtained from the Bank for International Settlements, Quarterly Review: International Banking and Financial Market

[28] Reporting area consists of Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom, Canada, Japan, United States, and other reporting offshore centres (Bahamas, Bahrain, Cayman Islands, Hong Kong, Singapore and Other).

Developments (various issues). The data was transformed into local currency using exchange rate data from the IMF, International Financial Statistics (various issues). The exchange rate data for 1998 were obtained from Bank of Thailand website at the following address: http://www.bot.or.th/govnr/public/BOT_Homepage/EnglishVersion/index_e.htm.
The series in local currency was deflated using the consumer price index (CPI) obtained from IMF, International Financial Statistics (various issues).

Domestic Bank Credit (LC)
Data on claims of domestic money banks on private sector were obtained from the IMF, International Financial Statistics (various issues). The data for 1998 were obtained from Bank of Thailand website. The series was deflated using the consumer price index (CPI) obtained from IMF, International Financial Statistics.

Financial Restraints (FR)
The financial restraints index is constructed using qualitative data on interest rates restraints and controls of portfolio inflows. Specifically, it is the arithmetic average of the following three dummy variables, which take the value 1 if a control is present and 0 otherwise: lending rate controls dummy, deposit rate controls dummy, and portfolio investment controls dummy. The data were obtained from Bank of Thailand Annual Reports (various issues); The Thailand Development Research Institute (1998), Thailand's Financial System: Structure and Liberalization, Thailand: The Thailand Development Research Institute (1998); and Johnston, B., S. Dorbar, and C. Echeverria (1997), "Sequencing Capital Account Liberalization: Lessons from the Experiences in Chile, Indonesia, Korea, and Thailand", IMF Working Paper, 97/157, Washington: International Monetary Fund.

Stock Prices (LP)
Data on the stock price index in local currency were obtained from the IFC, Emerging Market DataBase.

Broad Claims on Private Sector (LCB)
Broad claims refer to private claims on private sector of deposit money banks and private claims on private sector of finance and securities companies. Data were obtained from the IMF, International Financial Statistics. Data for 1998 were obtained from Bank of Thailand website.

Korea

External liabilities (LEL)
Data on external assets of international banks in the reporting area vis-à-vis all sectors in Korea (which correspond to Korea's external liabilities) were obtained from the Bank for International Settlements, Quarterly Review: International Banking and Financial Market Developments (various issues). The data was transformed into local currency using exchange rate data from the IMF, International Financial Statistics (various issues). The exchange rate data for 1998 were obtained from Bank of Korea website at the following address: http://www.bok.or.kr/kb/index_e.html. The series in local currency was deflated using the GDP deflator.

Domestic Credit (LC)
Data on claims of domestic money banks and non-bank financial institutions on private sector (including trust accounts) were obtained from the IMF, International Financial Statistics (various issues). The data for 1998 were obtained from Bank of Korea website. The series was deflated using the GDP deflator.

Financial Restraints (FR)
The financial restraints index is constructed using qualitative data on the liberalization of interest rates and portfolio inflows. Specifically, it is the arithmetic average of the following four dummy variables which take the value 1 if a control is present and 0 otherwise: lending rate controls dummy, deposit rate controls dummy, money market rates control dummy and portfolio investment controls dummy. The data were obtained from Bank of Korea Annual Reports (various issues); and Johnston, B., S. Dorbar, and C Echeverria (1997), "Sequencing Capital Account Liberalization: Lessons from the Experiences in Chile, Indonesia, Korea, and Thailand", IMF Working Paper, 97/157, Washington: International Monetary Fund.

Stock prices (LP)
Data on the stock price index in local currency were obtained from the IFC, Emerging Market DataBase.

GDP (LY) and GDP Deflator
The GDP data and the data used to construct the GDP deflator were obtained from IMF, International Financial Statistics (various issues).

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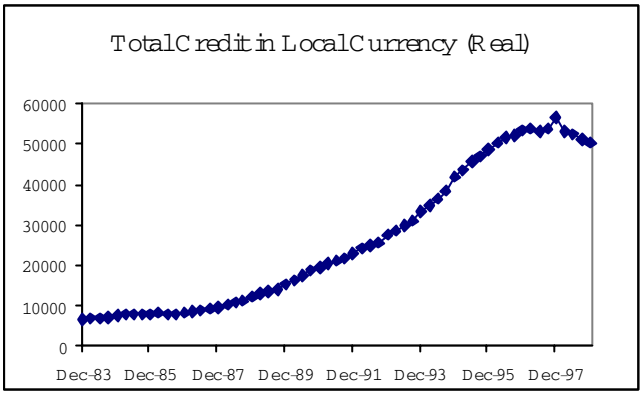
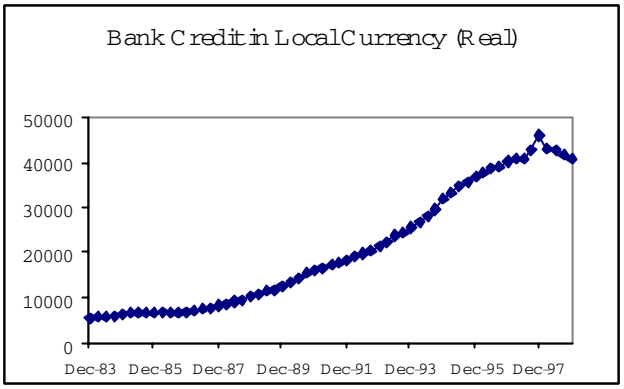
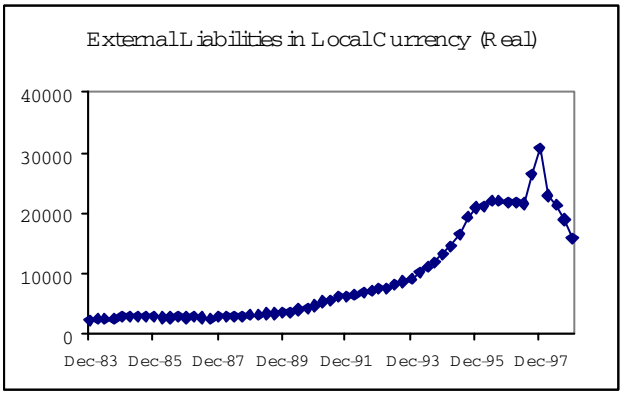
Figure 1. Thailand







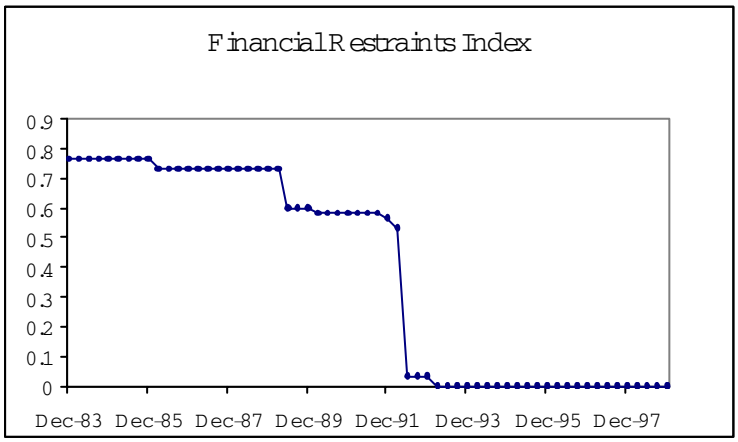


Figure 2. Korea