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Abstract

In this paper, we explore the issue on credit crunch from a comparative perspective. Utilizing longer time series data, we investigate the existence of credit crunch in selected *crisis-hit* economies in East Asia over the period 1980-2002. We detected some episodes of credit crunch both before and after the Asian economic crisis. These episodes after the Crisis are somewhat different from those detected by previous studies on the issue. We, then, review the credit-crunch episodes in the broad macroeconomic context in order to assess our results in the longer-run perspective. We are well aware that financial liberalization has changed the financial environments of these countries more or less in due course. Even so, the mixed results we obtained on the existence of credit crunch do not suggest that the impact of the austerity programs on financial intermediation after the Asian Crisis was ambiguous. On the contrary, they implied that the impact of the programs were so severe that credit crunch or supply retrenchment was overwhelmed by a sharp fall in credit demand because of real and expected persistent overall economic depression.

JEL Classification: E5, O11, O53

Keywords: credit crunch, East Asia, Asian Economic Crisis, disequilibrium analysis

* Lecturer, Faculty of Politics, Economics and Law, Osaka International University.

E-mail: enya@pel.oiu.ac.jp

** Corresponding author. Professor, Osaka School of International Public Policy, Osaka University, 1-31 Machikaneyama-cho, Toyonaka, Osaka 560-0043, Japan.

E-mail: kohsaka@osipp.osaka-u.ac.jp

*** Research Fellow, Japan Society for the Promotion of Science, Osaka School of International Public Policy, Osaka University. E-mail: mlpobre@osipp.osaka-u.ac.jp

I. Introduction

Financial intermediation plays a significant role in economic development. In fact, *the East Asian Miracle* has been supported by financial intermediation rather than by capital markets. The degree of financial intermediation, e.g. measured by broad money as a ratio to GDP, has been distinguishable from those in the other developing economies and regions. In the rapidly growing East Asian economies, the corporate sector depends heavily on external sources of funds, especially from financial intermediaries given their limited internal funds to finance their vigorous investment needs. We should note that this high debt-dependency of the corporate sector is the result of rapid economic growth and stable macroeconomic environment and not vice versa.

In the aftermath of the 1997 Crisis, however, the economic recovery in East Asia has not been supported by recoveries of domestic investment as well as bank credits. Credit slowdown was apparent across all the Asian economies. Triggered by the IMF-prescribed monetary tightening policy, it is believed that reduced credit supply further contributed to the already weakening economic activities in these countries. This mechanism is consistent with the pattern of causality between credit and real economic activity as proposed by the *credit view* (Bernanke and Gertler, (1995)).

The basic tenet of this view is that banks' supply of credit plays a significant role in the transmission of monetary policy to the real sector of the economy. This is based on the assumption that assets in the form of loans are equally relevant as bank liabilities in the transmission of monetary shocks to the real sector of the economy. With a tighter monetary policy, banks respond by curtailing their supply of loans. This arises from information asymmetries in the financial market as well as the imperfect substitutability between financial assets. Thus, according to this mechanism, the leftward shift of the supply of loans explains the observed credit slowdown in the crisis period. Put differently, the credit slowdown can be the manifestation of a *credit crunch* which may come from monetary tightening.

Whether the high-interest rate policy led to a credit crunch in the 1997 crisis period has attracted interests among policy makers and researchers. A number of empirical studies have examined whether and to what extent East Asian countries have been suffering from a credit crunch in the 1997 crisis period. The basic approach is to model a demand and supply for loans and identify whether the observed data on loans is demand or supply determined. A brief review of these studies is presented in the following section.

In this paper, we analyze the issue on credit crunch from a comparative

perspective. To do this, we cover a longer time period to investigate different periods of credit crunch in East Asia. In this study, we cover the period from 1980 to 2002. We detected some episodes of credit crunch both before and after the Asian economic crisis. These episodes after the Crisis are somewhat different from those detected by previous studies on the issue. We, then, review the credit-crunch episodes in broad macroeconomic context in order to assess our results in the longer-run view.

This approach has the following merits. Studies on the credit crunch in East Asia focused on the most recent experience when financial liberalization was at its peak. We are well aware that financial liberalization has changed the financial environments of these countries in the last two decades. Covering longer periods, we will be able to compare the similarities and/or differences in the nature and causes of the most recent credit crunch with previous experiences. Then, we may be able to understand the differential impacts of credit crunch in different financial environments.

The rest of the paper is organized as follows. The next section briefly reviews the literature on credit crunch in the East Asian countries after the Asian economic crisis. The third section explains the analytical framework that we adopt in the course of the analysis. The fourth section presents the estimation results of the study. The fifth section discusses the findings comparing recent credit crunch with previous experiences. The last section concludes the paper.

II. Review of the Literature

Several studies investigated whether credit crunch occurred in the East Asian countries in the 1997 crisis period as a result of the high interest rate policy. Ding, Domac and Ferri (1998) examined whether and to what extent East Asian countries have been suffering from a credit crunch. They examined the evolution of several macroeconomic variables including monetary and credit aggregates as well as the spread between bank lending rates and rates on risk-free assets in identifying whether demand or supply is the binding constraint in the observed credit slowdown. This framework has been applied to Indonesia, Korea, Malaysia, the Philippines and Thailand.

The main finding is that these East Asian countries suffered from an overall credit crunch although the situation differs considerably across the countries. In Korea and Malaysia, the credit squeeze has been rendered more through a wider wedge between lending rates and risk-free asset yields. In all countries, they also found evidence of a flight to quality, a situation where banks shift towards less risky assets (government securities).

Meanwhile, Ghosh and Ghosh (1999) used a disequilibrium framework to investigate a possible credit crunch in Indonesia, Korea and Thailand during 1997-1998. They used macroeconomic variables in their analysis with monthly observations from 1992:1 to 1998:6. Their main finding is that there is little evidence of quantity rationing at the aggregate level in all three countries. Credit slowdown was mainly due to lower demand for credit and that the rising real interest rates and weakening economic activity were the main factors that lowered credit demand.

In Thailand, although both credit supply and credit demand fell in real terms, estimated credit demand has generally fallen faster. It is only in January 1998 did they find evidence of a credit crunch. In Korea, excess credit demand in the first half of 1997 became very small at the onset of the crisis then finally contracted sharply in late 1997 and early 1998. In Indonesia, there is evidence of a credit crunch only in November-December 1997. Thereafter, there is no evidence of credit rationing.

In the study of single country cases, Kim (1999) also estimated a disequilibrium model of the bank loan market to identify the characteristics of the credit crunch and its intensity during the crisis in Korea. The results of his study reveal that the loan market is characterized by a state of predominantly excess demand for loans. Additionally, he found that there has occurred a credit crunch right after the financial crisis in December 1997. This finding is based on monthly data from January 1993 through May 1998. His findings support the idea that the marked decline in the aggregate bank credit is driven by a sharp decline in loan supply attributable to pervasive and stringent regulation on bank capital.

Baek (2002) expanded Kim's (1999) data set to cover from January 1992 to May 2001. Using the same disequilibrium framework, he found the evidence of three periods of credit crunch prior to the crisis and a two periods of credit crunch after the crisis period. The three credit crunch periods prior to the crisis are 1992:2-1995:4, 1996:1-1996:2 and 1997:1-1997:2 while the two credit crunch periods after the crisis are 1997:12-1998:3 and 2001:2-2001:4. Higher credit risk and remaining uncertainty in the loan market were cited as the main causes of the recent credit crunch in his study.

In the case of Malaysia, Beng and Ying (2001) estimated the extent of excess demand for loans during the recent currency crisis using the Johansen Cointegration technique. Their empirical results identify the period from July 1997 to March 1998 as the credit crunch period with the tight monetary policy and erosion of banking institutions' capital base as the main factors responsible for the retrenchment of loan supply. Finally, Ito and Da Silva (1999) looked for empirical evidence of credit crunch in Thailand using a specially designed survey for commercial banks and their results

confirm the existence of a credit crunch. Their study analyzed the developments in Thailand's credit market during the 1997-1998 currency and financial crisis.

III. Framework

In this paper, we define credit crunch as a situation where banks curtail their supply of loans at prevailing interest rates, resulting in a decline in the level of actual lending and an excess demand for loans. Bernanke and Lown (1991) define a bank credit crunch as a significant leftward shift in the supply curve for bank loans, holding constant both the safe real interest rate and the quality of potential borrowers. Similarly, the Council of Economic Advisors (1991) defines credit crunch as a situation in which the supply of credit is restricted below the range usually identified with prevailing market interest rates and the profitability of investment projects (quoted from Ding, Domac and Ferri (1998)). Two points can be inferred from the above definitions. First, credit crunch is primarily a supply phenomenon. Second, it may be understood as a disequilibrium situation. An abrupt change in the lending behavior of banks alters the relationship between credit availability and interest rates.

A change in the lending behavior of banks may be generally due to factors affecting their *ability* to make loans and their *willingness* to supply loans. In the former, regulations from the government play a significant role. Such regulations may come in the form of higher cost of borrowing, higher reserve requirement ratio and/or capital adequacy requirements. In the latter, expectations of overall economy and perceived credit risk of borrowers may significantly affect the reluctance of banks to supply loans. Banks may then adjust their lending rates more rapidly and a significant widening of the wedge between the lending rate and a risk-free asset such as the government securities occurs. Furthermore, their preference for more liquid assets may cause them to shift towards these less risky assets resulting in a further decline in the availability of loans. In any of these cases, the relationship between the lending rate and the supply of loan is altered.

Based on the preceding perspectives, we employ a disequilibrium framework to analyze the behavior of the demand and supply of loans. We characterize the credit market by the following equations

$$LD_t = \alpha_1 + \alpha_2 i_t + \alpha_3 X_t^D + \varepsilon_t^D \quad (1)$$

$$LS_t = \beta_1 + \beta_2 i_t + \beta_3 X_t^S + \varepsilon_t^S \quad (2)$$

$$Q_t = \min(LD_t, LS_t) \quad (3)$$

where LD_t is the real loan demand in period t , LS_t is the real loan supply in period t , i_t is the real lending rate in period t , X_t^D and X_t^S are sets of explanatory variables affecting the loan demand and supply respectively, α_i and β_i are the parameters to be estimated and ε_t^D and ε_t^S are the error terms of the loan demand and supply functions, respectively. Using this framework, we proceed to develop the model by incorporating the different factors that affect the demand and supply of loans. In this study, we specify the loan demand and supply functions as follows,

$$LD_t = \alpha_1 + \alpha_2 i_t + \alpha_3 IP_{t-1} + \alpha_4 IPGAP_{t-1} + \alpha_5 \pi_t + \alpha_6 L_{t-1} + \alpha_7 D_t + \varepsilon_t^D \quad (6)$$

$$LS_t = \beta_1 + \beta_2 i_t + \beta_3 R_t + \beta_4 IP_{t-1} + \beta_5 LC_t + \beta_6 \pi_t + \beta_7 GSEC_{t-1} + \beta_8 L_{t-1} + \beta_9 D_t + \varepsilon_t^S$$

(7)

where IP is the industrial production index, IPGAP is the deviation of current IP from its long-run trend, π is inflation rate defined as the percentage change in the consumer price index (CPI) over the previous year, R is the spread between the lending rate and a risk free asset (government securities), LC is the real lending capacity defined as total assets minus statutory reserves, GSEC is the real holdings of risk free assets and D is a dummy variable that controls for possible structural changes brought about by financial liberalization¹. Finally in the following we also include an interaction term between the dummy variable and the real interest rate in the estimated model, and some additional period dummies to cope with discontinuous changes in actual loans, which were the result from the fact that non-negligible amounts of Non Performed Loans were transferred to asset management corporations in the crisis period after 1997. All real variables are deflated by the CPI. Further details on the variables used in this study are provided in the data appendix.

A number of points with regard to the above specification of the demand and supply functions merit some explanations. First, in the demand function, we include the IPGAP variable to capture the borrowers' need for additional working capital in times of adverse shocks in their production. That is, when production temporarily falls relative to its long-run trend, the demand for credit may increase (Ghosh and Ghosh (1998)). We measure the long-run trend of production using the Hodrick-Prescott filter method. IPGAP is therefore computed as current IP less its long-run trend. Second, we specify the production index and the IPGAP variables with one period lag to

¹ The dummy variable takes on the value of unity from June 1996 in Korea, from February 1991 in Malaysia and from June 1992 in Thailand. These periods account for changes in the interest rate policy in each country.

account for the simultaneity problem in the model.² Third, we include a risk variable (R) in the supply function to account for the bank's perceived credit risk of borrowers. Even with high lending rates, lenders may still be reluctant to lend because of high risk.

Fourth, since both the borrowers and lenders make decisions simultaneously with other financial and portfolio decisions, a list of other stock variable that plays as an alternative to bank loans should also be included (Ito and Ueda (1981)). In the supply function, we include government securities held by banks (GSEC) to account for their preference for risk-free assets as a major alternative asset in their portfolio decisions. This variable is also specified with one period lag to account for simultaneity problems. However, in the demand function, data availability do not permit us to do the same. Finally, we include the observed level of loans for the preceding period (L_{t-1}) as a predetermined variable. This is consistent with the short-run optimal level in the presence of adjustment. The variables are specified in log-levels except for the interest rates and the IPGAP.

We estimate the parameters of the model using the likelihood function and the maximum likelihood methods proposed by Maddala and Nelson (1974).³ We then use the parameters derived from this estimation technique to estimate the loan supply and demand and compare it with the observed level of credit. By doing so, we will be able to determine whether the loan demand or supply is the binding constraint in the observed credit slowdown and identify whether credit crunch has occurred. We apply the above analysis to Korea, Malaysia and Thailand using monthly data over the sample period 1980 to 2002 (1983-2002 for Thailand).

IV. Estimation Results

Table 1 reports the parameter estimates of the loan demand and supply functions for each of the three countries. In the credit supply function, the coefficients of almost all the variables have their expected signs. The real interest rate (i) has the expected positive sign, with an elasticity of 0.007 for Thailand, 0.005 for Malaysia but only 0.003 for Korea. In all countries, the coefficient of the real interest rate is significant⁴. The lending capacity (LC) is also robust across the three countries. It is

² We experimented including longer lags of the IP and IPGAP variables in the model. However, results from this experiment do not significantly improve the findings when only one period lag is included.

³ While we recognize that the presence of unit root in the variables that we consider in this study may pose some problems in the estimates, unavailability of an appropriate technique at this point in time to handle nonstationary variables in disequilibrium analysis limit us to follow the conventional practice in the literature of specifying the variables in levels.

⁴ The coefficient is statistically significant at the 1 % and 5 % level of significance in Malaysia and Korea, respectively. In the case of Thailand, the coefficient is barely significant at the 10% level.

positive and it has an elasticity of as large as 0.79 in Thailand, while 0.07 in Malaysia and 0.07 in Korea. The interest rate spread (R) which stands for the banks' credit risk perception of borrowers has its expected negative sign. However, it is statistically significant in Korea and Malaysia, while not necessarily so in Thailand. The government security variable (GSEC) is statistically significant in all three cases.

>>**Table 1 around here**

For the other variables, we obtain some mixed results. The industrial production index (IP) has the expected positive sign in Malaysia and Thailand and statistically significant, while in Korea it has the wrong sign (but statistically insignificant). The inflation rate is positive and statistically significant in all cases. Finally, the dummy variables for financial liberalization have significant effects in the loan supply functions in Malaysia and Thailand. For these two countries, the interaction term between the dummy variable and the real interest rate does yield significant effects. This suggests that with smaller semi-elasticities of interest rates the loan supply has become less sensitive to interest rate changes. Finally we detected a few significant discontinuous changes in loan supply in Thailand over the post-crisis period, which appears to reflect the above-mentioned asset transfers.⁵

In the loan demand function, we obtained very robust results on the real interest rate and the inflation rate across the three countries. The estimated coefficients of real interest rate (i) are negative and statistically significant. They are 0.007 in Korea, and 0.008 in Malaysia and 0.005 in Thailand. The inflation rate (π), which stands for macroeconomic stability, also has a statistically significant negative coefficient. The elasticity is 0.006 for Korea, 0.007 for Malaysia and 0.004 for Thailand.

The industrial production (IP), though statistically significant across the three economies, has a positive coefficient in Korea and Thailand but a negative one in Malaysia. This may reflect two opposing effects. A higher production level may reflect good economic conditions and therefore greater need for credit to meet expansion in business enterprises. On the other hand, when production is higher, companies may have better cash flow and therefore may curtail their demand for credit. The output gap (IPGAP) has a significantly negative sign in Korea and Thailand and positive but statistically insignificant in Malaysia. The dummy variable for financial

⁵ Our estimated coefficients of lagged dependent variables almost as large as one suggest very slow adjustment in both loan demand and supply. Accordingly, while our independent variables are statistically significant, a large part of variations in loan demand and supply are explained by their own lagged variables.

liberalization is significant in all three cases. Only in Thailand the interaction term between the dummy variable and the real interest rate is significantly positive, which suggests that the loan demand has also become less interest-rate sensitive.

Overall, in comparison with the previous studies using the disequilibrium framework, our estimates yield more significant and theoretically correct signs in the variables of the loan demand and supply functions. In Ghosh and Ghosh (1999), their estimates for the interest rate in the loan supply function yield a negative and significant coefficient in Thailand and positive but insignificant coefficient in Korea. In the loan demand function, their estimates for the interest rate in Thailand yield a negative but insignificant coefficient. Similarly, Kim (1999) obtained a negative and significant sign for the interest rate in his loan supply function for the case of Korea. Beng and Ying (2001) also obtained a negative and insignificant coefficient for the interest rate in their loan supply function for the case of Malaysia.

Figure 1 plots the estimated loan supply and loan demand as well as the actual loan to the private sector. Generally, our estimates yield a good correspondence between the actual loan to the private sector and the minimum of the contemporaneous loan supply and demand. According to our estimates, Korea was mostly in excess demand for loans in the 1980s, and then mostly in excess supply since the mid-1990s onward. Malaysia was generally in excess demand for loans except for the period 1991-95. Thailand was mostly in excess supply of loans in the years of 1994-97 and then persistently in excess demand after the Crisis.

>>**Figure 1** **about here**

Now we are going to identify periods of credit crunch. As said in the beginning of Section III, to identify credit crunch, the following three conditions must be met simultaneously:

- i) a decline in an *estimated* supply of loans,
- ii) a decline in the level of *actual* lending and
- iii) an existence of an *estimated* excess demand for loans.

Therefore, by definition, there would be no credit crunch in Korea after the Crisis and in Thailand in the 1980s, where we detected excess supply of loans. With this criterion, we can identify several months of credit crunch in each country as shown in Table 2.

>>**Table 2** **around here**

In Korea, we identify two credit-crunch periods in the 1980s and four in the early 1990s, but none after 1997. In Malaysia, two credit-crunch periods are identified

in the latter half of the 1980s and several periods after the Crisis, while in Thailand a few credit crunch periods in the 1980s and the early 1990s, and several after the Crisis. Finally, Table 3 summarizes the results on the existence of credit crunch in East Asia after the Asian Crisis including ours.

>>**Table 3 around here**

V. Discussion

In this section we will discuss the episodes of our identified credit crunch in broader macroeconomic context. Figure 2 provides macroeconomic and monetary developments in Korea, Malaysia and Thailand to facilitate mapping our estimated results onto the actual macroeconomic situations. Note, that, according to some criterions in previous studies, Malaysia and Thailand experienced banking crises in 1986 and 1983, respectively, but Korea barely escaped from it in the 1980s.⁶ Naturally, these banking crises have much to do with credit crunch, because banks would become more cautious in providing loans in the crises, part of which can be seen in our crunch episodes both before and after the Asian Crisis.

>>**Figure 2 around here**

As shown in Figure 2.a, in Korea, the first episode of credit crunch in the early 1980s corresponds to the harsh adjustment after the negative growth in 1979 and its aftermath, when the economy transitioned from rapid, inflationary growth to mild, stable one. Nominal credit growth showed a persistent decline along with lowering interest rates in this period. The second episode of credit crunch in the early 1990s also witnessed a persistent decline in nominal credit growth with decreasing interest rates, reflecting the macroeconomic downturn, while the third episode occurred during the relative stalemate of credit and real economic growth in 1993. Immediately after the Asian Crisis, we can see a sharper decline in credit growth, particularly in 1998, than these credit-crunch episodes. Note, however, that this decline in credit growth was accompanied by a severe fall of real economic growth, which has never been the case in the previous episodes.

The first episode of credit crunch in Malaysia was in the late 1980s, which

⁶ A “banking crisis” is defined as a period in which significant segments of the banking system become illiquid or insolvent (Kaminsky and Reinhalt (1999), Caprio and Klingebiel (1997) and (2003)). Large scale bank failures, enactment of emergency measures by the government (deposit freezes, nationalizations, deposit guarantees, bank recapitalization plans), reports of significant depositor runs, the level of nonperforming loans and the costs of the bailout are among the evidences for a banking crisis.

roughly corresponds to the period of their banking crisis. We can see persistent slowdowns of credit growth and a sharp fall of interest rates with economic slowdown (Figure 2.b). We also see an acute fall of credit growth in the early 1990s, but without decreases in interest rates and economic activity, when we did not detect credit crunch. Then comes the credit crunch after the Asian Crisis with a persistent and sharp fall and then a stalemate of credit growth, along with lowering interest rates and negative economic growth.

If we presume that credit crunch is likely to occur together with a persistent and/or sharp decline of credit growth and falling interest rates, Thailand appears to have had potential credit crunch i) after their banking crisis in 1983, ii) in the early 1990s and iii) even before the Asian Crisis (Figure 2.c). Actually, we detected credit crunch in those periods except for the pre-crisis period, when we identified excess supply of loans. In fact, while we see some falls of interest rates but little slowdown of economic activity in the three cases before the Crisis, in contrast, the fall of interest rates and real economic activity was unprecedented after 1997.

VI. Conclusion

Even within the framework of disequilibrium analysis of credit markets, we appeared to have witnessed mixed results in the literature as to the existence of credit crunch across economies in East Asia in the recent decades (See Table 3).⁷ Our result suggests that during the crisis period of 1997 through 1999, credit crunch appeared to exist in Malaysia and Thailand, but that is not the case in Korea. How can we reconcile with these apparent contradicting results? Recognizing the important role of financial intermediation as emphasized at the beginning of this paper, we suggest the following interpretations of our fact finding.

First of all, it is obvious that Thailand was the most hard hit on the financial intermediation and then came Malaysia by the Asian Crisis among the three economies under our study. The financial intermediary shrank on both the asset side and liability side in the two economies, which is contrasting to the Korean case after 1997 as well as to their own experiences of credit crunch or near-crunch before the Crisis. The impact of the Crisis on the financial intermediation in Korea appears to be at least relatively mild to the other two and to its own experiences in the recent past. Therefore, we

⁷ One might point out the limits of the analytical framework of disequilibrium analysis of credit markets here. It is well known that these economies in East Asia have had a long history of financial repression, or at least financial restraint, where the price mechanism did not play a due role in fund allocation because of government regulations and other institutional rigidities until the early 1990s. Partly, for example, coefficients of market interest rates are not necessarily stable in prior studies referred in this paper.

conclude that it is no surprise for us to detect credit crunch in Malaysia and Thailand, but none in Korea after the Crisis.

Second, or more importantly, our results point to the overwhelming role of aggregate demand depression in generating significant declines of credits in East Asia. In fact, we should note that so-called *V-shaped* recoveries of East Asian economies since the Crisis were not achieved by the resurgence of endogenous private demands (i.e. consumption and investment), but barely supported by that of exogenous demands (i.e. world exports and fiscal stimulus). Even as late as in 2002, we cannot witness the significant resurgence of domestic credits to the private sector in Malaysia and Thailand.

Thus, the mixed results on the existence of credit crunch do not necessarily suggest that the impact of the austerity programs on financial intermediation was ambiguous. On the contrary, they implied, the impact of the programs might be so severe that even enormous supply retrenchment could be overwhelmed by an evermore sharp fall in credit demand because of real and expected persistent overall economic depression as in the case of post-crisis Korea. Because credit crunch is, by definition, a mere difference between retrenchments of both loan supply and demand in the financial crisis.

Lastly, as a caveat, we must be aware that there is a basic difficulty in identifying credit crunch within an aggregate macroeconomic framework, because there we cannot distinguish between good and bad borrowers and/or loans. We cannot tell whether observed retrenchments in credit supplies were due to credit rationing against good borrowers or bad ones. One way to amend this difficulty is to take a microeconomic approach such as a questionnaire survey of individual borrowers/creditors as in Ito and da Silva (1999). Even with microeconomic surveys, however, without reliable market risk premiums, we would not be able to have objective judgments on the existence of credit crunch.

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Table 1: Parameter Estimates of the Loan Demand and Supply Functions

		KOREA			MALAYSIA			THAILAND		
		Supply Function			Supply Function			Supply Function		
Variable	Expected	Coefficient	T-Stat	P-Value	Coefficient	T-Stat	P-Value	Coefficient	T-Stat	P-Value
Constant		-0.494 **	-2.267	0.023	0.433 ***	5.500	0.000	-1.139 ***	-10.151	0.000
<i>i</i>	+	0.003 **	2.352	0.019	0.005 ***	4.670	0.000	0.007 ***	3.738	0.000
R	-	-0.002 ***	-2.904	0.004	-0.004 ***	-5.017	0.000	-0.003	-1.433	0.152
IP [-1]	+	-0.002	-0.106	0.916	0.034 ***	3.294	0.001	0.116 ***	3.669	0.000
LC	+	0.074 ***	2.967	0.003	0.066 ***	3.295	0.001	0.797 ***	18.838	0.000
π	-	0.002 *	1.804	0.071	0.002 ***	2.643	0.008	0.005 ***	3.468	0.001
GSEC[-1]	-	-0.018 *	-1.899	0.058	-0.013 ***	-2.634	0.008	-0.011 ***	-4.215	0.000
LOAN[-1]	0<<<1	0.979 ***	31.179	0.000	0.889 ***	43.314	0.000	0.259 ***	7.094	0.000
D		-0.010	-0.649	0.516	0.049 ***	3.714	0.000	0.056 **	2.138	0.033
D*i		0.000	-0.022	0.983	-0.004 **	-2.470	0.014	-0.006 **	-2.069	0.039
DC9803*IP[-1]		0.005 **	2.553	0.011						
DC		-0.015	-1.422	0.155						
DC9803*R					0.004 *	1.882	0.060			
DC9803					-0.023 **	-2.277	0.023			
DC9802								-0.148 ***	-8.522	0.000
DC0009								-0.089 ***	-12.238	0.000
DC0106								-0.056 ***	-9.414	0.000
DC0202								0.068 ***	10.334	0.000
		Demand Function			Demand Function			Demand Function		
Variable	Expected	Coefficient	T-Stat	P-Value	Coefficient	T-Stat	P-Value	Coefficient	T-Stat	P-Value
Constant		1.636 ***	3.831	0.000	-0.511 ***	-2.816	0.005	-0.256 ***	-4.609	0.000
<i>i</i>	-	-0.007 **	-2.148	0.032	-0.008 **	-2.546	0.011	-0.005 ***	-7.139	0.000
IP [-1]	+ / -	0.214 ***	3.293	0.001	-0.068 **	-2.008	0.045	0.152 ***	8.736	0.000
IPGAP[-1]	-	-0.002 ***	-2.788	0.005	0.000	0.302	0.763	-0.004 ***	-8.686	0.000
π	-	-0.006 ***	-2.794	0.005	-0.007 **	-2.076	0.038	-0.004 ***	-4.301	0.000
LOAN[-1]	0<<<1	0.790 ***	13.575	0.000	1.080 ***	37.459	0.000	0.961 ***	96.111	0.000
D		0.046 ***	2.561	0.010	-0.064 **	-2.457	0.014	-0.075 ***	-5.194	0.000
D*i		0.003	1.051	0.293	0.001	0.488	0.626	0.004 **	2.316	0.021
DC9803		-0.014 *	-1.673	0.094						
Sample Periods		1980:08-2002:09			1980:01-2002:09			1983:11-2002:12		

Note: D, DC, DC---- are dummy variables. D controls for changes in the interest rate policy in each country. D takes on the value of unity from June 1996 for Korea, from February 1991 for Malaysia, and from June 1992 for Thailand. DC controls for the effect of severe crisis. DC takes one from March 1998 to October 1998. DC---- controls for the structural changes in nominal outstandings of bank loan after financial crisis. For example, DC9803 takes one from March 1998. *, **, *** indicate statistical significance at 10%, 5%, 1% level, respectively.

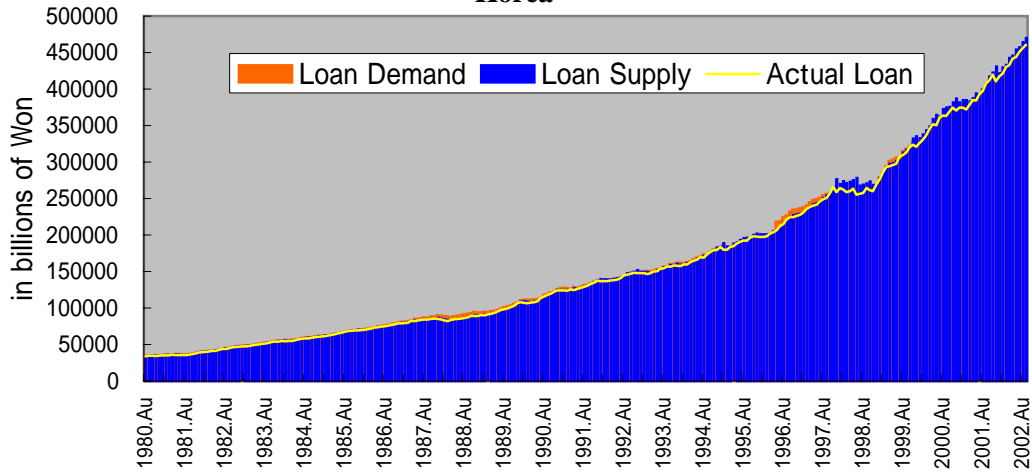
Table 2: Credit Crunch Periods

	Year	KOREA	MALAYSIA	THAILAND
1980s	1981	6-7		
	1986		Nov.	Mar.
	1987		5-6	
	1988	1-3		
	1989			Aug.
1990s	1990	Mar.		Oct.
	1991	Mar.		Apr.
	1992			May
	1993	Mar.		
	1994	Jan.		
	1998		3-6 Dec.	2-4 Jul. 9-11
	1999		1-4 11-12	Jun. Oct. Dec.
	2000		Jan.	Feb. Jun. 8-9 Dec.
	2001		Feb.	Feb. 5-6 9-10 Dec.
	2002			May

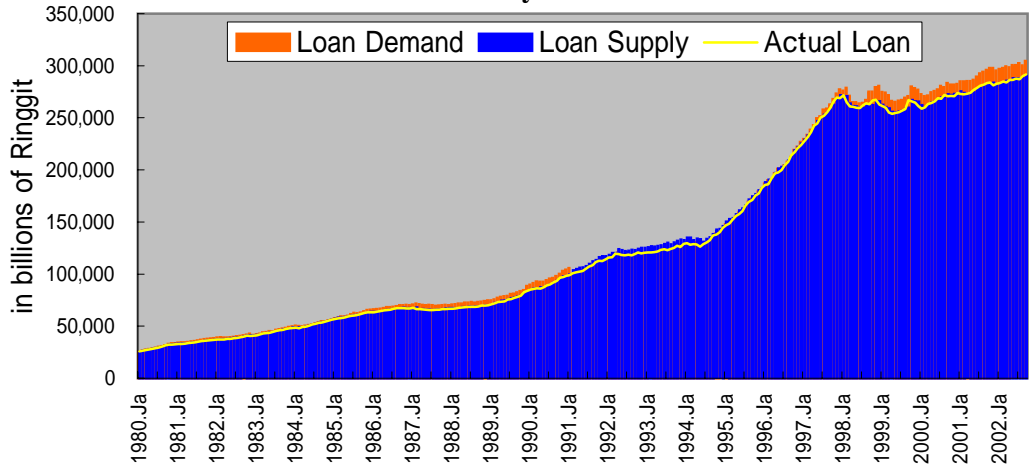
Table 3: Summary of Results on Credit Crunch in East Asia in the 1997 crisis period

	Korea	Malaysia	Thailand	Data Frequency	Coverage Period	Methodology
Ding, Domac and Ferri (1998)	Yes	Yes	none	monthly	1997-1998	Observation on Macro variables
Beng and Ying (2001)	---	Yes	---	monthly	1993-1999	Cointegration
Ito and Da Silva (1999)	---	---	Yes	-	1997-1998	Survey
Ghosh and Ghosh (1999)	none	---	none	monthly	1992-1998	Disequilibrium framework
Kim (1999)	Yes	---	---	monthly	1993-1998	Disequilibrium framework
Baek (2002)	Yes	---	---	monthly	1992-2001	Disequilibrium framework
Enya, Kohsaka and Pobre (2003)	none	Yes	Yes	monthly	1980-2002	Disequilibrium framework

**Figure 1.a. Actual Loan and Estimated Loan Demand and Supply:
Korea**



**Figure 1.b. Actual Loan and Estimated Loan Demand and Supply:
Malaysia**



**Figure 1.c. Actual Loan and Estimated Loan Demand and Supply:
Thailand**

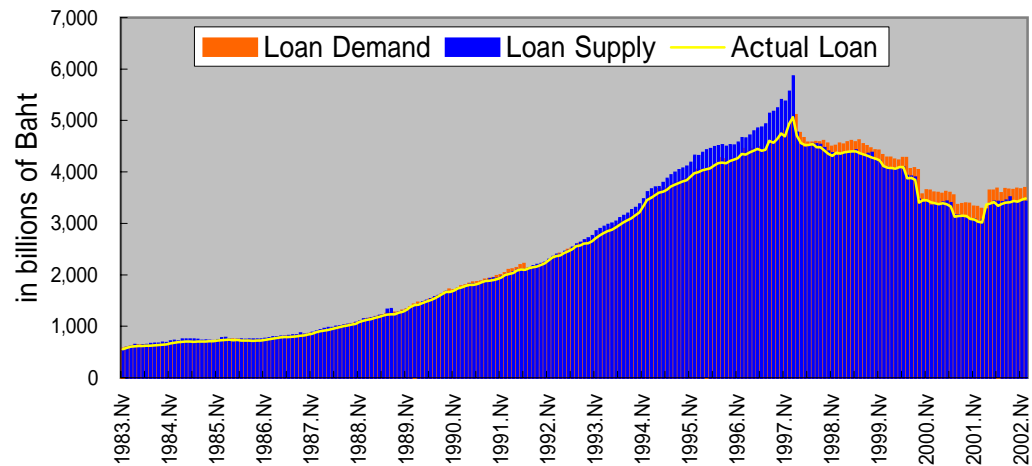


Figure 2.a. Monetary development: Korea

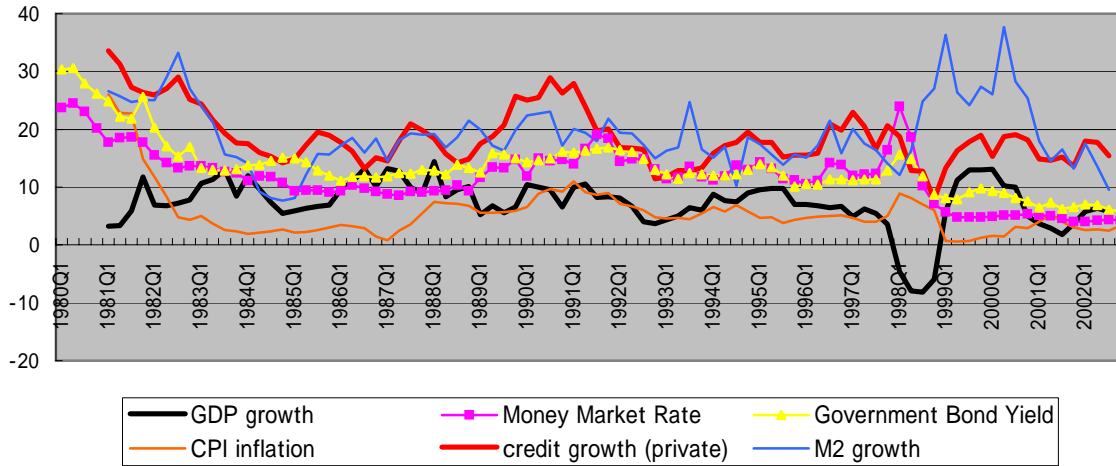


Figure 2.b. Monetary development: Malaysia

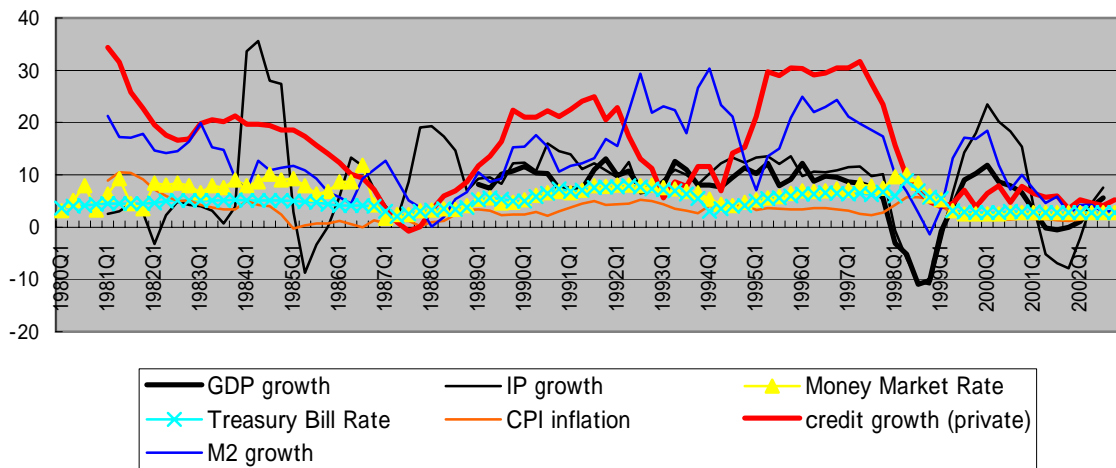
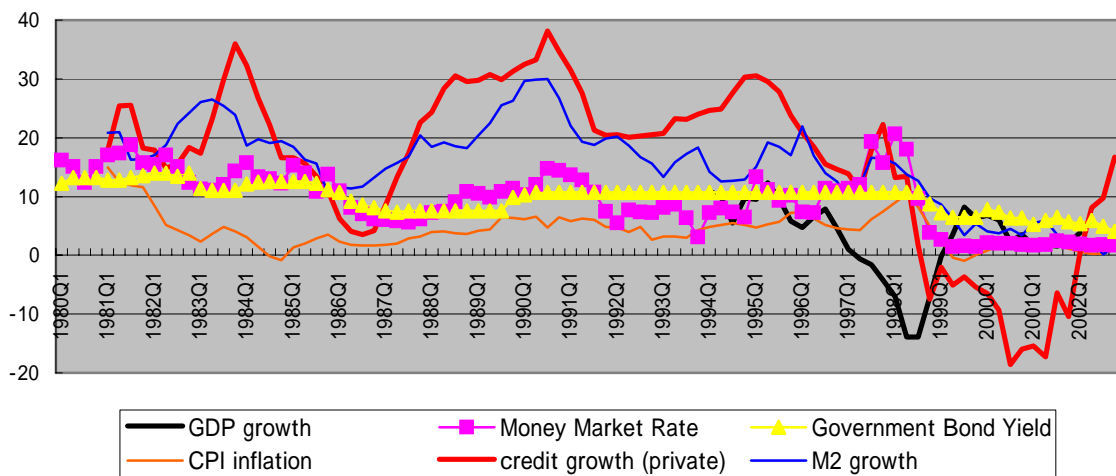


Figure 2.c. Monetary development: Thailand



Data Appendix

Data are monthly and cover the period 1980:1 to 2002:8 for Korea, 1980:1 to 2002:9 for Malaysia and 1983:10 to 2002:12 for Thailand.

i	Real lending rate. Lending rate deflated by CPI inflation (computed as year on year percentage change in CPI)	Nominal lending rate CPI	60p, IFS 64, IFS
IP	Industrial Production, logarithm.	Industrial Production For Thailand, IP indices before Jan 1987 are calculated using production unit data. *1	66, IFS For Thailand, Bank of Thailand Monthly Bulletin, various issues
IPGAP	Current Industrial Production less its long-run trend. (estimated by the Hodrick-Prescott filter method)	Industrial Production	66, IFS
π	Consumer price inflation rate. (computed as year on year change in CPI)	CPI	64, IFS
L	Actual real loans. (Loans on Private Sector by DMB deflated by CPI)	Loans on Private Sector CPI	22d, IFS 64, IFS
R	Risk. Lending rate minus interest rate on risk-free asset (government security)	Nominal lending rate Treasury Bill Rate	60p, IFS 60c, IFS
LC	Real lending Capacity, logarithm. (Total Assets minus statutory reserves, deflated by CPI)	Total Assets (Commercial Banks) Statutory Reserves (Commercial Banks)	Bank Negara Malaysia, <i>Monthly Statistics Bulletin</i> , various issues The Bank of Korea, <i>Monthly Bulletin</i> , various issues Bank of Thailand, <i>Monthly Bulletin</i> , various issues
GSEC	Real holdings of Government securities, logarithm. (deflated by CPI)	Treasury bills holdings (Commercial Banks) Government Securities holdings (DMB) for Korea	Bank Negara Malaysia, <i>Monthly Statistics Bulletin</i> , various issues. The Bank of Korea, <i>Monthly Bulletin</i> , various issues. Bank of Thailand, <i>Monthly Bulletin</i> , various issues.

*1: Weights computed as a proportion of the commodity to total unit of production were used to estimate IP indices before January 1987.