THE RELATIONSHIP BETWEEN FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH AND THE ASIAN FINANCIAL CRISIS: AN FMOLS ANALYSIS

Indrani Chakraborty* and Sudeshna Ghosh,
Institute of Development Studies Kolkata

Abstract
We study the relationship between financial development and economic growth empirically with panel data from five Asian countries, namely, Thailand, Korea, Indonesia, Malaysia and the Philippines over the time-period 1989-2006 in the context of the Asian Financial Crisis of 1997. These five countries are believed to be the worst-hit by the 1997 crisis. The period covers nine pre-crisis years, nine post-crisis years and the crisis-year 1997. We examine whether there has been a shift in the structure of the financial sector, that is, the share of financial institutions and financial markets within the financial sector, because of the crisis. We also analyze the effect of the crisis on the causality between financial development and economic growth. We have used the techniques of panel unit root, panel cointegration and Fully Modified Ordinary Least Square (FMOLS) by Pedroni (2000) for heterogeneous cointegrated panel data. We found that the relationship between financial development and growth is not be affected much by the Asian crisis.
Keywords: financial development, growth, Asian crisis, FMOLS.
JEL Classification: C23, G20, O16

1. Introduction

The relationship between financial development and economic growth is an important issue in the literature on growth and development. Financial development may affect economic growth through its effects on capital accumulation and rate of savings. Growth may affect financial development through its demand for financial services along its path. One key aspect of the relationship between financial development and economic growth is the direction of causality between them. Typically, two unidirectional types of causal relationship between financial development and economic growth can be hypothesized:

i. Economic growth causes financial development.

ii. Financial development causes economic growth.

There can be a bidirectional causal relationship between them as well.

The theoretical contribution on the relationship between the development of the financial sector and growth mainly deals with how financial intermediaries emerge, their effect on, and interactions with growth. For instance, the theoretical model of Greenwood and Jovanovic (1990) puts forward that financial intermediaries enhances growth by directing funds towards high-productivity investment projects. Theory also takes up the issue of the financial structure of an economy and its relationship with growth. As an example of such an analysis, we may refer to the work of Townsend (1983). A large number of empirical analyses on the relationship between financial development and economic growth focus on the direction of causality between financial development and growth [e.g., Demetriades and Hussein (1996)], some on the channels linking financial development and economic growth [e.g., Rajan and Zingales (1998)] and on financial structure and growth [e.g., Arestis, Luintel and Luintel (2005)]. In general, empirical studies using cross-section and panel techniques find positive effects of financial development on growth — even after accounting for potential biases brought about by simultaneity, omitted variables

Corresponding author. Associate Professor, Institute of Development Studies Kolkata, DD-27/D, Sector-I, Salt Lake City, Kolkata 700064, India. Email: indrani.c61@gmail.com. Fax: 2321 3119 Phone: (033) 2321 3120. The authors would like to thank Professors Amiya Kumar Bagchi, Achin Chakraborty and Malabika Roy for providing helpful comments and suggestions

and unobserved country-specific effects. The results of the time-series studies on the relationship between financial development and economic growth are more varied. In case of the causality issue also, different empirical studies conclude differently on the causal direction between financial development and economic growth. Interested readers may see Levine (1997, 2004) for a detailed discussion of the literature on the finance-growth nexus.

In a related study, Christopoulos and Tsionas use (2004) the fully modified ordinary least squares (FMOLS) method proposed by Pedroni (2000). There are numerous works on the different aspects of the financial development of the five countries selected for our investigation and financial crisis of 1997. Some selected works are that of Zahid (1995), Bustelo (1998), Rakshit (2002) and Joosten (2004).

Though there is a rich literature on the relationship between financial development and growth, we conduct a panel investigation using the FMOLS approach, which, according to us, is exploited little in this particular area of study. We use the relatively new concepts of panel data-based tests of unit root, cointegration and causality. We expect panel analysis to improve upon the power of time-series tests which may be low due to time-span and sample size. We study the relationship between financial development and economic growth empirically with panel data from five Asian countries, namely, Thailand, Korea, Indonesia, Malaysia and the Philippines over the time-period 1989-2006 in the context of the Asian Financial Crisis of 1997. These five countries are believed to be the worst-hit by the 1997 crisis. The period covers nine pre-crisis years, nine post-crisis years and the crisis-year 1997. We examine whether there has been a shift in the structure of the financial sector, that is, the share of financial institutions and financial markets within the financial sector, because of the crisis. We also analyze the effect of the crisis on the causality between financial development and economic growth.

In section 2, we discuss the financial background of the five countries in some detail. In section 3, we deal with the data and methodology used in our study. Section 4 is on the results of the analysis. We conclude in section 5.

2. A Glance at the Financial Background of the Five Countries

The five countries began to liberalize their financial markets essentially from the 1980s. A three-year financial reform plan was implemented in Thailand between 1990 and 1992 which included interest rate deregulation, relaxation of exchange rate controls, development of the supervision system, promotion of financial innovations and improvement of the payment system. In Korea, commercial banks were privatized between 1981 and 1983. Indonesia introduced a series of financial sector deregulations between 1987 and 1993. Malaysia launched the Financial Sector Master Plan and the Capital Market Master Plans in 2002. The Philippines lifted the interest rate on short-term loans in 1983 and started to relax the regulations on bank entry from 1989. Table 1 sums up some major steps of liberalization followed in the five countries.

During the first half of the 1990s, the macroeconomic conditions of the five countries started to weaken with appreciating real exchange rates, slowing exports growth, mounting current account deficits, increasing short-term foreign indebtedness, growing nonperforming loans, domestic lending booms and asset price bubbles. The prices of key export commodities saw sharp decreases with economic growth slowing down. During the same period, rapid credit expansion was intermediated through the banking sector in all the five countries. In 1996-7, the five countries experienced rising interest rates, depreciating currencies, falling real estate and equity prices, decreasing capital inflows, declining stock

markets. When speculative pressures on the Thai baht built up, it was allowed to float on 2 July 1997. This is taken as the beginning of the Asian Financial Crisis. Under similar conditions, the Philippine peso, the ringgit, rupiah and the won were allowed to float on July 11, July 14, August 14 and November 17 of 1997, respectively.

At the end of January 1998, the rupiah was about 325 per cent below its January 1997 value (in terms of local currency value of the United States dollar). Over the same period, the baht depreciated by about 113 per cent, the ringgit by about 82 per cent, the won by about 71 per cent and the Philippine peso by about 61 per cent. The baht, the ringgit and the Philippine peso started to regain their position from early 1998. The rupiah weakened sharply at first, but recovered somewhat during March and April 1998. This revival was short-lived. The Korean stock market index fell to an 11-year low on 26 May 1998. The Thailand stock market index fell to a 10 year low on 1 June 1998. Currencies in the region went down again. Towards the end of 1998, the currencies and stock markets bounced back. In 1998, real GDP dropped by 13.1 per cent in Indonesia, 10.5 per cent in Thailand, 7.4 per cent in Malaysia, 6.7 per cent in Korea and 0.6 per cent in the Philippines from the previous year. The growth of real GDP in Indonesia, Thailand and Malaysia was well below their 1985-94 average in 1999. The exports of the US to the five countries fell by about 24 per cent between 1996 and 1998. Nonperforming loans as a share of total loans in 1998-9 was over 40 per cent in Indonesia and exceeded 25 per cent in both Korea and Thailand. It was around 20 per cent in Malaysia and around 10 per cent in the Philippines. Government finance deteriorated during the crisis-period and did not return to their pre-crisis levels by 2002 in the five countries, but for Korea. Other consequences of the crisis consisted of slump in fixed investment and private consumption, decline of output and private capital inflows, unemployment, falling real wages, increase in the prices of basic necessities and rise in poverty.

Considering the severity of the crisis, Thailand, Korea and Indonesia took assistance from the International Monetary Fund (IMF). Malaysia did not ask for any support programme from the IMF to tackle the crisis. The Philippines was already in the midst of implementing macroeconomic and structural adjustment programmes supported by the IMF before the crisis began and in view of the crisis, the existing programmes were extended. The suggestions of the IMF included the closure of insolvent financial institutions and the recapitalization of the financial system. Aids from other sources were also taken. The Fiscal policies of Thailand, Korea and Malaysia turned expansionary from the early 1998. Fiscal policy was expansionary in Indonesia only from 1999-2000. In general, the countries used financial sector restructuring agencies and asset management companies to manage the troubled financial institutions. Measures were taken to strengthen the regulatory and supervisory framework. Improvement of corporate governance and resolution of corporate debt were also part of the reform measures. Increasing the transparency of government, improving the efficiency of the market, continuing the liberalization of external trade and capital flows were incorporated into the reform plans. Social sector policy reforms were not left out either.

The five countries reported positive rates of growth in 1999. Thailand had a current account deficit of 2.1 per cent of GDP in 1997 but registered a surplus of 12.8 per cent of GDP in 1998. In Malaysia, the current account went up from a deficit of 5.9 per cent of GDP in 1997 to a surplus of 13.2 per cent in 1998. The overall improvements in the five countries included reduced external debt, current account surpluses and improved foreign exchange reserves. Within the first months of 2002, the foreign exchange reserves

increased by about 43 per cent in Korea and Malaysia, by about 23 per cent in Indonesia and Thailand. Over the same period, the US dollar value of the won and the baht increased by about 10 per cent and the rupiah by about 20 per cent. The Philippines saw the US dollar value of its currency fall by 8 per cent and its foreign exchange reserves went down by around 5 per cent. Gradually, the ratio of nonperforming loans to total loans came down, the capital positions of the commercial banks improved, the stock of real credit to the private sector started to rise. Barring Korea and to some extent Thailand, the corporate sector made little progress in reducing their high debt-equity ratios till 2003. One can say that, by 2003, macroeconomic vulnerabilities can be said to have been reduced but the structural and institutional reforms were incomplete. Output improved but did not reach the pre-crisis levels, which were on the higher side compared the advanced countries.

3. Data and Methodology

Banks and stock markets are two important instruments of financial intermediation. By providing liquidity and by helping to take the edge off informational frictions, banks may affect growth. Stock markets can have effects upon economic growth by affecting capital allocation. We use both stock market development indicators and banking sector development indicators to measure the development of the financial sector.

As measures of stock market development, we use stock market capitalization of listed companies as percentage of Gross Domestic Product (GDP), which is referred to as MCAP in our regressions, and turnover ratio of stocks traded in percentage (TRNVR). Stock market capitalization can be measured either by the ratio of the stock market value to GDP or by the number of listed companies to GDP. This is a measure of the size of a stock market. Increased stock market capitalization may improve an economy's ability to mobilize capital and diversify risk. The basic assumption behind this indicator is that the size of the stock market is positively correlated with the ability to mobilize capital and diversify risk. Arestis and Demetriades (1997) use stock market capitalization as a ratio of stock market value to GDP as an indicator of stock market development.

Turnover ratio, a measure of stock market liquidity, is the total value of shares traded on major domestic stock exchanges relative to total market capitalization. Conceptually, liquidity of financial markets is taken to be inversely related to the costs of transacting in them. Turnover ratio is expected to indicate the level of transactions costs as high turnover ratio implies low transactions costs. The study by Beck and Levine (2004) is an instance where a measure of stock market development is the turnover ratio. Data for both the stock market development indicators come from *World Development Indicators* (CD-ROM 2008).

We take claims on private sector, that is, banks' claims on the private sector as a percentage of GDP, as a measure of development in the banking sector. This indicator (CLMPVT) is considered as a measure of the size of the banking sector. Claims on private sector is believed to increase investment and hence, growth. We choose this indicator as a measure of the size of the banking sector since it separates credit issued to the private sector from credit issued to governments and other public enterprises. The measure is expected to reflect the extent of efficient fund allocation because, in general, the private sector is argued to utilize funds in a more efficient and productive way than the public sector. Higher values of claims on private sector means more banking services and hence, greater financial development. Demetriades and Hussain (1996), Ghali (1999), Koivu (2002), Beck and Levine (2004) and Chakraborty (2008) use this indicator in their work. We use

line 22d from several issues of *International Financial Statistics* as the source of data for this variable.

Another variable to represent the banking sector development in our analysis is interest rate spread (SPREAD). This equals lending interest rate minus deposit interest rate. Interest rate spread can be said to indicate the efficiency of the banking sector in the sense that it describes transactions costs within the sector. Interest rate spread is likely to decrease because of a decrease in transactions costs. As it decreases, the share of savings going to investments can be expected to increase. Since growth is assumed to be related positively to investment, a decrease in the difference between the lending and deposit rates in the banking sector should help increase growth. It can be argued that, an efficient banking sector reduces transactions costs and the margin between lending and deposit rates (Koivu, 2002). This measure may also reflect improvements in the quality of borrowers in the economy. Since these improvements are generally linked to favourable economic development, this aspect of the measure is likely to be nearly eliminated through our use of control variables for economic growth in the regression. This variable has been used little in empirical studies on the relationship between financial development and economic growth. One of the very few studies that use interest rate spread is that by Koivu (2002). The data-source for this indicator in our study is *World Development Indicators* (CD-ROM 2008).

Following Koivu (2002), we use GDP growth in annual percentage (GDPGRWTH) to measure economic growth. To control for factors other than financial development that may affect economic growth, we use the following three control variables:

i. Following Khan and Senhadji (2000), we use population growth in annual percentage (POPGRWTH) as a control variable.

ii. We take gross capital formation as percentage of GDP (CAPFOR) as another control variable. In this context, we may note that Khan and Senhadji (2000) use investment as a share of GDP as a control variable.

iii. We take inflation in consumer prices measured in annual percentage (INF) as our third control variable. Some related studies that use inflation as control variables include those of Koivu (2002), Beck and Levine (2004). The data for GDP growth and the control variables are collected from *World Development Indicators* (CD-ROM 2008).

To find out if there has been a shift in the structure of the financial sector because of the 1997 crisis, we analyze the data first with the complete dataset comprising of the years 1989 to 2006 and then dropping the year 1997 from the dataset. The summary statistics of the complete dataset and the dataset without 1997 are demonstrated in Table 2 and Table 3, respectively.

Let us consider the following k^{th} order vector autoregressive (VAR) process:

$$x_{1t} = \mu_1 + \pi_{11}(L)x_{1t-1} + \pi_{12}(L)x_{2t-1} + \varepsilon_{1t} \quad (1)$$

$$x_{2t} = \mu_2 + \pi_{21}(L)x_{1t-1} + \pi_{22}(L)x_{2t-1} + \varepsilon_{2t} \quad (2);$$

where, μ_1 and μ_2 are constants and $\pi_{ij}(L)$ are polynomials of order (k - 1) in the lag operator L. If x_{1t} and x_{2t} have unit roots, the above model can be reparameterised in the equivalent error-correction representation as follows:

$$\Delta x_{1t} = \mu_1 + \gamma_{11}(L)\Delta x_{1t-1} + \gamma_{12}(L)\Delta x_{2t-1} + (\pi_{11}(1) - 1)x_{1t-1} + \pi_{12}(1)x_{2t-1} + \varepsilon_{1t} \quad (3)$$

$$\Delta x2t = \mu2 + \gamma_{21}(L)\Delta x_{1t-1} + \gamma_{22}(L)\Delta x_{2t-1} + \pi_{21}(1)x_{1t-1} + (\pi_{22}(1) - 1)x_{2t-1} + \varepsilon_{2t} \quad (4);$$

where, γ_{ij} are polynomials of order (k - 2) and Δ is the first difference operator. The error-correction representation accounts for disequilibrium by including adjustment mechanisms represented by the error-correction terms. If there is no unit root, the VAR represented by equations (1) and

(2) is stable and $(x_{1t}, x_{2t})'$ is a stationary process. If x_{1t} and x_{2t} are integrated processes of order one[1] but there exists a linear combination which is stationary, x_{1t} and x_{2t} are said to be cointegrated.

Tests for unit root and cointegration are originally developed for time-series data. They are also modified to be applicable to panel data. While the null hypotheses of one kind of panel unit root assume common unit root process, another variety assumes individual unit root process. Standard unit root tests for time-series data, such as, the Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) tests, are adjusted to form tests for unit roots in panel data, such as, the ADF-Fisher and PP-Fisher tests. Similarly, tests for cointegration in panel data are derived from the corresponding tests applicable to time-series.

The test to find unit roots in panel data developed by Levin, Lin and Chu (2002) test assumes common unit root process. Both the ADF-Fisher and PP-Fisher tests for unit roots in panel data assume individual unit root process. The Pedroni Cointegration test uses the framework proposed by Engle and Granger (1987) to test for cointegration in time-series data. Against the null hypothesis of no cointegration, two alternative hypotheses are conceived. One is of common autoregressive (AR) coefficients and the other is of individual AR coefficients. Several panel cointegration test statistics are obtained. The weighted and unweighted panel v-statistic, panel ρ-statistic, panel ADF-statistic and panel PP-statistic are based on the first alternative hypothesis. The remaining three statistics, namely, group ρ-statistic, group ADF-statistic and group PP-statistic, are formed under the second alternative hypothesis.

Following Granger (1969), the causal relationships between two variables X and Y can be classified as follows:

i. X is said to cause Y if the inclusion of the past values of X into the information set on which the prediction of Y is conditional reduces the minimum prediction error variance, X is said to cause Y.

ii. Bidirectional causality between X and Y is said to occur if X causes Y and Y causes X simultaneously.

iii. X and Y are said to be independent if the inclusion of past values of X does not lower the minimum prediction error variance of Y, the two series are said to be independent.

Finally, we will discuss a bit on the fully modified OLS method of estimation used in this study. Fully modified OLS estimator, proposed by Pedroni (2000) is meant for heterogeneous cointegrated panel data. This method addresses both the problems of non-stationary regressors and simultaneity bias. Pedroni extends this methodology of Philips and Hansen (1990), which considered semi-parametric correction to the OLS estimator to eliminate the second order bias introduced by the endogeneity of the regressors, to panel data analysis. With the purpose of removing the nuisance parameters, the fully modified OLS estimator corrects the dependent variable using the long-run covariance matrices and then applies simple OLS estimation method to the variables corrected for endogeneity.

4. Results

We conduct unit root tests to find out the orders of integration of the relevant variables and then perform tests for cointegration. We carry out Levin, Lin and Chu tests for unit roots alongwith the ADF-Fisher and PP-Fisher unit root tests. Table 4 shows the results of the unit root tests. We may note that all the unit root tests and also the Pedroni cointegration tests are conducted by choosing suitable lags using the Schwarz criterion. Newey-West bandwidth selection is done using Bartlett kernel. Appropriate exogenous variables are included in the test equations for unit root tests. The number of observations is balanced for each test.

We accept the presence of unit roots in the series when any one of the four tests indicates the presence of unit roots. Thus, the results of the unit root tests suggest that all the four financial development indicators and GDP growth are integrated processes of order one.

We now proceed to test for cointegration among the five series. We use Pedroni tests for cointegration in panel data. The results of Pedroni cointegration tests are presented in Table 5. Figures in parentheses denote the corresponding values of probabilities. Appropriate trend assumptions are chosen from the following alternatives: no deterministic trend or intercept, no deterministic trend and deterministic trend and intercept.

In Table 5, the majority of the statistics indicate the presence of cointegration among the variables in the four cases. Thus, following the Granger representation theorem[2] we may say that there is a long-run relationship among GDPGRWTH, MCAP and CLMPVT, among GDPGRWTH, MCAP and SPREAD, among GDPGRWTH, TRNVR and CLMPVT and among GDPGRWTH, TRNVR and SPREAD. We proceed to estimate these long-run relationships using the FMOLS method to estimate the cointegrating vectors. The FMOLS approach is able to incorporate some amount of heterogeneity across the individual members of the panel (Pedroni 2000).

Table 6 displays the results of the FMOLS regressions run on the full sample, that is, over the period 1989-2006. Common time-dummies are included in the regressions. Figures in parentheses show the values of t-statistics.

From Table 6, it is evident that stock market turnover is positive as expected, and also statistically significant in both cases. The other indicator of stock market development, market capitalization, is expectedly positive, but insignificant. From the two banking sector development indicators, the estimated coefficient of spread is negative and significant in both regressions including it. We may also note that, the estimated values of the coefficients of spread are high relative to those of the other three indicators in both the regressions. Surprisingly, estimated CLMPVT is negative in both regressions and also significant in one of them.

Table 7 exhibits the results of the FMOLS regressions run on the sample dropping the crisis year 1997. This means that the time-periods included in the regressions are 1989-1996 and 1998-2006. Before conducting the FMOLS regressions, unit root tests and Pedroni cointegration tests were carried out on the data dropping 1997 exactly similarly as with the full sample. The results of the unit root and cointegration tests indicate all the five series to be integrated of order one and cointegrated[3]. According to the results of Table 7, not much change in the signs, significance or values of coefficients of the four financial development indicators is apparent, relative to the results of Table 6. The only noticeable change is in the sense that, unlike the results of Table 6, MCAP is significant in one of the two regressions where it is present. Therefore, in view of the results of Tables 6 and 7, we may say that, FMOLS regressions run on our panel sample do not signify a major change in any one of the four financial development indicators because of the crisis-year 1997. Thus, the relationship between financial development and economic growth seems to be left unaltered by the financial crisis of 1997.

As we find some indication of the existence of a relationship between financial development and economic growth, we are interested to know the causal direction of the relationship and come to the issue of causality between financial development and growth. We use Granger causality test to test for causality on our sample. This test does not address the issue of contemporaneous causality. Since the mechanism by which the causal relationship between financial

development and economic growth is expected to act with lags, we do not conduct any test for contemporaneous causality. The results of the Granger causality Tests on the full sample and on the sample without 1997 are summarized in Tables 8 and 9, respectively.

The results of Table 8 suggest that market capitalization Granger causes growth of GDP but not the other way round. Causality runs from GDP growth to both claims on private sector and spread. There is no causal relationship between turnover and GDP growth. Thus, according to the results of our analysis, economic growth in our sample helps the banking sector grow.

The important change in the results of Table 9 from Table 8 is that, while MCAP shows no causal relation with GDP growth, turnover is caused by the growth of GDP. Thus, the 1997 appears to have affected the causal relationship between stock market development and economic growth.

5. Concluding Remarks

After performing a panel analysis on the relationship between financial development and economic growth using the FMOLS technique, our findings suggest that the Asian Financial Crisis of 1997 have not changed the relationship much, though the causal relationship between financial development and growth show a minor change due to the 1997 crisis.

The policy implications from the various analyses on the relationship between financial development and economic growth are interpreted differently by different authors. McKinnon (1973) and Shaw (1973) explain that policies leading to financial repression reduce the incentives to save which lowers savings, investment, and hence, growth (De Gregorio and Guidotti 1995). In accordance with their model, Bencivenga and Smith (1991) argue that the lack of immediate effects of financial liberalization cannot be taken to mean that such a policy would not raise growth eventually. Roubini and Sala-i-Martin (1992) maintain that by lowering savings and productivity of capital, financial repression hampers growth (De Gregorio and Guidotti 1995). It is a debated issue whether policymakers should remove obstacles to stock market development, such as, taxes, legal and regulatory barriers or adopt interventionist policies, such as, tax incentives to bolster stock market size and activity. There is a view that, apart from contributing to domestic financial liberalization, stock markets also encourage external financial liberalization by emerging as a significant channel of foreign capital flows but external financial liberalization may have adverse effects on developing economies. Singh (1997) argues that financial liberalization and the associated expansion of stock markets in developing countries are unlikely to favour long-term growth. The causality analysis can provide useful insights into the choice of policies particular to each country and such a break-up can be provided by time series analysis on each of the countries. It might be argued that, in case of finance-led growth, policies should be aimed to liberalize the financial sector and in case of growth causing finance, the weight should be on other policies to improve growth.

Various empirical studies also address policy issues. Levine (1991) demonstrates that impeding financial market activity lowers per capita growth rates. Levine and Zervos (1995) find that countries which liberalized restrictions on capital and dividend flows, exhibit improvements in the functioning of their stock exchanges after the liberalization (Demirgüç-Kunt and Levine 1996a). Demirgüç-Kunt and Levine (1996b) find that volatility of stock market return may rise in the short-term following the liberalization of capital controls and countries more open to international capital are more likely to

have less volatile markets in the long-run than those with tighter capital controls.

Ultimately, while choosing policies for practical purposes, it is judicious to take into account that the suitable arrangements to develop a financial system depend upon the specific characteristics of the country concerned, where these types of studies can help the policymakers.

Notes

1. Integrated process of order one implies that there is unit root at level but not at first difference.
2. This theorem implies that the presence of cointegration among variables means that there is a long-run relationship among the variables.
3. The results of these unit root and cointegration tests are with the authors and are available upon request.

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Table 1 Sequence of Some Stages of Liberalization of the Five Countries

Stage / Country	Elimination of direct credit	Decontrol of interest rates	Privatization	Deregulation
Thailand	1980	1992	1993	1993
Korea	1982	1991	1983	1988
Indonesia	1983	1983	1996	1992
Malaysia	1976	1991		1990
Philippines	1983	1983	1995	

Source: Noy (2005*)*.
Note: Blank spaces denote liberalized before 1980 or not liberalized till 2004.

Table 2 Summary Statistics: Full Sample

Variable	Number of Observation	Mean	Standard deviation	Minimum	Maximum
GDPGRWTH	90	5.37	4.25	-13.13	12.19
MCAP	90	68.60	63.40	2.22	328.88
TRNVR	90	75.57	72.92	6.80	380.30
CLMPVT	90	65.49	32.31	17.27	134.15
SPREAD	90	3.16	1.95	-6.91	7.68
POPGRWTH	90	1.55	0.66	0.26	2.89
CAPFOR	90	28.54	7.89	11.37	43.64
INF	90	6.26	6.60	0.30	58.39

Table 3 Summary Statistics: Dropping 1997

Variable	Number of Observation	Mean	Standard deviation	Minimum	Maximum
GDPGRWTH	85	5.44	4.30	-13.13	12.19
MCAP	85	70.54	64.30	2.22	328.88
TRNVR	85	74.28	74.30	6.80	380.30
CLMPVT	85	64.62	32.41	17.27	134.15
SPREAD	85	3.17	1.97	-6.91	7.68
POPGRWTH	85	1.55	0.67	0.26	2.89
CAPFOR	85	28.23	7.88	11.37	43.64
INF	85	6.39	6.77	0.30	58.39

Table 4 Results of Panel Unit Root Tests

Variable	Method	Statistic	Probability
GDPGRWTH	Levin, Lin and Chu	-3.45	0.00
	ADF - Fisher	22.80	0.01
	PP - Fisher	23.31	0.00
ΔGDPGRWTH	Levin, Lin and Chu	-10.86	0.00
	ADF - Fisher	98.94	0.00
	PP - Fisher	118.85	0.00
MCAP	Levin, Lin and Chu	-1.14	0.12
	ADF - Fisher	7.47	0.68
	PP - Fisher	6.33	0.78
ΔMCAP	Levin, Lin and Chu	-9.90	0.00
	ADF - Fisher	87.63	0.00
	PP - Fisher	95.74	0.00
TRNVR	Levin, Lin and Chu	-1.71	0.04
	ADF - Fisher	12.23	0.26
	PP - Fisher	12.23	0.26
ΔTRNVR	Levin, Lin and Chu	-12.53	0.00
	ADF - Fisher	110.69	0.00
	PP - Fisher	107.88	0.00
CLMPVT	Levin, Lin and Chu	2.66	0.99
	ADF - Fisher	3.82	0.95
	PP - Fisher	3.50	0.96

Table 4 contd. in the following page

Table 4 contd. Results of Panel Unit Root Tests

Variable	Method	Statistic	Probability
ΔCLMPVT	Levin, Lin and Chu	-5.45	0.00
	ADF - Fisher	45.89	0.00
	PP - Fisher	46.86	0.00
SPREAD	Levin, Lin and Chu	-1.36	0.08
	ADF - Fisher	11.62	0.31
	PP - Fisher	11.32	0.33
Δ SPREAD	Levin, Lin and Chu	-9.71	0.00
	ADF - Fisher	88.13	0.00
	PP - Fisher	101.48	0.00

Note: Δ denotes first difference.

Table 5 Results of Pedroni Cointegration Tests

Statistic	Cointegration among GDPGRWTH, MCAP and CLMPVT	Cointegration among GDPGRWTH, MCAP and SPREAD	Cointegration among GDPGRWTH, TRNVR and CLMPVT	Cointegration among GDPGRWTH, TRNVR and SPREAD
Panel v	-0.89 (0.26)	-2.39 (0.02)	-0.63 (0.32)	-2.49 (0.01)
Panel v(weighted)	-1.17 (0.19)	-2.39 (0.02)	-1.50 (0.12)	-2.41 (0.02)
Panel ρ	-0.93 (0.25)	0.63 (0.32)	-1.26 (0.17)	0.79 (0.29)
Panel ρ(weighted)	-0.96 (0.25)	0.63 (0.32)	-1.24 (0.18)	0.81 (0.28)
Panel ADF	-3.77 (0.00)	-3.73 (0.00)	-3.83 (0.00)	-3.12 (0.00)
Panel ADF (weighted)	-4.53 (0.00)	-4.39 (0.00)	-4.20 (0.00)	-3.56 (0.00)
Panel PP	-4.18 (0.00)	-3.44 (0.00)	-3.80 (0.00)	-2.77 (0.00)
Panel PP (weighted)	-5.79 (0.00)	-4.12 (0.00)	-4.32 (0.00)	-3.08 (0.00)
Group ρ	0.02 (0.39)	1.63 (0.10)	-0.25 (0.38)	1.79 (0.07)
Group ADF	-4.45 (0.00)	-4.91 (0.00)	-3.99 (0.00)	-3.99 (0.00)
Group PP	-7.58 (0.00)	-3.95 (0.00)	-4.72 (0.00)	-3.13 (0.00)

Table 6 FMOLS Estimates: Full Sample

Variable	Regression including GDPGRWTH, MCAP and CLMPVT	Regression including GDPGRWTH, MCAP and SPREAD	Regression including GDPGRWTH, TRNVR and CLMPVT	Regression including GDPGRWTH, TRNVR and SPREAD
MCAP	0.01 [1.33]	0.00 [1.34]		
TRNVR			0.01 [**4.06**]	0.02 [**5.04**]
CLMPVT	-0.03 [**-3.26**]		-0.03 [-0.23]	
SPREAD		-0.48 [**-5.53**]		-0.39 [**-2.93**]
POPGRWTH	0.18 [0.82]	0.89 [**3.90**]	-0.28 [0.96]	1.55 [**2.83**]
CAPFOR	0.28 [**7.77**]	0.18 [**4.01**]	0.32 [**7.49**]	0.20 [**2.39**]
INF	-0.16 [**-6.79**]	-0.28 [**-7.90**]	-0.13 [**-5.84**]	-0.22 [**-3.36**]

Note: Bold figures indicate 1% level of significance.

Table 7 FMOLS Estimates: Dropping 1997

Variable	Regression including GDPGRWTH, MCAP and CLMPVT	Regression including GDPGRWTH, MCAP and SPREAD	Regression including GDPGRWTH, TRNVR and CLMPVT	Regression including GDPGRWTH, TRNVR and SPREAD
MCAP	0.01 [**2.75**]	-0.00 [-0.65]		
TRNVR			0.01 [**5.77**]	0.02 [**8.71**]
CLMPVT	-0.03 [**-3.72**]		-0.03 [-0.45]	
SPREAD		-0.57 **[-6.13]**		-0.50 [**-5.55**]
POPGRWTH	0.65 [1.94]	2.14 [**3.89**]	0.65 [**2.46**]	2.32 [**3.04**]
CAPFOR	0.26 [**6.80**]	0.17 [**3.28**]	0.30 [**6.73**]	0.15 [0.93]
INF	-0.13 [**-5.57**]	-0.27 [**-8.22**]	-0.09 [**-3.94**]	-0.20 [**-3.96**]

Note: Bold figures indicate 1% level of significance.

Table 8 Results of Granger Causality Tests: Full Sample

Null hypothesis	F-statistic
MCAP does not Granger Cause GDPGRWTH	**14.70**
GDPGRWTH does not Granger Cause MCAP	2.65
TRNVR does not Granger Cause GDPGRWTH	0.66
GDPGRWTH does not Granger Cause TRNVR	2.34
CLMPVT does not Granger Cause GDPGRWTH	2.92
GDPGRWTH does not Granger Cause CLMPVT	**9.89**
SPREAD does not Granger Cause GDPGRWTH	0.08
GDPGRWTH does not Granger Cause SPREAD	**4.30**

Note: Bold figures indicate 1% level of significance.

Table 9 Results of Granger Causality Tests: Dropping 1997

Null hypothesis	F-statistic
MCAP does not Granger Cause GDPGRWTH	0.26
GDPGRWTH does not Granger Cause MCAP	1.96
TRNVR does not Granger Cause GDPGRWTH	0.79
GDPGRWTH does not Granger Cause TRNVR	**4.40**
CLMPVT does not Granger Cause GDPGRWTH	0.06
GDPGRWTH does not Granger Cause CLMPVT	**11.28**
SPREAD does not Granger Cause GDPGRWTH	0.04
GDPGRWTH does not Granger Cause SPREAD	**5.13**

Note: Bold figures indicate 1% level of significance.