

## **Foreign Capitals, Savings and Economic Growth: A Dynamic Panel Study on the East Asian Countries**

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### **Abstract**

The global economies in the 1990s was characterised by a string of new style financial crises that plunged a number of rapidly growing and successful economies in the world into financial chaos and economic collapse. The challenge of reconciling international mobility with domestic economic stability and developmental priorities has now emerged as the most pressing and controversial topic in international economies and policymaking. At the heart of this new policy focus is a renewed emphasis on the conventional wisdom about the need to treat foreign direct investment (FDI) flows separately from other forms of capital flows (short run and long run debt) when designing national policies to monitor capital flows. This paper contributes to the debate by assessing the role of foreign capital inflows and outflows in generating sustainable saving and growth prior and during the crisis. Although there have been a large number of studies of foreign capital inflows, few have gone beyond qualitative assertions regarding FDI, long and short-term debt, saving and growth. The main results of this study may be summarized as follows. The main results of this study can be summarized as follows. First, economic growth has been a significant (positive) effect on savings ratio and the causality runs in both directions. Second, short-term debt temporarily displaced domestic savings, but the coefficient is less than one prior the crisis and significantly different from unity during the crisis period. Third, FDI contributes positively to savings ratios in the short run as well as in the long run, hence suggesting that a transitory or permanent change in FDI would augment the supply of domestic savings. Finally, the empirical result shows that FDI is indisputably beneficial to the East Asian countries as it helps to boost the economic growth.

## **I. Introduction**

Foreign capital and domestic savings have been at the core of economic analysis largely because of their implication on the long-term economic progress. The influx of foreign capitals in the East Asian countries demonstrates that capital inflows can benefit the recipient country by filling the investment and technological gaps, and in this case help to accelerate economic growth. Such inflows, however, may also hinder the domestic economy when they become a source of economic instability, potential inflationary pressures and the widening of the current account imbalances. In this case, capital inflows impede economic progress<sup>1</sup>. The 1997/98 Asian financial crises demonstrate that had it not been for the mismanagement of private capital inflows, the Asian financial crises could perhaps have been avoided. In addition, the financial crises in Latin America and Russia also indicate that governments should manage their foreign exposure so as to prevent a mismatch in the currency composition of their assets and liabilities. These episodes illustrate the policy dilemmas that arise in connection with foreign capital inflows on the recipient countries.

Capital inflows increased domestic investments, and increased investments contributed to the achievement of higher growth (investment-led growth hypothesis). Higher growth invites more investment and more investments attracted further capital flows. This virtuous cycle of capital inflows and economic growth was indeed an integral part of what was known as the Asian ‘miracle’. Capital inflows in Asia unlike that of Latin America were mostly channelled to investments rather than consumption. The large deficits in the current account balance observed in the late 1980s-mid 1990 reflect this savings-investment gap. In order to support high levels of investment, East Asia had to draw savings mainly from the rest of the world. The domestic savings rate was already high in most of the East Asian countries, especially in Malaysia and Singapore, but the investment rate was even higher. The high investments by both the private and public sectors had contributed to the impressive growth records in the period prior to the

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<sup>1</sup> Recent studies have focused on implications of capital inflows on the macroeconomics variables of the host country (e.g. [Jordan and Fiona, 1998](#); [Furman and Stiglitz, 1998](#)).

financial crisis. Not only had they achieved average annual rates well above the world's average growth, they managed to sustain such rates for a long period.

Foreign capitals became an important source of fund in all Asian countries in general, and particularly in the five hardest-hit economies (South Korea, Malaysia, Indonesia, Thailand, and the Philippines) in the early 1990s. Capital inflows in the region rose from an average of 1.4 percent of GDP for the period 1986-1990 to 6.7 percent during 1990-1996, with Thailand's capital inflow rising to 10.3 percent. Thus, any shocks that induced a large drop in capital inflows had the potential to create serious financial and economic problems for the countries in the region (Whitt, 1999). The recent Asian financial crises have raised questions about the role of foreign capital in promoting sustainable growth.

A striking feature about the trend in capital flows to developing countries in the 1990s is that private capital flows were increasingly becoming a major source of financing of large current account imbalances, significantly dwarfing official flows in terms of relative importance. According to an estimate made by the World Bank (1999), private capital flows increased by more than five fold between 1990 and 1996, reducing the share of total official flows to less than 5 per cent. In the crisis-affected countries the large current account deficits recorded in most part of the 1990s were largely due to private savings-investment decisions and not budget deficits. The rapid growth of private capital flows, and of portfolio flows in particular, to East Asia in the last decade or so reflected the increasing financial integration of these countries internationally (see Baharumshah and Goh, 2001). The growth in international funds had been propelled and facilitated by technological progress, which had reduced the transaction costs of buying and selling financial assets. Besides that, the greater reliance on private rather than official financing also signaled the increasing creditworthiness of the host countries.

The surge of foreign capital to these countries carries with it an inherent risk in that it exposes the host country to external shock, which does not only threaten the stability of the financial system but also undermines their future economic growth prospects. The financial turmoil in Asia was triggered by capital account reversal leading to the collapse

of asset prices and exchange rates and these events happened at about the same time<sup>2</sup>. The depreciation of exchange rates to unprecedented levels amidst the economic and financial crisis of 1997-99 has had an impact on external debt obligations. An important policy lesson to be learned from this banking and currency crisis is that short-term capital can exit as easily as they can enter in an open economy. This suggests that private capital flows, particularly short-term debts, can be unreliable and excessively volatile. Depending on the stage of financial development, for many developing countries the cost of opening up the financial flows may exceed its benefits. In recent years, however, the flow of foreign direct investment (FDI) into developing countries outside Asia began to match those in the Asian developing economies (ADEs) countries. For example, in 1996 FDI in ADEs outpaced FDI in non-Asian developing countries by less than US\$ 2 million compared to more than US\$ 3 million in 1993 and to the tune of US \$ 12 billion in 1997<sup>3</sup>.

The objective of this paper is three-fold: First, the paper investigates the relationship between foreign capital inflows, and in particular the effect of short-term debt and other categories of capital flows on savings ratios of the host country. Second, we seek evidence on the causal relationship among domestic savings, foreign capital inflows and economic growth. The inclusion of short-term, long-term debts and FDI in our estimated equations allows us to test the hypothesis that foreign capitals displace domestic savings. Third, the aim of this paper is to find out if FDI is more resilient compared to other forms of foreign capital inflows during the crisis period. More precisely, we want to show that FDI foster rather than hinder capital accumulation.

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<sup>2</sup> The Indonesian rupiah depreciated more than 140 percent, while the Korean won and the Thai baht depreciated more than 80 percent, vis-a-vis the U.S dollar. The Malaysian ringgit and Philippine peso depreciated about 50 percent. Stock prices in these countries also plummeted. It is became less than half from January to December of 1997. This caused anxiety among investors and led to deterioration in market confidence, which in turn, sparked off the massive outflows of short-term capital and triggered a series of reductions in the value of regional currencies and equity markets.

<sup>3</sup> FDI is the major source of foreign capital in East Asian countries and it adds up to about 54 percent of the total capital inflows. Nevertheless, the percentage of FDI to total capital varies across these countries. Korea did not rely so much on FDI as compared to countries like Malaysia and Indonesia in the 1990s. For a more detailed discussion on the inflows of FDI in East Asia, see [Lall \(1996\)](#).

This study attempts to address these issues by focusing on the dynamic relationship between savings, investment and growth both in the short- and long run. We consider six Asian countries (hereafter referred to Asian-6) in our sample: Thailand (THI), Malaysia (MAL), Indonesia (IND), Philippines (PHI), Singapore (SIN) and South Korea (SKR). All these countries were severely affected by the recent financial crises, except for Singapore. We chose the Asian-6 because they are relatively open economies and actively sought foreign capital (FDI) to fill the savings-investment gap. In fact, four of the ASEAN countries (Malaysia, Indonesia, Thailand and the Philippines) accounted for approximately 50 percent of FDI flows to the developing countries since 1990. Foreign investment has been a key force behind the investment process in these countries. Moreover, the rise in national savings has coincided with a period of high investment growth. The developments prior to the Asian financial crisis also led to the surge of short-term capital. Domestic borrowers found that they could lower their financing costs by borrowing in dollar or yen rather than in local currency<sup>4</sup>.

This article contributes to the existing literature on the host subject in a number of ways. First, the ASIAN-6 received large FDI flows by world standards. Despite the importance of foreign capital to these countries, few empirical works have been carried out to examine the impact of foreign capital on economic growth and domestic savings in these countries. The FDI can permanently increase the rate of growth in the host country through technology transfer, diffusion and spillover effects into the host country. It is not uncommon to find some authors arguing that FDI contributes more to growth domestic savings. Second, there is also a growing consensus that the recent financial crises, particularly East Asia ones are due to large exposures of short-term debts<sup>5</sup>. Several authors have pointed out that unlike FDI, the effect of short-term debt on economic progress is only temporary. However, there is no empirical evidence to indicate a relationship between short-term debt and economic growth. The sample countries offer to

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<sup>4</sup> This is a common feature of the East Asian economies throughout the 1990s, where money flowed at an accelerating rate. In the peak year of 1996, about US \$90 billion flowed into South Korea, Indonesia, Thailand and the Philippines alone.

<sup>5</sup> Analyst believed that excessive external short-term obligation are vulnerable to sudden changes in market sentiment and financial panics (see for example, [Radelet and Sachs, 1998](#) and [Furman and Stiglitz, 1998](#))

validate this hypothesis since we observed a high domestic savings and corresponding current account deficits, except for Singapore.

Third, the empirical evidence on the causal relationship among domestic savings, FDI, short-term and long-term debts and economic growth is rather inconclusive. Hence, motivated by the recent events in the region, we intend to show to what extent FDI, domestic savings and short-term debt have an influence (if any) on the overall growth process. Finally, a major drawback in most of the previous studies is that they fail to consider the non-stationarity issue in dynamic panel data. This study makes some attempt at rectifying this lacuna by quantifying the above issue using the dynamic panel approach over the two sub-periods, prior to the Asian financial crisis (1965-1995) and during the financial crisis (1996-2000).

The main results of this study can be summarized as follows. First, economic growth has been a significant (positive) effect on savings ratio and the causality runs in both directions. Second, short-term debt temporarily displaced domestic savings, but the coefficient is less than one prior the crisis and significantly different from unity during the crisis period. Third, FDI contributes positively to savings ratios in the short run as well as in the long run, hence suggesting that a transitory or permanent change in FDI would augment the supply of domestic savings. Finally, the empirical result shows that FDI is indisputably beneficial to the East Asian countries as it helps to boost the economic growth.

The remainder of the paper is organized as follows: Section II reviews the theoretical issues on savings, growth and foreign capital. This followed by the data and model used in the analysis. In this section the methodology utilized in the analysis is also presented. The empirical results from applying the model to data for Asain-6 - South Korea, Singapore, Malaysia, Thailand, Indonesia and the Philippines – are presented and discussed in Section IV. Finally, the last section summarizes the main results along with our concluding remarks.

## **II. Savings, Growth and Foreign Capital in the Theory**

Foreign direct investment (FDI) represents the most important component of private capital flows, followed by portfolio equity and bond flows. ASEAN received large portfolio equity and bond inflows in the first half of 1990, and they were virtually negligible until the late 1980s. By 1997, East Asia had generally absorbed about 52.4 per cent of FDI and nearly 60 percent of all short-term capital flows to developing countries. In the mid-1990s, much of the short-term private capital came from Japanese banks as they followed their corporate foreign investors into Southeast Asia. According to the data from the IMF, Asia persistently and increasingly drew in tens of billions of capital inflows a year from the beginning of the decade, peaking at US\$ 106 billion for the region as a whole in 1996. This inflow comprising both indirect and direct foreign investments is one of the major contributing factors to propel growth rates in East Asia prior to the crisis.

There is now a large literature on the role of foreign capital (or aid) in determining the host country's economic growth and savings. Earlier studies that attempted to establish the relation between national and foreign savings failed to reach a consensus. Authors such [Griffin and Enos \(1970\)](#) showed that an extra dollar of foreign capital is associated with a rise in consumption of about seventy-five cents and a rise in investment by twenty-five cents. [Over \(1975\)](#) reported a positive correlation between foreign capital and national savings. Besides that, he went on to note that an increase in foreign capital provided an equal boost to the savings rate and was a stimulus to economic growth. Based on a large data set [Edwards \(1996\)](#) highlighted the importance of foreign savings as one of the explanatory variables in savings equation. Specifically, he concluded that high foreign savings is associated with lower domestic savings.

The bulk of the empirical evidence suggested that capital inflows showed greater volatility in Latin America than in Asia before the Asian financial crisis. Meanwhile, several authors noted that short-term capital was more volatile than the other types of capital inflows in both the region ([Kaminsky and Reinhart, 1998](#)). Such findings lead to the popular perception regarding the relative volatility of different types of capital.

Nevertheless, this issue on the volatility of short and long-term capital inflow is far from settled. In fact, the article by [Claessens \*et al.\* \(1995\)](#) found no statistical evidence to support the argument that long-term flows are less volatile to predict than short-term flows. The Asian financial crisis, on the other hand, revealed that the volatility of capital flows is due primarily to short-term debt. Indeed, despite the development of global derivative products in the 1990s, unhedged currency and interest rate exposures were key determinants of the crisis in Mexico and Asia.

Recently, researchers have investigated the effect of short-term debt and long-term capital on economic growth. Authors such as, [Corbo and Hernandez \(1995\)](#) argued that one reason why controls on short-term foreign capital flows may be counterproductive is that the flows they discourage might contribute to growth. [Gruben and Mcleod \(1998\)](#) using data from 18 Asian and Latin America countries showed that an increase in the share of FDI to GDP is positively and significantly related to domestic savings, and changes in the share of portfolio equity capital inflows to GDP also have a significant positive effect on national savings. Their findings also reveal that other types of capital inflow offer mixed and often insignificant results.

It is worth pointing out here that the empirical results on the contribution of foreign capital to the host country's economic progress are not conclusive. For instance, [De Mello \(1999\)](#) argued that in an open economy FDI might be detrimental to growth if it is a substitute for domestic savings, in which case, FDI inflows exacerbate balance of payments problems via foreign exchange remittances. Similarly, the work by [Reinhart and Talvi \(1998\)](#) based on the data from 24 countries in Latin America and Asia found a negative correlation between foreign and domestic savings for most of the countries in the sample (20 countries). This point is also made by [Nurhan \(1999\)](#), where she showed that a surge in capital inflows adversely affected domestic savings by increasing current consumption and current account deficit. A considerable part of domestic savings is used to finance transfers abroad due to the increased burden of external interest payments, which grows together with the excessive external debt. On the other hand, foreign capitals are mostly used to finance domestic consumption and import of consumer goods.



The literature on the subject has also revealed a positive correlation between foreign capital and economic growth. The empirical results by [Lahiri \(1989\)](#) and [Hussein and Thirlwall \(1999\)](#), all suggest that foreign capital enhances economic growth.

To sum up, the review of the relevant literature reveals three important arguments that stand out in empirical studies: First, the bulk of the evidence suggests that high saving will result in high levels of investment and hence a higher level of economic growth. Second, an increase in domestic savings may indeed be offset by reductions in foreign capital inflows and vice versa. Third, empirical evidence on the contribution of foreign capital on economic growth is at best mixed. The existing empirical literature did not distinguish the contribution of short-term debt and FDI on economic growth, except for the work by [Gruben and Mcleod \(1998\)](#).

### **III. Data and the Model**

Our analysis focuses on the Asian-6 - South Korea, Singapore, Malaysia, Thailand, Indonesia and the Philippines. Quarterly frequency data set was not readily available in any existing database set and so annual data were used instead. The bulk of the data from 1965 to 2000, for gross domestic savings (GDS; row 0.54), gross domestic product (GDP; row 0.01), long-term debt (LD; row 232), short-term debt (SD; row 235) and foreign direct investment (FDI; row 214) comes from *Key Indicators of Developing Asian and Pacific Countries*, 2001, Vol. XXXI, Oxford University Press, New York. The variables are expressed as a ratio to the GDP and are based on market prices. To be consistent, all variables are converted to US dollars.

The reduced form, long-run model for the saving rates (GDS/GNP) that we estimate (in logarithmic form) is:

$$GDS / GNP_t = \alpha_0 + \alpha_1 GDP_t + \alpha_2 SD_t + \alpha_3 LD_t + \alpha_4 FDI_t + \mu_t \quad (1)$$

where  $\mu_t$  is the error term to capture the unobserved effects and assumed to have zero mean and constant variance. The  $\alpha$ 's are parameters to be estimated and  $t$  denotes time subscript. All explanatory variables are defined above.

The analysis is based on various unit root and cointegration tests. There are two main approaches to testing for cointegration. They are the Engle and Granger (1987) two-step procedure and the Johansen (1988) and Johansen and Juselius (1990) procedure<sup>4</sup>. To test for cointegration among the macroeconomic variables we followed the procedure developed by Johansen (1988) and Johansen and Juselius (1990) since this particular method is claimed to be much superior to the residual based Engle and Granger procedure. The Johansen-Juselius method sets out a maximum likelihood procedure for the estimation and determination of the presence of cointegrating vectors in the system.

We begin our analysis by showing the univariate properties of the various variables of interest using the standard Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) unit root tests. The form of the ADF test used allows for both the presence of a constant and a constant deterministic drift. The PP test, which allows for general forms of heteroscedasticity, also included constant and drift terms. Taken together, the results from these two unit root tests in Table 3 failed to reject the null hypothesis of a unit root. The null hypothesis, however, was overwhelmingly rejected for all the series in first-differences by the ADF and PP tests. Since all the variables are integrated to the same order, this allows us to proceed with the cointegration test.

### **[Insert Table 1]**

To determine whether these non-stationary variables are cointegrated, the multivariate cointegration technique developed by Johansen (1988) and its extension in Johansen and Juselius (1990) was employed to the five-dimensional vector:  $X_t = [GDS/GDP_t, G_t, SD_t, LD_t \text{ and } FDI_t]$ . The Johansen methodology offers two likelihood ratio test statistics for determining the number of cointegrating vectors. In the first likelihood ratio statistics the null hypothesis is that there are at most  $r$  cointegrating vectors against the alternative

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<sup>4</sup> Apart from being multivariate, the Johansen procedure has several appealing features. First, it allows more than one cointegrating relation among the variables being examined. Second, there are concerns about the small-sample bias in estimates from the Engle-Granger procedure. Finally, unlike the Johansen procedure, the Engle-Granger two-step procedure does not easily accommodate dynamics in the cointegration analysis.

hypothesis that there are  $r$  or more cointegrating vectors. This is the trace statistics. In the second test, the null hypothesis is that there is at most  $r$  cointegrating vectors against the alternative of  $r+1$  cointegrating vectors. This statistics-maximum eigenvalue  $\lambda$ -max statistic is generally considered more powerful because the alternative hypothesis is in equality. Although these two likelihood ratio statistics will have non-standard distribution under the null hypothesis, asymptotic critical values have been generated by Monte Carlo methods and tabulated by [Osterwald-Lenum \(1992\)](#).

Results of the cointegration analysis are summarised in Table 2. The multivariate Johansen-Juselius tests reveal that the null hypothesis of no cointegration ( $r=0$ ) is easily rejected at the 5 per cent significance level in the system of five variables. Notice that both the computed  $\lambda$ -max and trace statistics exceed their critical values. In addition, we found that the eigenvalue associated with the first vector is dominant over those corresponding to other vectors, thereby confirming that there exists a unique cointegrating relationship in the system (for all countries). This outcome implies that income, FDI, long term-debt and short-term debt share a stable long-term relationship with domestic saving. At this point it is important to find out if each of the variables (including the short-term debt) enters the cointegrating relationship significantly. We test for zero restrictions on each of the coefficients derived by the Johansen procedure. The LR statistics reveal that all five variables enter the cointegrating relationship significantly, suggesting that omission of any one of these variables may bias the results<sup>6</sup>.

**[Insert Table 2]**

Given that both the trace and  $\lambda$ -max statistics yield a single cointegrating vector among the five  $I(1)$  variables, we proceeded with the dynamic Generalized Least Squares methodology of [Stock and Watson \(1993\)](#) as described in [Campbell and Perron \(1991\)](#). This method corrects for (i) serial correlation using Generalized Least Square (GLS); and (ii) endogeneity of the regressors by including lags and leads of changes in the

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<sup>6</sup> We also increased the order of the VAR to two given our interest in the long run and the relatively small number of observations. The results obtained were consistent with those found for VAR (1): There is only one stationary relation among the five variables.

explanatory variables. Furthermore, [Mark and Sul \(1999\)](#) have shown that there are sizeable gains in pooling the data. [Kao and Chiang \(1999\)](#) have compared different estimation techniques for panel data and have found that the dynamic GLS (DGLS) easily outperforms both OLS and fully modified OLS (FMOLS). Therefore, in our discussion the focus is on the results obtained from the DGLS model.

The long-run DGLS (following the Stock and Watson approach) for the savings equation is:

$$\begin{aligned}
GDS / GDP_{ijt} = & \pi_{ij} + \pi_{ij1}G_{ijt} + \pi_{ij2}SD_{ijt} + \pi_{ij3}LD_{ijt} + \pi_{ij4}FDI_{ijt} + \lambda_{ij1}(L)\Delta G_{ijt} + \lambda_{ij2}(L^{-1})\Delta G_{ijt} \\
& \lambda_{ij3}(L)\Delta SD_{ijt} + \lambda_{ij4}(L^{-1})\Delta SD_{ijt} + \lambda_{ij5}(L)\Delta LD_{ijt} + \lambda_{ij6}(L^{-1})\Delta LD_{ijt} + \\
& \lambda_{ij7}(L)\Delta FDI_{ijt} + \lambda_{ij8}(L^{-1})\Delta FDI_{ijt} + \mu_{ijt}
\end{aligned} \tag{2}$$

where

$$\begin{aligned}
\pi_{ijm}(L) &= \sum_{\kappa} \pi_{ij\kappa} L^{\kappa} \text{ for } m=1,3,5,7 \text{ and} \\
\pi_{ijm}(L^{-1}) &= \sum_{\kappa} \pi_{ij\kappa} L^{-\kappa} \text{ for } m=2,4,6,8
\end{aligned}$$

$L$  is the lag operator. The  $\alpha$ 's are parameters of the models to be estimated,  $\mu_t$  is the error term to capture the unobserved effects and assumed to have zero mean and constant variance. All variables are expressed in ratio of GDP, and  $t$  denotes time subscript. The integer  $k$  is the lag (lead) and is chosen in the following manner. Starting with a reasonable upper bound of  $k$ , on estimation, if the variable is significant, then  $k$  is chosen to be the upper bound. If the variable is insignificant then the number of lags (leads) is reduced by one until the last included lag is significant in the estimation.

By estimating Equation (2), it is possible to construct asymptotically valid test statistics as well as to estimate the long-run relationship, where the coefficients of  $G$ ,  $SD$ ,  $FDI$ , and  $LD$  are the cointegrating parameters. Thus using a standard F- or Wald-test can test the causal relationship between any of the explanatory variable. For example, SD Granger-cause  $GDS/GDP$ , if the null hypothesis that  $\pi_{ij2} = \lambda_{ij3} = \lambda_{ij4} = 0$  is rejected. Following

Koa and Chiang (1999) we estimated the parameters of the model by the DGLS technique. Finally, the short-run DGLS for the savings equation is:

$$\Delta S / Y_{ijt} = \eta_{ij} + \eta_{ij1} ECM_{ijt-1} + \eta_{ij2}(L)\Delta G_{ijt} + \eta_{ij3}(L)\Delta SD_{ijt} + \eta_{ij4}(L)\Delta LD_{ijt} + \eta_{ij5}(L)\Delta FDI_{ijt} + \mu_{ijt} \quad (3)$$

where the term  $ECM_{ijt-1}$  is the one period lagged error correction term from the long run savings function.

#### IV. Empirical Results

##### (i) The long run model

The estimations were carried out first over the period 1965-2000, with the observations for 1965 and 2000 retained for lag and lead. The preliminary results show that the panel OLS method does not produce residuals free from autocorrelation<sup>7</sup>. Hence, we employed the Stock and Watson (1993) generalized dynamic Least Square (DGLS) estimator that includes leads, lags and an autoregressive error process. Table 3 describes the long run relationship for the three sample periods: 1965-2000, 1965-1994 and 1995-2000. As shown in column 1 of Table 3, all the variables carry the expected sign and only one (short-term debt) out of the four variables is statistically insignificant for the full sample period. In order to evaluate the robustness of the results due to the sampling period, we carried out the analysis for two sub-periods. The first sub-period ends in 1994, to exclude the period of large depreciation of the yen against the dollar that triggered the crisis in Asian and in the following year marked the slowdown of the Asian economies (Kwan, 1998)<sup>8</sup>. The second is from 1995-2000 and it coincides with the Asian financial crisis. These results are given in Table 3. One interesting feature of the relationship between saving, economic growth and foreign capitals is that the long run parameters appear to vary over the two sub-periods, suggesting that the long run parameters of the model are affected by the events in the mid 1990s.

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<sup>7</sup> These results were obtained using Shazam 7.0. The results of the OLS method are available from the first author upon request.

<sup>8</sup> The data reveals that large amounts of net capital inflows in Asia occurred in 1995 and 1996. For Thailand the figures suggest that capital flight began in early 1997. This suggests that international investors recognized the vulnerability of the Thai baht before the Asian crisis.

Column 2 of Table 3 reports the long run parameters of the model during the pre-crisis period. According to the long run equation, short-term debt and long-term debt are negatively correlated to domestic savings, but the coefficients are not significant at the standard significant levels. Hence, the evidence indicates that short and long-term debts do not displace domestic savings in the long run. On the other hand, the signs on the coefficient of the income and foreign direct investment (FDI) variables are positive, implying that economic growth and FDI contributes positively to domestic savings. Both of these variables are statistically significant in the long run relationship based on conventional significance levels.

**[Insert Table 3]**

Results of the long run parameters during the Asian financial crisis appear in column 3 of Table 3. We observed that the results during the crisis period are qualitatively similar to that during the pre-crisis period. However the magnitude of the individual coefficients varied between the two sample periods. Several striking features emerged from the estimates based on the data during the financial crisis. First, in contrast to the two other determinants of long run savings rates, the influence of economic growth and FDI have become less dominant during the crisis period. Both variables display the anticipated positive sign, which suggests that FDI and growth boost national savings. Specifically, the contribution of economic growth and FDI on national savings is much smaller during the Asian financial crisis. Third, it should be noted that we find the coefficient of the short-term debt statistically insignificant. Thus, short-term debt has no significant bearing on savings (growth) over the two sub-periods. Fourth, the estimated size of the coefficient of the long-term debt is negative in both periods but it is much larger during the crisis period. Thus, our estimates appear to suggest that long-term debt during the crisis displaced more domestic savings than those found in the earlier periods. Finally, all in all, the parameters appear to be unstable over the full sample period. Therefore, our results based on sub-sample analysis suggest that the recent Asian financial crisis has altered the long run relationship among national savings, long-term debt, FDI and economic growth.

*(ii) Short-run dynamics between savings, economic growth and foreign capital*

The short run model is obtained through a search procedure, and the results of the error correction equation are reported in Table 4. The short run model fits the data well and the error-correction term is correctly (negatively) signed and statistically significant at the five percent level. Hence, the short-run model reinforced the results of the cointegration test reported earlier. The speed of adjustment during the first sub-period (1965-1994) is -0.288 implying that 28.8 percent of the previous year's domestic savings from its long run or equilibrium value will be corrected each year. Interestingly, the results suggest that the speed of adjust towards its equilibrium level has increased over the two sample periods. As depicted in Table 4, this result could be interpreted as a sign of greater flexibility in the ASEAN economies. Notice that the error-correction (ECM) term presented in the last column of the table indicates that the burden of short-run endogenous adjustment to bring the system back to its long-run equilibrium is borne by the domestic savings ratio.

Looking at the specific parameters, we found that short-term debt carries the expected negative sign in both sub-periods, suggesting that it displaces domestic saving in the short-run. However, we found that the coefficient is statistically significant at conventional levels only during the post-crisis period (1995-2000). Besides that the estimated coefficient was greater than one, indicating that short-term debt displaced domestic savings in more than one-to-one fashion. The overall effect is large and our results suggest that during the crisis period short-term debt can adversely affect domestic investment. It is worth noting here that short-term debt has no significant bearing on the short-run savings rates during the pre-crisis period as domestic savings played a more significant role in the economy than in the post-crisis era. As in the long run model, the coefficients of the FDI and growth rate carry a positive sign and they are statistically significant at the five percent level. These findings are consistent with the notion that economic growth and FDI contribute positively to the savings rates in the Asain-6 countries. It is noteworthy to point out that the size of both variables increases during the crisis period. For instance, the coefficient of FDI (growth) increases by more than double (four-fold), indicating the greater importance of the contribution of FDI (growth) on the

short-run savings rates during the crisis period. In other words, the declining growth and FDI in some of the crisis-affected East Asian countries will adversely affect their savings rates. These results are in accordance with the bulk of the literature (Lahiri, 1989 and Hussein and Thirlwall, 1999).

**[Insert Table 4]**

Finally, the coefficient on long-term debt bears a negative sign (insignificant) during the pre-crisis period. It is positive and statistically significant during the crisis period, which indicates that long term foreign capital is more important than short-term foreign capital as sources to finance the development during the Asian crisis. A note of caution is needed with regards to the empirical results of the period during the Asian financial crisis. While the approaches adopted in this paper are well refined and can invite confidence, the sample period may not be long enough. The absence of large numbers of observations during the post-crisis period remains one of the drawbacks of the present study. Nevertheless, previous studies have made no attempt to distinguish between the contributions of short-term and long-term debts on saving ratios. In this section, we demonstrate how robust our empirical results are to the sampling period.

**(iii) Granger Causality Tests**

The cointegration analysis presented above implies that the five variables are bounded together by one long-run relationship, but do not provide information on the causal relationship between these variables. We proceeded with the Granger-causality test and the results are summarized in Table 5. Results in the table point to several interesting facts about the causal relation; first, there is sufficient evidence to support the view that FDI and long-term debt (FDI and LD) Granger-cause domestic savings. The F-test of the exclusion of the dynamic terms and the level of FDI and LD in the savings equation shows that long-term capital Granger-causes savings. On the other hand, SD does not affect savings as well as the growth rate. Second, both FDI and the savings ratio affect economic growth (see row 2, Table 5). The effect of FDI on economic growth is either directly or indirectly through domestic savings. It indirectly affects growth through



capital formation since it helps to boost domestic savings. Capital formation including new machinery, managerial expertise, and marketing know-how will contribute to an increase in total investment. An increase in investment directly contributes to growth (FDI→GDS/GNP→G). FDI also contributes to savings directly: FDI contributes positively to employment, export earning, and government tax. These in turn, enhance domestic savings (FDI→GDS/GNP). Hence, a clear conclusion emerged for the causal relationship: The long-term growth prospects of the East Asian economies are affected by long-term (FDI and long-term debt).

**[Insert Table 5]**

Third, a bi-directional causality relationship between savings ratio and economic growth is detected. Hence our results tend to support the view that higher savings ratio causes economic growth and vice versa. This finding is noteworthy because it explains why the Asian-6 has recorded high savings and growth rates over the past few decades. Fourth, we observed that the causality runs from growth to short-term debt and long-term debt (column 2). These findings demonstrate the importance of economic progress and how economic growth leads to the influx of foreign capital across most categories of capital flows. Hence, supporting the popular view that the economic progress in the Asian-6 as well as the openness of the East Asian countries has attracted both short and long-term investors. These and other causalities are displayed in Table 5.

## **V. Conclusions and policy implications**

Maintaining an adequate or optimal level of savings remains a central policy concern, not only to guarantee sufficient financing for capital accumulation, but also to avoid an excess of investment over savings rate, which as demonstrated by the recent Asian financial crisis tends to create inflationary pressures or balance of payment disequilibria. This paper contributes to the debate on the importance of the various categories of foreign capital (short-term debt, long-term debt and FDI) to domestic savings and economic growth in a dynamic panel VAR framework. Overall, the empirical results tend

to support the view behind the success of the Asian-6 - economic growth is largely investment driven (investment-led hypothesis).

The empirical results and their policy implications may be summarised as follows. First, the results demonstrate that economic growth has a significant positive effect on savings ratio. Not surprisingly, the empirical analysis based on the dynamic panel approach showed that savings and economic growth reinforced each other – the causality runs in both directions. The two-way causality reported in this study is consistent with the hypothesis that there is a virtuous circle that goes from rapid growth to increased savings, higher savings is also likely to lead to faster capital accumulation and increased growth. Several authors have provided support on the hypothesis that, there is a virtuous circle that goes from faster growth to increased savings to even higher growth (Collins 1999; Gruben and Mcleod, 1998; Edwards 1995). Therefore, our finding does not concur with the view that domestic savings is the only source of increasing a nation's wealth (see for example, FitzGerald, 1993).

Second, we find no evidence to suggest that increase in short-term debt crowded-out domestic savings during the pre-crisis period. The variable appears to be insignificant both in the short and long run model. However, during the financial crisis we found that short-term debt crowded-out domestic savings in more than one-to-one fashion in the short-run. The over-dependency on short-term and not to mention their subsequent impact in destabilizing the economic performance has left their economies vulnerable to external shocks. The recent financial crisis clearly illustrates this point. The five economies of Indonesia, South Korea, Malaysia, the Philippines and Thailand experienced net inflows rising from \$40.5 billion in 1994 to \$93.0 billion in 1996. But in 1997 the inflows abruptly reversed, with net outflow of around \$12.1 billion. All of these countries experienced negative growth rates for several quarters following the period of capital reversal<sup>9</sup>. The retreat of foreign capital during the financial crisis emphasized the

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<sup>9</sup> Radelet and Sachs (1998) pointed out that each of the five countries had initiated, but not completed financial liberalization and reform. The partial reforms had led to an increasingly fragile financial system, characterized by growing short-term foreign debt, rapidly expanding bank credit, and inadequate regulation and supervision of financial institutions. These weaknesses, in turn, left the Asian economies vulnerable to a rapid reversal of capital flows.

need for more long-term debt and FDI financing in order to avoid real consequence when the short-term capital flows reversed. Long-term debt displaces less domestic savings while FDI is positively associated with savings rates. Foreign savings are more likely to increase growth the less likely they are to displace domestic savings.

Fourth, we found that FDI contributed positively to the savings ratio. It appears to be significant not only in the short run but also in the long run, implying that transitory (or permanent) change in FDI augments the supply of domestic savings - FDI inflows permit the level of investment in a country's to exceed the country level of savings. Besides that the estimated coefficient was smaller than one, indicating that increase in FDI crowded in domestic savings. This finding concurs with a number of recent studies by [Markusen and Venables \(1997\)](#) and [Borensztein \*et al.\* \(1998\)](#), among others. The papers by [Calvo \*et al.\* \(1996\)](#) and [Gruben and Mcleod \(1998\)](#) have all argued that foreign capital inflows ease the resource constraint in developing countries and may enhance national savings with the time lag via increasing income. FDI is indisputably beneficial for the Aisan-6. It helps to boost domestic economy and also increases domestic savings. The Asian financial crisis did not alter this. Hence, the Asian's best route of ensuring economic growth is through openness and liberal economic policies. If a country wants to impose capital controls, the last type of capital control is FDI. Hence our results justify the concerns of [Carbo and Hernandez \(1995\)](#) and [Gruben and Mcleod \(1998\)](#), among others about the potential loss resulting from capital inflows.

Fifth, the results identify a number of channels through which growth influences national savings. High short term-debts depress national savings during the crisis but not during the crisis period. Hence, the large capital withdrawal observed during the recent Asian

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<sup>8</sup> [Edwards \(1995\)](#) finds no differences in the response of domestic savings to changes in foreign savings among the Asian and Latin American countries. He concludes that domestic and foreign savings are substitutes - a 1 % increase in foreign savings is associated with 0.50 to 0.63 % declined in domestic savings. [Gupta \(1987\)](#), however, shows that increases in foreign savings increased savings in Latin American countries but has no effect on Asian countries' savings.

financial crisis will be replaced by domestic savings following a fall in consumption. Indeed, the results suggest that a temporary fall in short-term debt by 1 percent led to an increase in savings ratio by 1.6 percent. Finally, the experience from the Asian-6, however, suggests that change in savings ratio is not a slow process. The institutional environment in these countries may perhaps explain this result. In fact, we found the adjustment of process in the post crisis period has increased somewhat.

**Table 1: Unit Root Test Results**

Variable	Augmented Dickey-Fuller (ADF)				Phillips-Perron (PP)			
	Levels		First Difference		Levels		First Difference	
	No trend	Trend	No trend	Trend	No trend	Trend	No trend	Trend
SP	-0.92	-2.35	-3.07	-3.67	-1.34	-1.87	-10.2	-11.66
SK	-2.43	-2.04	-3.70	-4.19	-1.92	-1.60	-6.40	-6.65
SM	-1.11	-3.12	-6.62	-6.51	-1.34	-2.37	-7.32	-8.99
SS	-1.91	-1.87	-4.83	-5.60	-2.15	-1.77	-5.98	-6.11
ST	-0.72	-2.00	-6.73	-6.58	-1.39	-1.89	-8.23	-7.83
SI	-2.52	-1.63	-4.34	-4.93	-1.55	-1.74	-8.86	-8.91
SDP	-1.23	-1.45	-3.04	-3.99	-1.60	-1.40	-9.99	-11.80
SDK	-1.86	-1.74	-3.61	-3.53	-1.98	-1.95	-6.32	-6.29
SDM	-2.00	-2.13	-6.15	-5.97	-1.99	-2.11	-6.28	-6.20
SDS	-1.28	-2.08	-3.10	-3.21	-0.89	-1.22	-3.87	-3.82
SDT	-1.34	-2.69	-3.97	-3.82	-1.54	-2.90	-6.48	-6.37
SDI	-1.38	-1.73	-3.88	-4.53	-1.48	-1.69	-4.72	-5.17
FDIP	-1.34	-2.69	-4.93	-4.82	-2.07	-3.36	-7.16	-6.99
FDIK	-2.14	-2.31	-3.46	-3.43	-2.36	-1.88	-4.65	-4.71
FDIM	-2.27	-2.71	-3.26	-3.643	-2.09	-2.61	-7.18	-7.13
FDIS	-2.30	-2.14	-5.11	-5.15	-2.41	-3.00	-7.43	-7.39
FDIT	-2.00	-3.31	-4.50	-4.56	-1.48	-2.24	-4.88	-4.91
FDII	-1.00	-1.51	-7.78	-7.77	-2.28	-2.87	-6.04	-5.95
GP	-0.99	-1.94	-5.52	-5.46	-1.22	-2.02	-9.93	-11.20
GK	-2.36	-1.28	-5.15	-5.55	-2.24	-1.13	-6.95	-7.22
GM	-1.25	-1.62	-4.34	-4.52	-0.92	-1.32	-6.22	-6.46
GS	-1.69	-2.09	-2.98	-3.91	-1.81	-0.99	-8.06	-9.82
GT	-1.47	-0.89	-5.95	-6.22	-1.84	-1.33	-7.21	-7.98
GI	-2.33	-0.87	-3.94	-4.74	-2.55	-0.59	-6.01	-9.64
LDP	-1.98	-2.00	-5.28	-5.56	-1.94	-1.81	-5.71	-5.82
LDK	-1.92	-2.36	-3.12	-3.88	-1.73	-1.99	-6.70	-6.50
LDM	-2.26	-2.77	-4.21	-4.15	-1.47	-1.86	-4.00	-3.991
LDS	-2.31	-2.96	-4.92	-4.90	-2.12	-2.82	-7.19	-7.06
LDT	-1.45	-2.90	-4.64	-4.51	-1.31	-2.52	-5.75	-5.71
LDI	-1.41	-2.88	-4.51	-4.38	-1.22	-2.43	-5.72	-5.68

Notes: The denotation: S= Saving/GDP; GRO= Growth rate of GNP; FDI =Foreign direct investment/GDP; SD= Short -term debt/GDP; LD= Long term debt/ GDP. The null hypothesis is that series is non-stationary. The critical values for rejection are the same for both Dickey- Fuller (ADF) and Phillips-Perron (PP) test. At 5% significant level, the critical values for rejection is  $-3.41$  for models with a linear trend. Lag one year are used for all the variables.

**Table 2: Testing for Cointegration Using the Johansen and Juselius Method**

Tests Variables:		S GRO FDI SD LD											
Hypothesis		Korea		Malaysia		Philippine		Indonesia		Singapore		Thailand	
$H_0$	$H_A$	k=1	r=1	k=1	r=1	k=2	r=1	k=1	r=1	k=1	r=1	k=1	r=1
<b><math>\lambda</math>-max</b>													
$r=0$	$r=1$	69.786*		52.757*		38.542*		73.598*		26.614**		65.588*	
$r \leq 1$	$r=2$	20.008		24.004		28.270		18.845		24.656		21.535	
$r \leq 2$	$r=3$	12.793		19.110		10.611		13.699		10.699		10.780	
$r \leq 3$	$r=4$	4.989		4.617		8.567		5.589		7.574		7.011	
$r \leq 4$	$r=5$	3.054		3.389		3.854		3.936		5.704		2.485	
<b>Trace</b>													
$r=0$	$r \geq 1$	110.632*		103.879*		90.467*		115.658*		75.248**		107.399*	
$r \leq 1$	$r \geq 2$	40.845		51.121		51.924		42.060		48.634		41.812	
$r \leq 2$	$r \geq 3$	20.838		27.117		21.923		23.215		23.977		20.276	
$r \leq 3$	$r \geq 4$	8.044		8.006		12.420		9.515		13.277		9.496	
$r \leq 4$	$r=5$	3.054		3.389		3.854		3.926		5.704		2.485	

Notes: The sample period is from 1965-2001. Asterisks (\*) (\*\*) denote statistically significant at the 5 and 10 percent level. (Critical values are taken from [Osterwald-Lenum, 1992](#); Table 1)

**Table 3: Long Run Results of Saving Ratio, Growth and Foreign Capital Using Dynamic GLS**

Variables	1965-2000	1965-1994	1995-2000
	Estimated Coefficients		
Short term debt / GDP	-0.005 (0.927)	-0.083 (0.295)	-0.111 (0.208)
Growth rate of GDP	0.472 (0.000)	0.043 (0.000)	0.019(0.000)
FDI/GDP	0.349 (0.022)	0.656 (0.000)	0.445 (0.000)
Long term Debt / GDP	-0.038 (0.234)	-0.086 (0.026)	-0.152 (0.000)
	R <sup>2</sup> = 0.61	R <sup>2</sup> = 0.65	R <sup>2</sup> = 0.955
	Countries = 6	Countries = 6	Countries = 6
	Log LR=384.13	Log LR=363.22	Log LR=71.36

Note: The value in the parenthesis is the P-value.

**Table 4: Short Run Results of Saving Ratio, Growth and Foreign Capital Using Dynamic GLS**

Variables	1965-2000	1965-1994	1995-2000
	Estimated Coefficients		
Short term debt / GDP	-0.159(0.043)	-	-1.691(0.000)
Growth rate of GDP	0.057(0.002)	0.080(0.003)	0.375(0.000)
FDI/GDP	1.493(0.003)	1.409(0.010)	3.732(0.000)
Long term Debt / GDP	-0.024(0.194)	-0.035(0.446)	0.678(0.000)
ECM <sub>t-1</sub>	-0.265(0.000)	-0.042(0.010)	-0.873(0.000)
	R <sup>2</sup> = 0.15	R <sup>2</sup> = 0.11	R <sup>2</sup> =0.97
	Countries = 6	Countries = 6	Countries = 6
	Log LR=352.55	Log LR=340.07	Log LR=71.14

Note: The value in the parenthesis is the P-value.

**Table 5: Granger Causality Test\* Results Based on Dynamic GLS**

DEP.VAR	S/GDP	GRO	FDI/GDP	SD/GDP	LD/GDP
<b><math>\chi^2</math>-statistics</b>					
S/GDP	—	0.068 (0.0009)**	1.216 (0.002)**	0.0314 (0.753)	0.126 (0.0573)**
GRO	22.85 (0.000)**	—	57.96 (0.0003)**	0.921 (0.788)	2.45 (0.19)
FDI/GDP	0.0816 (0.045)**	0.0058 (0.196)	—	0.0074 (0.761)	6.532 (0.0006)**
SD/GDP	0.243 (0.0435)	0.0561 (0.0002)**	0.038 (0.909)	—	0.277 (0.000)**
LD/GDP	0.879 (0.0047)**	0.126 (0.00002)**	1.183 (0.111)	0.025 (0.900)	—

Notes: Asterisks (\*\*) and (\*) denote statistically significant at 5 percent and 10 percent significance level respectively. We used the Stock and Watson approach that include the level of the variable first different lead one year and first different lag one year to conduct the Granger non-causality test (see text pp. 12-13).

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