

E C O N O M I C S   B U L L E T I N

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## Private capital formation: Short- and long-run crowding-in (out) effects in ASEAN, 1971-99

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### *Abstract*

This study presents an empirical assessment of the factors that have stimulated (deterred) private investment in the Association of Southeast Asian Nations (ASEAN) economies during the past three decades. The results for the short-run suggest that output growth and public investment were the dominant determinants of private investment, while those for the long-run suggest FDI as an additional dominant determinant. The monetary policy variables were on the other hand less effective determinants. Furthermore, whereas output growth and FDI were implicit crowding-in factors, public investment was an effective crowding-out factor. The other determinants imparted both crowding-in and crowding-out effects. While external indebtedness generated long-run crowding-out effects, there is limited evidence to suggest that it did so in the short-run.

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## 1 Introduction

The role of capital formation (both public and private) in engendering gross domestic product (GDP) or output growth is so well documented that we need not say more about it.<sup>1</sup> Public investment is primarily undertaken by governments for the provision of public goods, while private investment undertaken by both domestic (local) and foreign enterprises is for purely commercial and hence profitability reasons. The foreign component comes in the form of what is now renowned as foreign direct investment (FDI).

Developing countries were characterised by either declines or low levels of capital formation almost two decades ago. Several macro-factors might have been responsible for this. However, most notable among them were the debt crisis and the global shocks induced by, particularly, the oil crises, which triggered macro-instability in the respective economies. That is why the World Bank was forced to step-in with structural adjustment programmes meant to stabilise and sustain the economic growths of developing countries.

This research concentrates on a sub-region of the world, which has been of interest to economists most particularly because of its consistently high growth rates experienced in the past three decades (at least until the 1997/98 financial crisis). No doubt, its growth bears some relation to the capital accumulation, including private investment, particularly, FDI which surged into the region after the 1985 Plaza Accord<sup>2</sup>. Although the primary objective of the study was to focus on the Association of Southeast Asian Nations (ASEAN) economies<sup>3</sup>, data limitations have restricted our investigation to only four (Indonesia, Malaysia, the Philippines and Thailand) of the original five ASEAN members<sup>4</sup> otherwise referred to as the ASEAN-4.

The aim of the study is:

- To identify determinants of private investment, and assess whether there are any country-specific differences (similarities) both in the short-run and in the long-run.
- To use the empirical findings to recommend policies intended to maximise the crowding-in effects and to minimise the crowding-out effects.

We undertake a systematic analysis in order to achieve this. First, a country-specific analysis is undertaken. This provides a comparative assessment of the different countries. Second, the analysis is undertaken by pooling data across the countries. Third, the analysis is conducted for the different economic cycles to establish the periodic differences (similarities) of response. Fourth, two different estimation techniques are employed, one to capture the short-run effects, and the other to generate long-run effects.

The paper is therefore organised as follows. The literature review is conducted in section 2, while the hypothesis, empirical methodology and data limitations are discussed in section 3. Section 4 presents an overview of the time-series trends of the variables. The empirical results are presented in section 5, and policy considerations and concluding remarks are contained in section 6.

## 2 The literature

While private investment in developing countries is determined by a broad number of factors<sup>5</sup>, the most instrumental might be output growth, FDI, real exchange rates, public investment, fiscal deficits, real interest rates and uncertainty.

Private investors are reassured about the future market expectations and, thus the certainty of the investment environment when there is a 'feel good' factor in the macroeconomic environment. The key indicator for this is improving (or at least stable) levels of output growth. In general, however, output growth may be used in the equation to capture the predictions of the flexible accelerator model. Larrain and Vergara (1993) found output growth's crowding-in effects in Korea, Singapore, Thailand and Malaysia.

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<sup>1</sup> See for instance Barrow (1997).

<sup>2</sup> It recommended an orderly appreciation of all the major non-dollar currencies.

<sup>3</sup> Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam.

<sup>4</sup> Which included Singapore.

<sup>5</sup> For a thorough review see for instance Serven and Solimano (1993).

The effects of FDI on total private investment may be twofold. On the one hand, it may impart crowding-out effects when it distorts the domestic enterprises and other foreign affiliates from undertaking investment (i.e. by driving them out of business). Nonetheless, crowding-out that eliminates inefficient firms is good for productivity enhancement. Crowding-in takes place when investment by foreign affiliates stimulates new investment in the downstream or upstream production, particularly, when investment is undertaken in undeveloped sectors of the economy (UNCTAD, 1999). Agosin and Mayer's (2000) results on developing countries show that neutral effects dominated while the number of crowding-in and crowding-out cases were equal. Out of the 12 Latin American countries included in the study, none was in the group for crowding-in effects and none of the 12 Asian countries was in for crowding-out effects. While neutral and crowding-in effects predominated in Asia, neutral and crowding-out effects prevailed in Latin America. African countries were found in all three groups.

Likewise, the effect of real exchange rates is expected to be twofold. First, a devalued currency can deter private investment (at least in the short-run) when it increases the prices of imported capital and intermediate goods. In addition, devaluation automatically raises the burden of debt thereby reducing the net worth of firms producing home goods. As a consequence, these firms may face credit constraints or higher costs of capital thus reducing their investment capability. Second, if an economy relies on the export of tradable goods, then a devalued currency stimulates private investment in the short-run. However, Cardoso (1993) argues that the terms of trade is the real driving force affecting both the real exchange rate and the cost of capital and thus investment. For instance, the deterioration of terms of trade leads to the deterioration of the real exchange rate and cost of capital. Empirical investigation by Larrain and Vergara (1993) found no significant influence of real exchange rates on private investment in Korea, Singapore, Thailand and Malaysia.

The effects of public investment may also be twofold depending on the extent to which it involves projects complementary to, or substitute for private investment. In short-run Keynesian models, more public spending could raise aggregate expenditure and output (Kuehlwein and Samalapa, 1999). In the long-run models, more public spending on investment could boost the size of the total capital stock (Heijdra and Meijdam, 1997). For instance, investment in infrastructure and public expenditures for the maintenance of infrastructure and human capital formation are more likely to crowd-in private investment. Ahmad and Miller (1999) for example found expenditure on transport and communication to induce private investment in developing countries. In the short-run, such investment may facilitate the promotion of technology, skill and production complexity. In the long-run, it encourages the deepening of the value-added content of production activity. In addition, it activates the capacity-building meant to sustain the value added deepening across a range of tradable activities in response to changing world demand and technologies. These factors in turn stimulate private investment. Therefore, excessive compression of such expenditures may curtail private investment. Serven and Solimano (1993) observed this in Latin America after 1982, and Larrain and Vergara (1993) in Korea, Singapore, Thailand and Malaysia. Likewise, Kuehlwein and Samalapa (1999) found that public investment programs in developing countries that do not boost budget deficits and obtain some foreign financing may not crowd-out private investment and could be a promising means of promoting capital formation. But, public spending can also crowd-out private investment if it boosts real interest rates. Similarly, other types of expenditures particularly in projects that are either deficient or commercially oriented including the so-called 'parastatals' may negate private investment. Reinikka and Svensson (1999) for instance, found poor public capital<sup>6</sup> to significantly reduce productive private investment in Uganda. Alternatively, as observed by Dessus and Herrera (1996) for a group of 28 developing countries (1981-91), public investment can induce crowding-out effects via output growth when budget constraints are differentiated between public and private sectors.

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<sup>6</sup> Proxied by unreliable and inadequate power supply.

High fiscal deficits push interest rates up or reduce the availability of credit to the private sector, or both, crowding-out private investment. Kuehlwein and Samalapa (1999) found this to be the case in Thailand. Hence, the reduction of the public deficit should allow private investment to expand. Serven and Solimano's (1993) results revealed strong complementarities between public and private investment for a panel of Latin American, African, and East Asian countries; and for cross-country studies of Latin America, and East Asia.<sup>7</sup> Larrain and Vergara (1993) also got similar results for Korea, Singapore, Thailand and Malaysia. However, Cardoso's (1993) results on a sample of six Latin American countries provided limited evidence of crowding-out effects. The external debt burden can hamper investment through each of the three channels. First, debt service requires an external transfer that under conditions of external financing, leads to reduced investible resources. Second, the anticipated tax associated with future debt service reduces the anticipated return on investment. Third, uncertainty about policies needed in the future to meet an equally uncertain debt service also tends to depress investment (Serven and Solimano, 1993). However, Bohm and Funk's (1999) results led them to conclude that the degree of tax policy uncertainty does not necessarily significantly influence investment. Based on their findings on Thailand, Kuehlwein and Samalapa (1999) argue that under certain conditions, foreign borrowing allows interest rates to fall.<sup>8</sup> Some empirical studies consider the effects of fiscal variables on investment, typically using aggregate fiscal measures. Barro's (1991) study on the effects of tax-financed government expenditure on investment finds that higher income taxes reduce the after-tax return on private investment. Levine and Renelt (1992) on the other hand conclude that none of the fiscal variables possess a robust correlation with investment.

Restrictive monetary and credit policies raise the cost of real bank credit, and by raising interest rates, they raise the opportunity cost of retained earnings (Serven and Solimano, 1993). As Larrain and Vergara (1993) found in Korea, Singapore, Thailand and Malaysia; and Anderson, Ronald and Kegels (1997) in transition economies, in turn, high interest rates increase the cost of capital, and thus reduce the likelihood of private investment. Furthermore, restrictive monetary and credit policies indirectly curtail domestic consumption thus negating any potential benefits from scale economies, and hence the prospects of further investment.

Since investment decisions by nature represent sunk costs, they are largely irreversible once investment has started. The more predictable the future environment is, the greater the likelihood that private investment will be undertaken. Otherwise, firms will opt for lower capacity if the future is uncertain. Studies by Serven and Solimano (1993) suggested that an increase in macroeconomic instability played an important role in the decline in private investment rates in Latin America after 1982. Larrain and Vergara (1993) also observed this in Korea, Singapore, Thailand and Malaysia; Jayaraman (1996) in the South Pacific developing member countries; and Koke (1999) in Central and Eastern Europe. In sum, an uncertain future makes investments risky and therefore erodes investors' confidence.

### **3 The model and methodology, and data limitations**

#### **3.1 *The theoretical and empirical models, and methodology***

The literature on investment decisions in industrialised countries puts forward two arguments. The first one, which relates to changes in aggregate demand gives rise to the income accelerator. The second one concerns the relative prices of capital and labour (or more generally variable inputs) and therefore profitability (Rama, 1993).<sup>9</sup> However, as the discussion in the foregoing section illustrates, the literature in developing countries considers not only these two arguments but, typically four others that arise from the specific features of these countries. These are, financial repression, lack of infrastructure, foreign exchange shortage and economic instability. For that matter, when developing countries are taken into consideration, the theoretical models

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<sup>7</sup> The analysis suggested that the increase in the external debt was the chief determinant of the decline in private investment in the sample.

<sup>8</sup> They found that holding the deficit constant, Thai government equipment expenditure lowered interest rates.

<sup>9</sup> For a thorough review of this evolution see Serven and Solimano (1993).

can be divided into the following broad sub-topics: (i) monopolistic competition without investment costs, (ii) the ‘true’ neoclassical case under perfect competition, (iii) effective demand or the so called neoclassical model (quantity rationing in the goods market), (iv) the implicit (Tobin’s  $q$ ) approach, (v) financial repression (credit rationing), (vi) foreign exchange shortage, and (vii) economic instability.<sup>10</sup> Evidently, these theoretical models suggest that there are competing specifications for the investment function. These depend on the values of some key parameters of the economy and on whether some quantity constraints are binding. Unsurprisingly, the theoretical models have restrictions on the optimisation problem of the representative firm.

For obvious reasons, the theoretical investment rules are not used in their pure form for the empirical task. The equations for the pre-1990s’ standard macroeconomic empirical models estimated for many developing countries (to produce short-run forecasts), were often specified in a rather *ad-hoc* way. To sort out this problem, Rama (1993) (under a research project ‘Private Investment and Macroeconomic Adjustment’ financed by the Research Committee of the World Bank) surveyed 31 then ‘recent’ studies that dealt specifically with the determinants of private investment in developing countries.<sup>11</sup> He concluded that while the list was not exhaustive, it included a large variety of specifications. It then became evident that the chosen specifications were either pure models (i.e. one of the aforementioned seven) or a linear combination of two or more specifications. In concurrent research articles under the same project, a group of economists including Serven and Solimano (1993), Larrain and Vergara (1993) specified empirical models in which output growth, real exchange rates, public investment, fiscal deficit, real interest rates and uncertainty acted as determinants for private investment in developing countries. Among the points raised under issues for future research was the investigation of the effects of FDI, which they had omitted due to data limitations.

This study, therefore builds on the aforementioned empirical model specifications. In a nutshell we simply add an FDI variable, and hypothesise that private investment is influenced by output growth, foreign direct investment, real exchange rates, public investment, fiscal deficit, real interest rates and uncertainty. The model can simplistically be represented as:

$$PRI = f(Gr, FDI, RXR, PBI, XD, RIR, RISK) \quad (1)$$

where PRI = private investment, Gr = real output growth, FDI = foreign direct investment, RXR = real exchange rates, PBI = public investment, XD = external debt, RIR = real interest rates and RISK = a measure of uncertainty. PRI, FDI, PBI and XD are measured as percentages of GDP.<sup>12</sup> Output growth is computed from output from the World Penn Tables Mark 6.1, retrieved from data base on web site. Private investment, FDI, public investment, external debt, real interest rates, real exchange rate and inflation rate are retrieved from the World Bank data base on web site. RISK is proxied by the coefficient of variation over the past years. We use three different measures: computed from real exchange rates, real interest rates and inflation rate.<sup>13</sup> The structural model estimated is therefore of the form:

$$PRI = \alpha + \beta X + \mu \quad (2)$$

where  $\alpha$  = constant,  $\beta$  = slope coefficient,  $\mu$  = error term and X = matrix of the determinant variables.

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<sup>10</sup> See investment equations reviewed by Rama (1993).

<sup>11</sup> These are summarised in Table 5A1 of his article.

<sup>12</sup> This scaling down helps eliminate trends and is concomitant with most empirical studies.

<sup>13</sup> We experimented with average absolute deviations over 2, 3, 4 and 5 years for each of the series by running a partial regression analysis for private investment and the series under investigation. The best results for the partial regressions turned out to be as follows: Indonesia (RIR - 3, RXR - 3, INFL - 3); Malaysia (RIR - 1, RXR - 3, INFL - 4); Philippines (RIR - 4, RXR - 2, INFL - 3); Thailand (RIR - 1, RXR - 3, INFL - 4); Pool (RIR - 1, RXR - 4, INFL - 3).

Although data for some variables was available for earlier years, the consistent time-series of data on external debts was available only since 1971. In similar nation, the data for public investment and private investment was available only until 1999. Therefore, the period 1971-1999 was adopted as the sample period. In addition, based on the data trend analysis of section 4, although the exact cut-off period in some cases varies across countries, we choose 1985<sup>14</sup> for purposes of having common reference periods. Therefore on top of the entire sample period, we adopt the two cycles, i.e. 1971-1985 and 1986-1999 as sub-periods of analysis.

Because of data limitations, we are unable to generate country-specific estimates for the different sub-periods. Instead, we capture the time-effects for the different periods from a dummy variable defined as:

$$D_1 = \begin{cases} 0 & \text{for observations for 1971-1985} \\ 1 & \text{for other observations (i.e. 1986-1999)} \end{cases}$$

Our structural model in this instance becomes:

$$PRI = \alpha + \beta X + \delta D_1 + \mu \quad (3)$$

where  $\delta$  = dummy slope and  $D_1$  = dummy for time-effects.

The above model can be estimated using the Ordinary Least Squares technique. However, because of the endogeneity of FDI (which is part of private investment), the following equation for the determinants of FDI was introduced:

$$FDI = f(Gr, GDP, RXR, PBI, LIB) \quad (4)$$

where FDI = foreign direct investment, Gr = output growth (future market potential), GDP = output (current market size), RXR = real exchange rates, PBI = public investment (quality of infrastructure), and LIB = liberalisation (FDI policy reform). The literature on the determinants of FDI is so well documented that we need not go into any details.<sup>15</sup> Its structural model is similar to that presented in equation (3) without the time effects dummy. Instead, a dummy is introduced to proxy FDI policy liberalisation, i.e.:

$$D_2 = \begin{cases} 0 & \text{for pre-liberalisation period 1971-1984} \\ 1 & \text{for post-liberalisation period 1985-1999<sup>16</sup>} \end{cases}$$

Consequently, a two-equation system is estimated. Because of the potential for reverse causation between output growth and private investment in equation (1), and output growth and FDI in equation (4), output growth and private investment both lagged by one year are treated as instruments for output growth in the former equation; while output growth and FDI both lagged by one year are treated as instruments for FDI in the latter equation. These together with the other determinant variables then comprise the complete set of instrumental variables. The model is then estimated using the 3SLS technique.

The methodology discussed above only generates estimates for the short-run. However, for purposes of assessing the long-run relationships we require a technique that can generate estimates for the long-run association between the depended and independent variables. The Johansen (1995) technique for testing the presence of co-integration fulfils this. This methodology is so well documented that we need not say much about it.

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<sup>14</sup> This signifies a turning point particularly with respect to private investment (see Figure 2). For instance, there was more vigorous FDI activity following the realignment of the major non-dollar currencies.

<sup>15</sup> See for instance UNCTMD (1992) and UNCTAD (1997).

<sup>16</sup> For details on FDI policy reform in the ASEAN-4 see for instance Bende-Nabende (1999, Chapter 2).

### 3.2 *Data limitations and their containment*

The most notable limitation of the annual time series data used was its small sample size, which could not permit us to conduct an efficient country-specific analysis for the two sub-periods. This was overcome by using a time effects dummy in the country-specific analysis and by pooling the data.

For the pooled estimation, for purposes of ensuring an unbiased estimation, an analysis of variance (ANOVA) test was employed to test for the poolability of the data. The computed F-statistics presented in Table I, suggest that the data is homogeneous.<sup>17</sup>

**\*\*Table II\*\***

Unit root tests were undertaken to establish the order of integration of variables. The results presented in Table II demonstrate that most of the variables (except output growth, real interest rates and uncertainty variables) were I(1). Therefore, for purposes of keeping to a uniform analysis format, and hence uniform interpretation of the results, all variables (except output growth) are analysed in first difference format.

## 4 **Data time-series trends**

The data time series trends presented Figure 1 and in the Appendix are self-explanatory, and we need not say more for space saving purposes.

**\*\*Figure 1\*\***

## 5 **The empirical results**

### 5.1 *Short-run dynamics*

#### *Country specific results*

**\*\*Table III\*\***

From the country-specific results summarised in Table III, it is evident that output growth and public investment were the dominant statistically significant determinants of private investment in the ASEAN-4 economies. Specifically, output growth induced crowding-in effects typical of its accelerator characteristics. Public investment on the other hand engendered crowding-out effects perhaps suggesting that the ASEAN-4 economies have invested in projects, which are substitutes for private investment.

The effects of FDI were mixed. For instance, there is evidence of significant crowding-in effects in the Philippines and in Thailand. In addition, the results suggest insignificant crowding-in effects for Indonesia, but crowding-out effects for Malaysia. Evidently, the crowding-in effects are in the comparatively less developed countries, while the crowding-out effects are in the comparatively more developed Malaysia where competition from FDI might be curtailing local private initiative.

The most striking aspect of the results for external indebtedness is its apparent crowding-in effect in three countries (Indonesia, Malaysia and Thailand), although statistically significant in only Malaysia. While this provides no economic meaning<sup>18</sup>, we can conclude that there is no evidence to suggest that external debts discouraged private initiative. In the Philippines (which had the highest ratio of debt/GDP for almost 20 years) however, crowding-out effects of external debt are statistically significant.

The impact of real exchange rates is consistent across the countries, but significant only for Thailand. For instance it suggests crowding-out effects perhaps implying that the exchange rates imparted minor effects on the cost of capital imports. In fact, the graph suggests that this may have been the case particularly prior to 1986.

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<sup>17</sup>  $F = [(RRSS - URSS)/(k + 1)] / [URSS/(n_1 + n_2 - 2k - 2)]$ , where  $RSS_{1i}$  = residual sum of squares for the 1st data set for equation  $i$ ;  $RSS_{2i}$  = residual sum of squares for the 2nd data set for equation  $i$ ;  $URSS_i = RSS_{1i} + RSS_{2i}$ ;  $n_1$  is the size of the 1st population; and,  $n_2$  is the size of the 2nd population.  $RRSS$  is obtained from the regression with the pooled data, which imposes the restriction that the parameters are the same. See for instance Maddala (1992) for details.

<sup>18</sup> The regressions might have linked the growing trends of private investment to those of external debts.

The results for real interest rates, which are statistically significant all countries except Thailand suggest crowding-out effects in Indonesia, Malaysia and Thailand, but crowding-in effects in the Philippines. In line with real exchange rates therefore, increases in real interest rates in general deterred private investment. The Philippines' case may be linked its political and natural disasters, particularly during the 1980s, which might have led to credit constraints. Consequently, local borrowers had no option but to accept the going rates, which because of limited competition in the financial industry were often on an upward trend.

The results for the uncertainty in general indicate that the proxy variable derived from real exchange rates is a better measure of uncertainty for Indonesia, that derived from interest rates has worked well for Malaysia and the Philippines, while that derived from inflation was good for Indonesia and Malaysia. The time effects dummy suggests a significantly different intercept for only Indonesia over the two sub-periods.

#### *Pool results*

Like the country-specific results, (see Table IV) output growth dominated the determination of private investment over the different periods. Concomitant with the country-specific results, public investment significantly crowded-out investment over the entire period. However, splitting the data into the two sub-periods demonstrates that the crowding-out effects were statistically significant only during the first sub-period.

**\*\*Table IV\*\***

Unlike the country-specific results however, the results for FDI are statistically significant over all sample periods<sup>19</sup>. The results for external indebtedness while showing significant crowding-in effects over the entire sample, reveal insignificant crowding-in effects in the first sub-period, but crowding-out effects during 1986-99. Real exchange rates caused insignificant crowding-in effects in 1971-85 and significant crowding-out effects between 1986-97, which neutralised each other over the entire period. Nonetheless, the direction of impact suggest crowding-out concomitant with the entire period effects are similar to those for Indonesia, Malaysia and the Philippines. Real interest rates imparted insignificant crowding-out effects throughout. They appear to have been influenced by Indonesia, Malaysia and Thailand. The uncertainty variables are insignificant across all periods. The time effects dummy (over the entire period) suggests insignificantly different intercepts for the different sub-periods. Effectively, the only significant difference over the two sub-periods was that of FDI and real interest rates.

### **5.2 Long-run dynamics**

Because of sample size limitations, only panel co-integration for the entire sample is undertaken. In addition, since the co-integration test utilises variables that are I(1), we have had to eliminate all the variables whose unit roots results suggested that they were I(0). These include output growth, real interest rates and all the risk proxy variables. This elimination left us with public investment, FDI, external debts, and real exchange rates as the only determinants of private investment. However, we decided to introduce and experiment with GDP as well. We note that the co-integration analysis treats all the variables in the VAR as endogenous.

**\*\*Table V\*\***

In testing for co-integration, we utilise the Osterwald-Lenum (1992) critical values for the trace statistic. The trace statistics reported in Table V illustrate co-integration, with co-integration rank of 4 at the 5 per cent level.

**\*\*Table VI\*\***

The standardised co-integration vectors are reported in Table VI. The results for public investment and FDI are consistent with those generated under the short-run analysis, i.e. crowding-out effects of public investment, and crowding-in effects of FDI. However, unlike the short-run results, the results suggest a long-run negative association between private investment and external indebtedness, and a long-run positive association with real exchange rate. Thus, perpetual external indebtedness negates private initiative in the long-run. On the other hand, as

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<sup>19</sup> Perhaps influenced by the data for the Philippines and Thailand.



countries develop, and increase their export potential, exchange rate depreciation encourages long-run private initiative by making exports more competitive abroad.

## **5 Conclusion and policy implications**

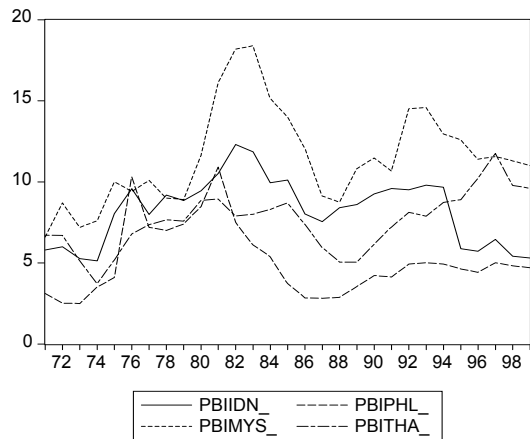
We find that output growth exerts a positive impact on private investment in the ASEAN-4 economies. Similarly, public investment impacts significantly, but negatively on private investment suggesting a substituting, rather than the much-desired complementary effect. FDI tends to crowd-in investment in the comparatively less developed countries, but to crowd it out in the comparatively more developed ones. For that matter, its resultant effects probably depend not only on the level of linkages within the host country, but also on the resources bases the host country possesses. While evidence suggests that high interest rates negate private initiative, there seems to be a less significant influence of exchange rates. From the public debt perspective, apart from the significant results for the Philippines, there is no evidence to suggest that external indebtedness curtails private investment the other aforementioned economies, at least in the short-run. There is on the other hand some, but not conclusive evidence that economic uncertainty deters private investment.

While the long-run influence of output growth, FDI, and public investment reflects that of the short-run, that for public indebtedness suggests a crowding-out influence and that for exchange rates a crowding-in influence.

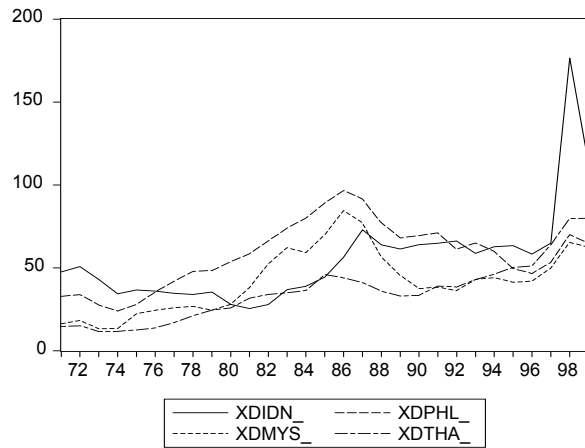
On the policy front, there is no doubt that output growth is the engine of private investment in the ASEAN-4 economies. Therefore, the respective governments need to pursue policies that lead to sustained output growth if they are to attract sustained private investment. In addition, it is essential for governments to earmark and prioritise those public projects (particularly investment in human capital and infrastructure) which have the potential to complement private investment. For instance, whereas investment in human capital builds a labour-force with the potential of improving productivity, a good infrastructure facilitates the production and distribution processes of goods and services. For that matter, there is need for further privatisation earmarked at eliminating any would be substitute projects for private investment. The resources derived from the privatisation of these projects can then be diverted into schemes that are complementary to private investment. There is no doubt that FDI is either a current or a potential future key determinant of private investment for most developing countries, including the ASEAN-4. Nonetheless, it is essential to recognise that FDI offers a mixture of positive and negative effects. However, it is then the task of the host country to disentangle these effects, and take appropriate measures that maximise the positives but minimise the negatives. For instance, governments do not only have to monitor the practices of TNCs, but have to develop their resource bases to levels capable of exploiting the dynamic comparative advantages FDI offers. To achieve this, they have to develop resource bases that can facilitate their progressive shifts up the levels of technological complexity. This involves instituting plans for deepening the content of export activity and building the human capital and macroeconomic capacity to sustain such shifts across a range of tradable activities in response to changing world demand and technologies. This will enable the linkages to develop more naturally. Unfortunately, the current unprecedented and accelerating pace of technological change, whose development developing countries have to keep pace with, makes any such capacity building more challenging. Besides resources capacity building, these countries require to make the investment environment conducive for private investment. For instance, they should resolve their conflicts at round table discussions, and not through armed confrontations; and pursue private investment friendly policies. This will help them to build the investors' confidence. Since after the 1997/98 Asian Financial crisis, capital inflows, particularly FDI, into the ASEAN-4 economies have dropped drastically. Thus, there is a likelihood that the task of filling the resource gap will inevitably fall on official financing. External debts can, therefore not be avoided. What is more realistic, however is for the loans to be project-specific. Moreover, as discussed above, such projects should have the potential of enhancing the private sector and, hence the growth-process.

## Appendix

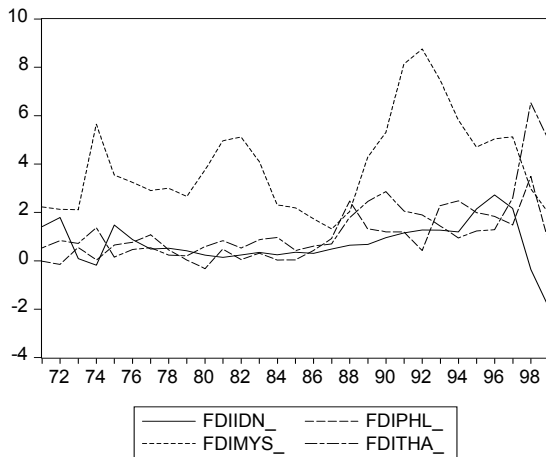
Public investment



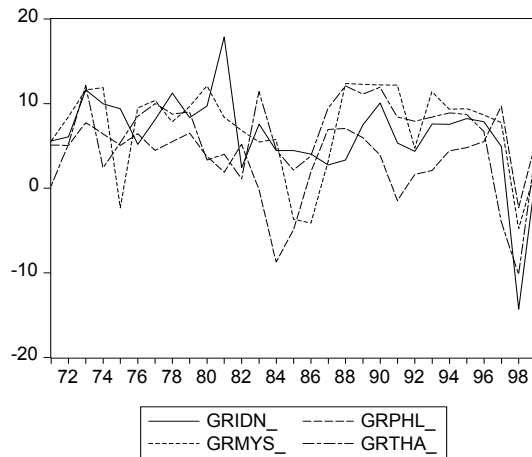
External debt



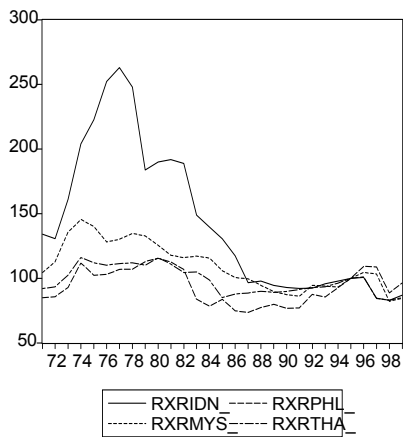
FDI



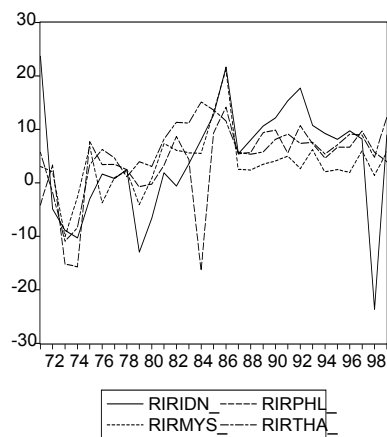
Output growth



Real exchange rates

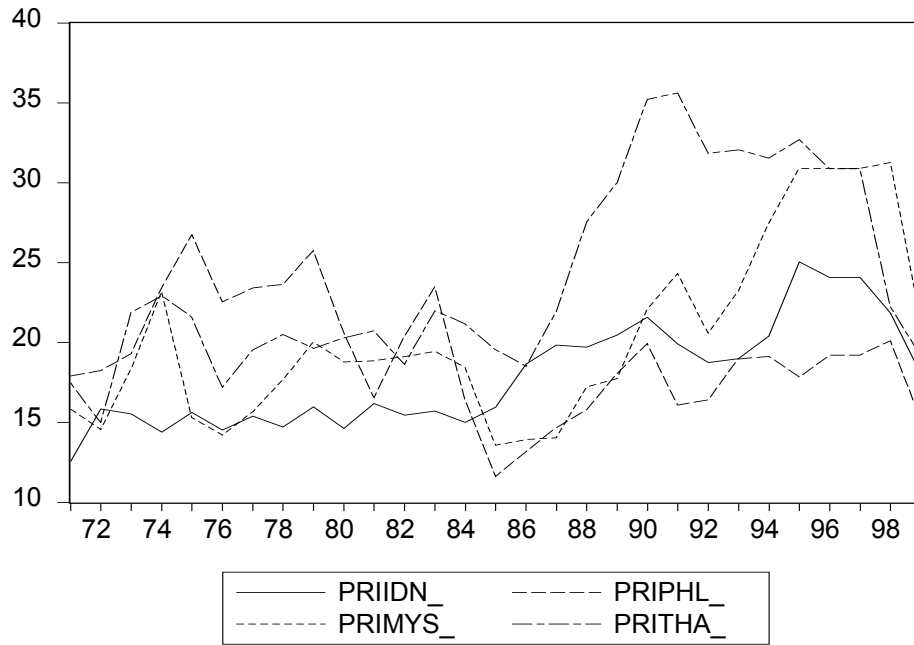


Real interest rates



Notes: Country abbreviations: IDN - Indonesia, MYS - Malaysia, PHL - the Philippines, THA - Thailand.

Variable abbreviations: FDI - foreign direct investment (billions US dollars), XD - External debt, PBI - Public investment (billions international prices), PGR - Output growth (percentage), RXR - Real exchange rates and RIR - Real interest rates.



**Figure 1 Private capital investment (% of GDP)**

Notes: Country abbreviations: IDN - Indonesia, MYS - Malaysia, PHL - the Philippines, THA - Thailand.

**Table I ANOVA test**

Pool	RSS <sub>1</sub>	RSS <sub>2</sub>	URSS	RRSS	k	n <sub>1</sub>	n <sub>2</sub>	Computed F
mys/tha	96.7	119	215.7	241.1	10	28	28	0.363
mys/tha/idn	241.1	22.24	263.34	341.2	10	56	28	1.666
mys/tha/idn/phl	341.2	89.6	430.8	509.1	10	84	28	1.487

Notes: Country abbreviations: idn - Indonesia, mys - Malaysia, phl - the Philippines, tha - Thailand.

**Table II Unit roots**

Determinant variable	Indonesia	Malaysia	Philippines	Thailand	Pool		
					1971-85	1986-99	1971-99
Private investment	1	1	1	1 or 2	1	1	1
Output growth	0	0	0	0	0	0	0
Public investment	1	1	1	1	1	1	1
FDI	1	1	1	1 or 2	1	1	1
External debts	1	1 or 2	1	1	1	1	1
Real exchange rates	1	1	1	1	1	1	1
GDP	1	1	1	1	1	1	1
Real interest rates	0 or 1	0	0	0	0	0	0
Risk (rxr)	0	0	0	0	0	0	0
Risk (rir)	0	0	0	0 or 1	0	0	0
Risk (infl)	0	0	0	0	0	0	0

**Table III Country-specific results**

Determinant variable	Indonesia	Malaysia	Philippines	Thailand
Output growth	3.68*** (0.05)	4.92*** (0.12)	4.07*** (0.10)	6.65*** (0.13)
Public investment	-2.56** (0.18)	-1.99* (0.26)	-3.62*** (0.19)	-1.66* (0.39)
FDI	0.27 (0.34)	-0.80 (0.41)	6.23*** (0.33)	1.92* (0.44)
External debts	0.37 (0.01)	2.21** (0.07)	-2.53** (0.05)	0.59 (0.14)
Real exchange rates	-1.04 (0.01)	-0.55 (0.06)	-0.86 (0.05)	-3.63*** (0.08)
Real interest rates	-1.68* (0.03)	-2.13** (0.08)	3.06*** (0.03)	-0.38 (0.09)
Risk (rxr)	-1.73* (0.02)	1.78* (0.18)	3.27*** (0.08)	2.24** (0.21)
Risk (rir)	0.35 (0.10)	-1.73* (0.18)	-1.76* (0.16)	0.71 (0.18)
Risk (infl.)	-1.22 (0.03)	-0.37 (0.56)	1.95* (0.09)	3.6*** (0.31)
Time dummy	1.74* (0.95)	1.24 (2.37)	0.35 (1.25)	1.30 (2.14)
<i>Statistics</i>				
Adjusted R <sup>2</sup>	0.40	0.44	0.55	0.60
Standard error of regression	1.35	2.59	2.06	2.04
Durbin-Watson statistic	1.94	1.86	1.82	1.92
Mean dependent variable	0.20	0.20	-0.10	0.06
Standard deviation of dependent variable	1.74	3.46	3.08	3.24
Sum of squared residuals	30.81	113.87	72.06	70.9

Note: Figures reported are t-statistics. Standard errors in parentheses.

**Table IV**      **Pool results**

Determinant variable	1971-85	1986-99	1971-99
Output growth	4.33*** (0.08)	4.81*** (0.08)	7.60*** (0.05)
Public investment	-4.84*** (0.18)	-1.32 (0.33)	-4.48*** (0.15)
FDI	6.37*** (0.35)	3.05*** (0.27)	4.86*** (0.20)
External debts	0.67 (0.08)	-0.05 (0.05)	2.15** (0.02)
Real exchange rates	0.58 (0.02)	-1.74* (0.06)	-0.54 (0.02)
Real interest rates	-0.53 (0.03)	-0.72 (0.10)	-0.68 (0.03)
Risk (rxr)	0.38 (0.06)	-0.17 (0.28)	0.59 (0.06)
Risk (rir)	0.19 (0.08)	-0.86 (0.17)	-0.33 (0.07)
Risk (infl.)	-1.04 (0.05)	1.24 (0.22)	-0.88 (0.05)
Time dummy	n.a.	n.a.	1.14 (1.17)
<i>Statistics</i>			
Adjusted R <sup>2</sup>	0.34	0.24	0.36
Standard error of regression	2.35	2.73	2.33
Durbin-Watson statistic	2.4	1.90	2.09
Mean dependent variable	-0.06	0.07	0.09
Standard deviation of dependent variable	2.89	3.13	2.91
Sum of squared residuals	253.9	283.7	548.7

*Note:* Figures reported are t-statistics. Standard errors in parentheses.  
n.a. - not applicable.

**Table V Panel co-integration**

Sample period	Ho: $r = p$	Eigenvalue	Trace statistic	5 percent critical value	1 percent critical value
1971-1999	$p = 0$	0.872	332.12	94.15	103.18
	$p \leq 1$	0.605	176.07	68.52	76.07
	$p \leq 2$	0.499	105.42	47.21	54.46
	$p \leq 3$	0.481	52.84	29.68	35.65
	$p \leq 4$	0.027	3.02	15.41	20.04

**Table VI Co-integrating vectors**

PRI	PBI	GDP	FDI	XD	RXR
-1	-3.53	0.021	5.925	-0.202	0.093
	(0.251)	(0.011)	(0.514)	(0.031)	(0.024)
	[14.06]	[2.10]	[11.53]	[6.52]	[3.88]

Notes: ( ) – standard errors, and [ ] t-statistics.

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