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THE DETERMINANTS OF FDI INFLOWS: AN ARDL BOUNDS TESTING APPROACH

Key Words

Investment, FDI; Exports; Human Capital ARDL; and ASEAN.

Abstract

This paper empirically explores the joint impact of domestic investment, financial intermediation, human capital, exports and economic growth on the FDI inflow to the ASEAN. Both the short and long run movement of the FDI growth process are modelled during the 1968-2002 period using the most recently developed autoregressive distributed lag (ARDL) approach. The empirical results of this study can be summarized as: (i) the bound test suggests that there is existing long-run relationship among FDI and its determinants; (ii) the growth rate of GDP and domestic investment significantly encourages FDI inflows to ASEAN-5; (iii) the development level of financial sector and human capital are crucial for FDI inflows; (iv) outward-looking together with stable exchange rate policies contribute positively to FDI inflows; (v) the results reveal that the link between domestic investment and FDI is crucial for post financial crisis. All in all, our results suggest that it is worthwhile for authorities to encourage domestic as well as foreign capital to put back these countries on their pre-crisis growth paths.

Introduction

The 1980s and 1990s have witnessed an unprecedented increase in foreign direct investment (FDI) inflows into the more dynamic economies such as East Asia economies. Large capital inflows combined

with high domestic savings rates produce investment boom across much of the East Asian countries.

Since the early 1970s, East Asia's economies have reoriented their development strategies from protectionist

import substitution policy to an outward-oriented approach. These countries and in particular the ASEAN-5 (Singapore, Malaysia, Thailand, Indonesia, and the Philippines) had successfully transformed themselves from being inward-oriented (import substitution industrialization) inspired by “infant industry” argument to being outward-oriented (export oriented industrialisation) (Baharumshah, 2002). As a result of these policies, besides several exogenous factors, such as currency overvaluation and the rising labour cost in Japan, the economic performance was impressive in terms of growth rates and foreign capital started to flow into these countries at accelerating rates in the 1980s until the 1997 financial crisis.

Investors were attracted to these countries because of their sound macroeconomic fundamentals. Additionally, these economies had small fiscal deficits, stable exchange rates, high savings rates, and a highly regarded work force. Other domestic factors that could have contributed to the surge of foreign capital include the widespread liberalization of financial markets as well as the creditworthiness of these countries. The rapid economic growth had made these economies an attractive location for foreign capital. Besides the domestic factors, several authors have also

argued that external factors jointly contributed to the significant role in explaining the causes of the capital inflows to these countries. These factors include low world interest rate and recessions in the major industrial countries. In addition, largely the strong yen against the US dollar has propelled Japanese investment in the region. Since the value of ASEAN-5 currencies was more or less tied to a basket of currencies, primarily to the US dollar, Japanese companies could use them as a low-cost substitute for their American manufacturing base. The inflow of FDI to the ASEAN countries accelerated with the yen appreciation because production and investment in Japan itself became relatively more expensive. When the yen was strong and appreciating, the influx of Japanese long-term capital and know-how boosted domestic fixed investment in ASEAN-5 and stimulated output. Japanese firms (multinationals) shifted unprofitable production to the low-wage ASEAN-5 countries and hence provided a growth stimulus to its small neighboring countries. In contrast, the depreciation of the yen after 1995 slowed East Asian expansion significantly.

However, for many years, a number of authors attempted to examine the role that foreign direct investment (FDI) plays on the growth process in developing countries. This has been a

strongly debated question in development economics, but the literatures seem to be in conflict in their conclusions. Statistical analysis did not contribute to resolving this theoretical dispute since the empirical evidence provides conflicting results. Doubts concern not only the significance of the impact of FDI on economic growth but also its significant positive or negative effect on economic growth.

The available empirical literature on the impact of FDI on growth provides contrasting results not only about the existence of a significant relationship between FDI and economic growth but also on the sign of this relationship. The previous studies can be classified into three groups: The first group shows that there is a negative impact of FDI on economic growth as in the work of Bornschier *et al.* (1978); Saltz (1992) and Dutt (1997). The second group shows that there is a positive impact of FDI on economic growth as in the work of Bende-Nebende and Ford (1998); Borensztein *et al.* (1998) and Dattaray (2001), while the third group shows that there is no significant relationship between FDI and economic growth as in the work of Hein (1992).

One of the first studies on the implications of FDI on growth is Saltz's (1992). In his study, Saltz pre-

sented an empirical analysis of cross sectional data from 75 developing countries from 1970-1980. This neo-classical framework treated the stock of FDI as an independent variable in OLS regression on growth rate. The regression coefficients of FDI were negative and statistically significant. Saltz concluded that countries with large presence of FDI had generally slower rate of growth than expected. In addition, it was noted that although the level of investment was positively correlated with the stock of FDI, the additional investment resulted from FDI did not contribute to growth.

Dattaray (2001) belongs to the second group of studies on the implications of FDI on growth. He attempted to verify whether FDI is a vehicle of growth in developing countries. His results show that FDI is good for countries with proper economic conditions such as minimum threshold level of human capital and viable production conditions.

However, previous studies show that the significant impact of FDI on economic growth and its direction depends on many factors; the main factor among others is the level of the development of the recipient country (Marino, 2000). The level of development determines the level of the variables that would influence FDI. The variables include openness, the degree

of dependence upon governance, the size of potential market, the quality of labor force and the state of the infrastructure.

Five years after the financial crisis, which plunged the Asian economies into economic collapse, the ASEAN-5 economies in general have not recovered fully and are still at growth rates below those rates before the financial crisis. The negative impacts of this crisis on ASEAN-5 economies during the period 1997-2001 are apparent: in the first place, FDI inflows to these countries (including Singapore which was not severely affected by the financial crisis) declined. For example, the net inflow of FDI in Indonesia declined from (6194) million US\$ in 1996 to (-3278) in 2001. Secondly, fixed investment, as a percentage of GDP, for all the selected countries declined. Malaysia, for example, experienced a decline from a high of 43.1% in 1997 to 24% in 1999. Thirdly, inflation rates increased during the crisis in all countries, for example in Indonesia, inflation increased from around 5% in 1996 to more than 50% in 1998. Finally, the ratio of saving as a percentage of GDP declined in all countries except Malaysia where it increased from 43% in 1997 to 46% in 2000. And finally, the growth rates of gross domestic product (GDP) declined to negative values for the period of the crisis and are

still unstable and very low compared to those rates before 1997.

Thus, the financial crisis shows that ASEAN economies have become very sensitive to changes and fluctuations in the world economy following the outflow of foreign capital which led to a sharp decline in economic growth as shown by the national data of five ASEAN economies that were hit by this crisis. Despite the efforts of policy makers using economic measures and policies initiated to cushion the effects of the financial crisis, the negative impact on the ASEAN economies was significant.

This paper was motivated by the events presented above. First, a large body of the literature on the “Asian miracle” has emphasized the role of FDI inflows as the main vehicle of economic growth. Although the consensus suggests that FDI is crucial for successful development, a more severe question in the wake of financial crisis that broke out in 1997 in Asia is how we can increase the inflows of FDI to ASEAN, as well as the search for new policy options that could encourage FDI inflows and thereafter sustain ASEAN-5’s economic growth.

The objective of this study is two-folds: first, to investigate the long and short-run impacts of growth rate, domestic investment, financial intermediation, exports and human capital

on FDI using data from five ASEAN countries (ASEAN-5: Singapore, Malaysia, Thailand, Indonesia and the Philippines). These were selected because of their high domestic investment (savings) rate and FDI has been drawn to the region by the abundance of labour. Much of the FDI is export oriented and these countries were used as a platform for exports. Despite that all these countries were severely affected by the recent financial crisis (Singapore, the exception)⁽¹⁾. The remarkable growth records over the three decades, driven by exports and private investment as well as the financial crisis that have severely affected these countries, offer a remarkable opportunity to test some of the well-known hypotheses in the growth theory. The second objective is to seek evidence in support of the domestic-led-FDI hypothesis. Earlier works used a shorter sample, which excludes the post-crisis period. The Asian financial crisis has severely affected the growth rates of the countries included in our sample.

Model Specification

There are a number of models which explain economic growth in developing countries. A partial list

includes Romer (1991), Grossman and Helpman (1991), Barro and Sala-I-Martin (1995), and Borensztein *et al.* (1998). In all these articles, authors considered economic growth as a result of capital deepening.

A number of authors such as Barro (1991); Serven and Solimano (1992); Fry (1995, 1998); Borensztein, *et al.* (1998), Agrawal (2000a, 2000b); Xu (2000); Prodrecca and Ford (2001); Hecht *et al.* (2002); and Baharumshah *et al.* (2003) found that foreign direct investment, domestic investment, financial intermediation, domestic saving, exports and human capital have a significant impact on economic growth in developing countries. Thus, we specify the FDI equation as follows:

$$FDI = \beta_0 + \beta_1 G + \beta_2 H + \beta_3 X + \beta_4 GDI + \beta_5 FI + \beta_6 REX + \varepsilon \quad (1)$$

where, *FDI* denotes foreign direct investment, *G* denotes growth rate of real GDP, *GDI* denotes gross domestic investment, *FI* denotes financial intermediation, *H* denotes human capital, *X* is export of goods and services, *REX* denotes real exchange rate, the disturbance term ε is to capture the unobserved effects and is

(1) Looking at gross domestic investment (GDI) ratio, the Philippines have the lowest among the selected countries followed by Indonesia and Thailand. The low savings rate as well as investment rates in the Philippines may explain why the country's per capita is the lowest among the countries under investigation.

assumed to have zero mean and constant variance.

Econometric Method

We apply the ARDL approach proposed by Pesaran *et al.* (2001) to estimate equation 1. The following ARDL model is estimated to examine the long-run relationship:

$$\begin{aligned} \Delta FDI = & \alpha_0 + \alpha_1 G_{t-1} + \alpha_2 H_{t-1} + \alpha_3 X_{t-1} + \\ & \alpha_4 GDI_{t-1} + \alpha_5 FI_{t-1} + \alpha_6 FDI_{t-1} + \\ & \alpha_7 REX_{t-1} + \beta_1 \sum_{i=1}^m FDI_{t-i} + \beta_2 \sum_{i=0}^n \Delta G_{t-i} \\ & + \beta_3 \sum_{i=0}^p \Delta H_{t-i} + \beta_4 \sum_{i=0}^q \Delta X_{t-i} + \\ & \beta_5 \sum_{i=0}^x \Delta GDI_{t-i} + \beta_6 \sum_{i=0}^y \Delta FI_{t-i} + \\ & \beta_7 \sum_{i=0}^z \Delta REX_{t-i} \end{aligned} \quad (2)$$

The choice of the correct lag is a crucial issue in these tests. There are many information criteria such as Akaike Information Criteria (AIC), Schwarz Bayesian Criteria (SBC) and Log-likelihood Ratio (LR) statistic that can be used to select the optimal lag length. In this study, we rely on SBC, because it chooses the most parsimonious model, it is consistent, it has small sample properties and performs slightly

better in the majority of their experiments (see for Morimune and Mantani, 1995; Quinn, 1988; Pesaran and Shin, 1999; Alam and Quazi, 2003).

One of the important advantages of ARDL procedure was that the estimation is possible even when the explanatory variables are endogenous (Alam and Quazi, 2003). Furthermore, as long as the ARDL model is free of residual correlation, endogeneity is less of a problem. Pesaran and Shin (1999) showed that the appropriate lags in the ARDL model corrected for both residual correlation and endogeneity. The important advantage of ARDL against the single equation cointegration analysis such as Engle and Granger (1987) is that Engle and Granger suffer from problems of endogeneity while the ARDL method can distinguish between dependent and explanatory variables. The variables can be distinguished by estimating each equation by considering each of the variables in turn as a dependent variable⁽²⁾.

$$\begin{aligned} \Delta y = & \alpha_{0y} + \sum_{i=1}^n b_{1y} \Delta y_{t-i} \\ & + \sum_{i=1}^n b_{2y} \Delta x_{t-i} + \sum_{i=1}^n b_{3y} \Delta z_{t-i} \\ & + \gamma_{1y} y_{t-1} + \gamma_{2y} x_{t-1} + \gamma_{3y} z_{t-1} + \varepsilon_{1t} \end{aligned} \quad (3)$$

(2) See Siddiki (2000).

$$\begin{aligned}\Delta x = & \alpha_{0x} + \sum_{i=1}^n b_{1x} \Delta y_{t-i} \\ & + \sum_{i=1}^n b_{2x} \Delta x_{t-i} + \sum_{i=1}^n b_{3x} \Delta z_{t-i} \\ & + \gamma_{1x} y_{t-1} + \gamma_{2x} x_{t-1} + \gamma_{3x} z_{t-1} + \varepsilon_{1t} \quad (4)\end{aligned}$$

$$\begin{aligned}\Delta z = & \alpha_{0z} + \sum_{i=1}^n b_{1z} \Delta y_{t-i} \\ & + \sum_{i=1}^n b_{2z} \Delta x_{t-i} + \sum_{i=1}^n b_{3z} \Delta z_{t-i} \\ & + \gamma_{1z} y_{t-1} + \gamma_{2z} x_{t-1} + \gamma_{3z} z_{t-1} + \varepsilon_{1t} \quad (5)\end{aligned}$$

The F -statistics are used for testing the existence of long-run relationship. The null hypothesis for testing the non-existence of first long run (Eq.3) i.e. $H_0 : \gamma_{1y} = \gamma_{2y} = \gamma_{3y} = 0$ is denoted by $F_y(y; x, z)$. The F test for the null hypothesis for testing the non-existence of second long run (Eq. 4) is $H_0 : \gamma_{1x} = \gamma_{2x} = \gamma_{3x} = 0$ denoted by $F_x(x; y, z)$. The F test for the null hypothesis for testing the non-existence of third long run (Eq. 5) is $H_0 : \gamma_{1z} = \gamma_{2z} = \gamma_{3z} = 0$ denoted by $F_z(z; y, x)$. If the $F_y(y; x, z)$ is higher than the upper bound of the critical value while $F_x(x; y, z)$ and $F_z(z; y, x)$ are lower bound of the critical value, there exists a unique and stable long run relationship and y is the exogenous variable and x and z are exogenous variables.

Furthermore, the ARDL method estimates the long and short-run components of the model simultaneously, removing problem associated with omitted variables and autocorrelation. Thus, estimates obtained from the ARDL method of cointegration analysis are unbiased and efficient, since they avoid the problems that may arise in the presence of serial correlation and endogeneity (Siddiki, 2000).

Data and empirical results

Data and the Variables

Our sample consists of five ASEAN countries namely Indonesia, Malaysia, the Philippines and Thailand and it covers the period 1968 to 2002. The annual data for all ASEAN-5 was collected from different sources.

In existing literature, many proxy variables have been used in literature to represent financial development. They fall in three broad categories: (1) monetary aggregates, such as M1, M2, M3 and domestic credit; (2) currency ratio, defined as the ratio of currency to monetary aggregates; and (3) monetization variable, defined as the ratio of monetary aggregates to national income. We have chosen to rely on the first category because of availability of time series data for the entire sample period for all the countries under investigation (King and

Table 1
Description of the Data and Statistical Sources

Variable	Description of the Data	Source
GDP	Real Gross domestic product	IFS, IMF
G	Growth rate of real gross domestic product	IFS, IMF, ADB
FDI	Foreign Direct Investment	IFS, IMF
GDI	Gross Domestic Investment	IFS, IMF, ADB
REX	Real Exchange Rate $RER = E.P^I/p$ where E is the exchange rate, P is domestic deflator and P^I is US deflator	IFS, IMF
FI	Financial intermediation proxied by M2 less currency outside banks	IFS, IMF, ADB
S	Domestic Saving	IFS, IMF, ADB
H	Human capital proxied by secondary school enrolment	UNESCO, DS
X	Export of goods and services	IFS, IMF
CPI	Consumer price index	IFS, IMF, ADB
GDPD	GDP deflator	IFS, IMF
POP	Population	IFS, IMF, ADB

Note: ADB, denotes Asian Development Bank; DS, Departments of Statistics in each country.

Levine, 1992; Ansari, 2002). Among the four alternatives in this category, M2 performed well in the model. The data definitions and statistical source used in this study are listed in Table 1.

In literature, many proxies for human capital were suggested; as secondary school, primary-school enrolment or higher education ratios. It is worth noting that the secondary-school enrolment ratio is more significant in explaining income concentration than the primary-school enrolment ratio as suggested by previous work (see the work of De Paula *et al.* 1999; Ahluwalia, 1974).

We consider as history the period 1968 to 2002 based on the availability of data; but during this period, some events

occurred such as: An increase in oil prices in 1970s, a commodity crisis in Malaysia, and the 1997 financial crisis. Therefore we test for structural stability (Chow test) but the results suggest that no structural changes took place. Indeed, we added dummy variables for these events and still the results were not significant, which means that our results were not biased.

Cointegration Test

In this section we investigate the existence of a long run relationship or cointegration between the variables in model (2) using Bound test procedure developed by Pesaran *et al.* (2001). This was done to test the null hypothesis of no cointegration against the alternative hypothesis. F -statistic, and was computed

Table 2
Bound Test for the Existence of Long-Run FDI

	Countries				
	Indonesia	Malaysia	Philippines	Thailand	Singapore
<i>F-statistics</i>					
$F_{\Delta FDI}(\Delta FDI; GDI, FI, G, X, REX, H)$	4.9870***	5.4868 ***	3.3780**	3.1062 *	6.0095 ***
$F_{\Delta GDI}(\Delta GDI; G, FI, FDI, X, REX, H)$	1.7856	1.3130	1.4951	1.8692	2.8732
$F_{\Delta G}(\Delta G; FDI, GDI, FI, X, REX, H)$	1.6090	2.3325	1.3751	1.9366	1.9886
$F_{\Delta FI}(\Delta FI; GDI, FDI, G, X, REX, H)$	1.7253	2.3516	0.7535	1.9112	0.4657
$F_{\Delta X}(\Delta X; FDI, GDI, FI, G, REX, H)$	0.6953	1.1558	0.7069	1.7453	1.0336
$F_{\Delta REX}(\Delta REX; FDI, GDI, FI, G, X, H)$	1.2472	0.9685	1.5143	1.3482	1.5668
$F_{\Delta H}(\Delta H; FDI, GDI, FI, G, REX, X)$	1.3283	2.8450	2.2568	1.1540	2.7201

Note: the relevant criteria value bounds are given in Table C1.ii (with restricted intercept and no trend; number of regressors = 6), Pesaran *et al.* (2001). They are 1.99-2.94 at the 90% significance level, 2.27-3.28 at the 95% significance level and 2.88-3.99 the 99% significance level. Asterisks *, **, *** denotes that F-statistics falls above the 90%, 95%, 99% upper bound respectively.

to estimate the significance of the lagged level of the variables in Equation (2), i.e. $\alpha_0 = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = 0$. The rejection of the null hypothesis suggests that there exists a long-run relationship between *FDI* and *G*, *H*, *X*, *GDI*, *FI* and *REX*. Indeed, we can treat *G*, *H*, *X*, *GDI*, *FI* and *REX* as the exogenous “long-run forcing” variables for *FDI*. If the computed *F*-statistic falls above the upper bound criteria value, which is provided by Pesaran *et al.* (1996, 2001), then the null hypothesis of no cointegration is rejected. If it falls below the lower bound, then the null of no cointegration cannot be rejected. Finally, if it falls within the critical value bound, the result is inconclusive. The existence of a unique long-run relationship is crucial for valid estimation and inference of the parameters of the model. Once cointegration is confirmed, we

move to the second stage and estimate the log-run coefficients of *FDI* model and the associated ARDL error correction model.

To investigate whether we have a unique long-run relationship between the variables in the model, the same exercise of treating each of the variables as the dependent variable was reported and the corresponding *F*-statistic was computed.

The empirical results of bounds tests are presented in Table 2. Using the asymptotic criteria value bounds computed by Pesaran *et al.* (2001), all the $F_{\Delta FDI}$ statistics in lag two were significant at different levels. $F_{\Delta FDI}$ -statistic test result for Thailand's *FDI* equations was 3.106, and it fell above the upper bound criteria value (1.99-2.94) at 10% significant level. Thus,

the null hypotheses of no long-run relationship was rejected at 10% level, regardless of whether the underlying data are I (0), I (1) or fractionally integrated. For Indonesia, Malaysia and Singapore, the $F_{\Delta FDI}$ - statistic results were 4.9857, 5.4868 and 6.0095 respectively, and all fell above the upper of the 1% critical value bounds (2.88-3.99). Again this implies rejecting the null hypothesis at 1% level, regardless of the underlying orders of integration. Meanwhile, in the case of the Philippines, the $F_{\Delta FDI}$ result was 3.3780, which rejected the null hypothesis at 5% significant level.

Results reported in Table 2 also show that the null hypotheses that the level variables do not enter significantly in the equations for ΔG , ΔGDI , ΔFI , ΔX , ΔREX and ΔH and cannot be rejected at 10% significant level or better. Only in the ΔFDI equations is the null hypothesis rejected, suggesting that there exists a unique long-run relationship among the specified variables in FDI model and that G , GDI , FI , X , REX and H can be treated as the exogenous “long-run forcing” variables in the equation.

Long-Run Equilibrium Estimation

Given the existence of a long-run relationship, the next step is to use the ARDL approach to estimate the para-

meters of this long run relationship. This method has the additional advantage of yielding consistent estimates of the long-run coefficients that are asymptotically normal irrespective of whether the variables under consideration are I (0), I (1) or fractionary integrated (see Pesaran and Shin, 1999; Pesaran *et al.* 2001; Alam and Quazi, 2003).

The results of an ARDL ($p, q_1, \dots, q_k$) models based on SBC criteria are reported in Table 3. As we can see from the table, most of the variables under consideration are significant and the signs are consistent with a priori expectations. Clearly, the growth rate of GDP is positively signed in all the countries suggesting that it plays a significant role in encouraging foreign capital inflow to ASEAN-5.

In the cases of exports, it is positively noted that countries which are consistent with previous empirical evidence and experience phenomenal growth rates such as ASEAN are also countries that are successful exporters. The theoretical argument is that exports orientation increases the openness⁽³⁾ of the economy and, by exposing it to foreign technology channeled by FDI and foreign competition, provokes a rapid rate of technological progress. The empirical

(3) The degree of openness is measured by ((Exports + Imports)/2) as percentage of GDP).

Table 3
Estimated Long-run Coefficients for FDI Model

Regressors	<i>Dependent Variable is FDI</i>				
	Indonesia	Malaysia	Singapore	Philippines	Thailand
	SBC Selected Models				
	<i>Coefficient [T-ratio]</i>				
G	0.7359 [1.9436]*	0.1443 [4.7684]***	0.0827 [2.3135]**	0.4514 [1.8700]*	0.1088 [5.6687]*
GDI	0.0703 [1.8039]*	0.7128 [2.2153]**	0.7945 [2.2419]**	0.3935 [0.7838]	0.1457 [2.7511]**
FI	0.0255 [0.1711]	0.7068 [2.3088]**	1.4645 [1.9236]*	0.2795 [1.7329]*	0.0579 [2.0628]**
X	0.2451 [2.0481]**	0.6983 [2.4275]**	0.2749 [1.7935]*	0.2835 [1.7295]*	0.1533 [1.8813]*
H	0.0458 [1.7200]*	2.2455 [1.7306]*	1.3749 [2.2644]**	0.7346 [1.2721]	0.0210 [3.7481]***
REX	-0.6221 [-4.8035]***	0.0612 [0.2344]	0.2955 [1.8845]*	-0.1626 [-0.4308]	0.0037 [1.7172]*
C	3.3608 [1.0778]	-28.303 [-2.029]*	-20.1301 [-2.3136]*	-4.1350 [-1.608]	3.5990 [3.4462]***
The period	1969-2002	1968-2002	1969-2002	1970-2002	1968-2002
No.of Obs.	(34)	(35)	(34)	(33)	(35)

Note: Asterisks ***, **, * represent 1%, 5%, 10% significant levels, respectively. The following notation applies: G, growth rate of gross domestic product; S, denote domestic saving; GDI, gross domestic investment; FDI, foreign direct investment; FI, financial intermediation; H: human capital; X: exports of goods and services; REX, real exchange rate.

evidence provides the strong support of the export-led growth hypothesis (see Bahmani-Oskooee and Alse, 1993; Baharumshah and Rashid, 1999, to name a few). All in all, these authors suggest that countries with higher exports growth over extended period tend to attract more FDI than others. Finally, Hufbauer et al. (1994) has shown that the size of the host country and the openness of the host countries are important determinants of FDI flows.

Of the five countries in question, Indonesia, Malaysia, Thailand, and

Singapore show evidence that domestic investment is key to FDI inflows, while the Philippines do not. Fry (1993) in an empirical study of FDI in South Asia argues that the best way to encourage FDI is to implement policies that generally improve the investment climate. According to Fry, where domestically financed investment is booming, FDI will seek to participate. Hence, he argues that as a general principle, policies that encourage domestic investment will also stimulate FDI.

The arguments made and the evidence cited in support of the development of the financial sector is crucial to attract further FDI. With the exception of Indonesia, all countries in question shows evidence that financial intermediation promotes FDI inflows to ASEAN-5. Its coefficient magnitude is noticeably very high in Singapore (1.464), followed by Malaysia (0.707) where the financial market is more developed than other ASEAN financial markets. The results perhaps reflect the extent of financial liberalization adopted by these countries.

Outward policies attract more foreign capital as suggested by empirical results, where the coefficients of exports of goods and services are statically significant and it is positive in all the countries under consideration. Furthermore, the human capital development is essential to encourage foreign capital inflows to ASEAN-5. The empirical results with the exception of the Philippines, in all countries in question show evidence that human capital promotes FDI inflows to ASEAN-5 countries.

The sign of real exchange rate of Malaysia, Thailand and Singapore is positive and statically significant in all but Malaysia. While its coefficient is negative in Indonesia and the Philippines, it is statically significant in Indonesia. Previous literature sug-

gests that the depreciation of local currencies decreased the cost of production, and raised the profitability of FDI and the wealth of the foreign investors. However, for the case of Indonesia, there was a negative relationship between the exchange rate of Rupiah and FDI inflows; this could be a result of unstable and high fluctuation of the exchange rate of Rupiah during and post-financial crisis as a result of the financial crisis and political instability. This could affect the behavior of foreign investors and lead to a decline in FDI inflows and also an increase in the outflow of FDI from Indonesia as clearly shown by Indonesia's data.

Most of the long-run parameters are consistent with previous theories and empirical works with the exception of real exchange rate of Rubiah, but they are different in their magnitude on FDI inflows, which could be due to the development level between the countries under consideration. For example, Singapore is more developed than the other ASEAN countries; this could reflect in the impact of the determinants of FDI as exchange rate and financial intermediation on FDI inflows to Singapore. For example, the financial intermediation impact in Singapore and Malaysia was greater than in Indonesia, the Philippines and Thailand. This is consistent with the fact that the financial sector in

Singapore and Malaysia was far more developed than in other ASEAN-5 countries (see Reszat, 2002).

ECM

We estimated the short-run dynamic of the FDI model for ASEAN-5 using the ARDL approach to cointegration proposed by Pesaran *et al.* (2001). The ARDL method is superior to the Engle and Granger (1987) method because the latter may suffer from problems of endogeneity and serial correlation. Thus, estimates obtained from the ARDL method of cointegration analysis are unbiased and efficient, since they avoid the problems that may arise in the presence of serial correlation and endogeneity. The results of ECM estimation based on the ARDL technique for the FDI model along with battery diagnostic tests are reported in Table 4.

The diagnostic statistics in Table 4 indicated that the FDI equations were well specified. None of the statistics in Table 4 were significant at 5% significant level. Thus the diagnostic test results obtained revealed that all equations passed the tests successfully, i.e. the χ^2 tests showed no evidence of residual serial correlation, while the Ramsey's RESET tests showed any functional form misspecification. Indeed, the χ^2 tests did not indicate any evidence of normality

problem or heteroscedasticity of residual.

As shown in Table 4 the estimated lagged error-correction term (ECM) in the cointegration regression appeared to be negative and statistically significant, a feature necessary for stability of the model. This again reinforces the finding that the variables under consideration were cointegrated. The coefficients of the ECM range from as high as 0.757 (Singapore) to as low as 0.291 (the Philippines), suggest that the speed of adjustment back to equilibrium following the disturbance were fairly rapid. For instance, more than 75% of the adjustment is completed in a year for Singapore due to short-run adjustment.

The coefficients of financial intermediation in FDI equations for all ASEAN-5 countries, except for Indonesia, were found to be unambiguously positive and significantly different from zero at different significance levels; however, the coefficients differed in terms of magnitudes, and ranged from 1.321 (Singapore) to 0.0314 (Thailand) in short-run. This finding is consistent with the view that financial development was a necessary condition for achieving high rates of FDI inflows and countries with well-developed financial markets gained significantly from FDI (Carkovic and

Table 4
Error Correction Representation for the Selected ARDL Model:
Short-Run Estimation for FDI Model

Regressors	<i>Dependent Variable is ΔFDI</i>				
	<i>Countries</i>				
	Indonesia	Malaysia	Philippines	Thailand	Singapore
	Coefficient [T-ratio]				
ECM (-1)	-0.4395 [-4.741]***	-0.5773 [-4.388]***	-0.2907 [-2.855]***	-0.5431 [-4.053]***	-0.7573 [-5.270]***
ΔG	0.3235 [2.061]**	0.0833 [3.966]***	0.1312 [2.442]**	0.0591 [2.798]**	0.0626 [2.226]**
ΔGDI	0.0309 [1.925]*	0.4115 [1.743]*	0.1144 [1.374]	0.0791 [1.755]*	0.6017 [2.096]**
ΔFI	0.0112 [0.169]	0.4081 [2.494]**	0.0812 [2.401]*	0.0314 [2.010]*	1.3115 [2.947]***
ΔX	0.1077 [2.359]**	0.4032 [2.148]**	0.0824 [1.912]*	0.0833 [1.938]*	0.6598 [5.243]***
ΔH	0.0201 [1.828]*	1.2965 [1.722]*	0.2135 [1.727]*	0.0114 [0.505]	3.3945 [2.348]**
ΔREX	-0.2735 [-4.765]***	0.0353 [0.265]	-0.0472 [-0.689]	0.0021 [1.767]*	0.2238 [1.873]*
C	1.4773 [0.971]	-16.342 [-1.967]*	1.2021 [2.284]**	1.9558 [3.712]***	-15.251 [-2.183]**
Diagnostic tests: χ^2 -statistics [prob.]					
$\bar{R}^2$	0.8092	0.9588	0.9033	0.7423	0.8116
h -statistic	1.3044 0.192]	0.9902 [0.322]	0.0289 [0.977]	-0.5308 [0.595]	-0.5644 [0.572]
A: AR (1)	1.3042 [0.253]	0.4761 [0.490]	0.0010 [0.974]	0.0560 [0.813]	2.5710 [0.109]
B: RESET (1)	0.6386 [0.424]	0.8675 [0.352]	0.4191 [0.518]	0.8654 [0.352]	0.7461 [0.388]
C: Norm. (2)	1.6960 [0.428]	0.7921 [0.673]	0.1894 [0.910]	0.1894 [0.910]	1.4471 [0.485]
D: Hetero. (1)	0.8684 [0.351]	1.2444 [0.265]	0.6097 [0.435]	0.4179 [0.518]	0.4158 [0.519]

Notes: The t -statistics are represented in squared brackets. Asterisks ***, **, * represent 1%, 5%, 10% significant levels, respectively. Δ Denotes the first difference of each variable. The following notation applies: G, growth rate of gross domestic product; GDI, gross domestic investment; S, domestic saving; FI, financial intermediation; H: human capital. X: exports; REX: real exchange rate. The probability values of the diagnostic tests are represented in squared brackets.

A: Based on Breusch-Pagan test of residual serial correlation

B: Ramsey's RESET test using the square of the fitted values

C: Based on a test of skewness and kurtosis of residuals

D: Based on the regression of squared residuals on squared fitted values.

Levine, 2002). Our findings are also consistent with the findings of Kalemli-Ozcan *et al.* (2002), which stated that the level of development of local financial markets was crucial for positive effects to be realized and the link between FDI and growth was causal, as FDI promotes growth through financial markets. The result of this study suggested that countries should weigh the cost of policies aimed at attracting FDI versus benefits that seek to improve local conditions. Better local conditions not only attract foreign companies but also allow host economies to maximize the benefits of foreign investments.

The results in Tables 3 and 4 showed that the coefficients of the domestic investment variables were statistically significant at standard significance level in all ASEAN-5 countries in both long and short runs except for the Philippines. This implies that domestic investment had positive effects on the inflow of foreign direct investment (FDI) in both long and short terms to ASEAN-5. The estimated coefficients showed that domestic investment had different levels of effects in attracting foreign direct investment (FDI). The capital accumulation records⁽⁴⁾ during the pre-crisis period could be another impor-

tant reason for foreign capital inflows into ASEAN-5 countries.

Among the countries under investigation, Singapore and Malaysia seem to have the most efficient domestic investment sectors as measured by the magnitude of the domestic investment coefficients. The coefficients of domestic investment in the long run were 0.794 for Singapore, 0.712 for Malaysia, and 0.146 for Thailand, and 0.070 for Indonesia. This suggested that the impact of domestic investment on FDI was the least in Indonesia, while not significant for the Philippines. The magnitude of the coefficients suggested that a 100 million US\$ increase in domestic investment could increase FDI inflow by 79.4 million US\$ and 71.3 million US\$ in Singapore and Malaysia, respectively. Domestic investment led foreign direct investment (FDI) hypotheses are confirmed by the data of four out of five economies under the study, in both long and short runs.

Unfortunately, very few studies have been done regarding the impact of domestic investment on FDI. In theory, there appeared to be several ways in which domestic investment might act as a catalyst for FDI. One obvious channel was public investment in physical and human infrastructure. The better the infrastructure, the more profitable is

(4) See Table 2.1c.

the FDI, *ceteris paribus*, we would expect to see FDI inflows increases in public investment. Another plausible argument is that private domestic investors have more accurate information about the local business climate than do foreign investors. When information is incomplete, domestic investment acts as a signal about the state of the economy to foreign investors. Fry (1993) in an empirical study of FDI in South Asia, argued that the best way to encourage FDI is to implement policies that generally improve the investment climate. According to Fry, when domestically financed investment is booming, FDI will seek to participate. Hence, he argued that as a general principle, policies that encourage domestic investment would also encourage FDI. In his empirical study on the South Asia countries, Agrawal (2000) found that FDI had a strong positive effect on economic growth, also he found that there was a strong complementary relationship between FDI and domestic investment; possibly through various backward and forward linkages.

Moreover, the long and short-run ARDL results of ASEAN-5 countries were in agreement with previous literatures on the role of human capital in encouraging FDI inflows. Our results confirmed that human capital was an important determinant of FDI inflow to ASEAN-5. The literature indicated that high human capital

was one of the determinants for attracting FDI. Cross-country evidence indicated that human capital was an important determinant for inward FDI especially among efficiency-seeking MNEs (Noorbakhsh *et al.* 2001). Broadman and Sun (1997), and Coughlin and Segev (2000) provided evidence for China in the early 1990s. They showed that adult literacy is one of the key determinants for geographic determinants of FDI. Thus, the highly significant coefficients of human capital confirmed that human capital in our study is consistent with previous literatures such as Xu (2000), Noorbakhsh *et al.* (2001), Broadman and Sun (1997) and Coughlin and Segev (2000).

The empirical results suggested that the outward-looking policy contributed to FDI growth. The estimated parameters of exports of goods and services in the FDI model were consistent with the theory. In all cases, the *t*-statistics were significant, indicating that the traded sector was a very important determinant of the inflow of FDI to ASEAN-5 in ECM. For all ASEAN-5 countries, the export coefficients ranged from 0.659 (Singapore) to 0.082 (the Philippines). According to the size of the export coefficients, Singapore's export (0.659) had the highest impact in encouraging FDI inflows followed by Malaysia exports (0.402); an increase

in a 1% of exports, FDI inflow to Singapore and Malaysia will increase by 0.659% and 0.402% respectively. This implies that the improvement of the FDI inflows could be due to the continuous expansion of ASEAN-5 exports. The empirical results based on previous studies confirmed that higher exports lead to higher FDI inflow. Many studies such as by Jansen (1995), Balasubramanyam *et. al.* (1996,1999), Marchant, *et. al.* (2002), and Elizabeth (2002) also found that FDI is more predictive in countries that have pursued export promotion. Our results provide further insight into the role played by the export sector in the effectiveness of export-oriented policies used by ASEAN-5 countries.

Also, we examined the impact of exchange rate on the inflow of FDI in ASEAN-5. The results showed that the coefficients of exchange rate were positive in Malaysia, Thailand, and Singapore but were significant only in Singapore and Thailand. On the other hand, there was a negative effect of the exchange rate on FDI Indonesia and the Philippines but was significant in Indonesia. The mixed results may be due to instability of exchange rate during the financial crisis period.

Past theoretical literature showed that the depreciation of domestic currency can have significant effects on

FDI inflows, but the empirical evidence was ambiguous (Pain, 2003). Several studies such as Froot and Stein (1991), Blonigen and Slaughter (2001) and Klein and Rosengren (1994) have found that the dollar depreciations enhanced FDI inflows. Others like Stevens (1992) and Healy and Palepu (1993) found no such evidence. Froot and Stein (1991), Klein and Rosengren (1994) and Blonigen and Slaughter (2001) stated that a depreciation of the domestic currency increases the relative wealth of foreign firms, which leads them to increase their investment; and they suggest that real exchange may be used as an instrument for attracting FDI. The negative impact of depreciation of Rubiah on FDI inflows into Indonesia may be due to the very high fluctuation of the Rubiah during the post financial crisis coupled with the political instability, which may be cause of the negative relationship between FDI inflow and depreciation of Rubiah. Importantly, the researcher tries to add dummy variable, but there are no important changes in the results.

Thus, we can conclude that, if there is no high fluctuation in real exchange rate, the depreciation of local currency could positively encourage FDI inflows to ASEAN-5 countries because it lowers the cost of production and investment in these

countries, and raises the FDI profit. Also the wealth effect is another channel through which a depreciation of the real exchange rate could raise FDI, except in the case of Indonesia.

Finally, we examine the stability of the long run parameters together with the short-run movements for each equation. To this end, we relied on cumulative sum (CUSUM) and cumulative sum squares (CUSUMSQ) tests proposed by Brown *et al.* (1975). The same procedure was applied by Pesaran and Pesaran (1997) and Mohsen *et al.* (2002) to test the stability of the long-run coefficients. The tests applied to the residuals of the ECM models (Table 3) along with the critical bounds are graphed in Figures 1-5. As can be seen in Figures 1-5, the plots of CUSUM and CUSUMSQ statistics stayed within the critical 5% bounds for all equations. Neither CUSUM nor CUSUMSQ plots crossed the critical bounds, indicating no evidence of any significant structural instability. These results were the same no matter which selection criterion was chosen, which indicated that the growth of FDI functions in Indonesia, Malaysia, the Philippines, Singapore and Thailand were stable. They appeared to be unaffected by the recent financial crisis over the sample period.

Conclusion

In this paper, we examined the FDI inflows into ASEAN-5 namely: Indonesia, Malaysia, the Philippines, Thailand and Singapore using the ARDL approach. The main conclusion of this study is that all ASEAN-5 share a common set of determinants of FDI inflows. The results of the empirical test clearly point toward a positive impact of domestic investment and economic growth rate on FDI inflows, suggesting that investment induces growth and that there is the existence of “growth-FDI” nexus and that domestic investment accumulation lead FDI.

The empirical results also indicate, among other things, that the development level of the financial sector curtailed FDI inflows into ASEAN-5. As the financial system becomes more sophisticated, its effect on FDI becomes greater. The financial Sector in Singapore is well developed followed by Malaysia’s compared to other ASEAN-5 financial markets. Our results suggest that the financial intermediate impact on Singapore’s and Malaysia’s economic growth is greater than those in other ASEAN-5. More importantly, our results show that in Singapore, financial intermediation has higher impacts on FDI inflows than the other variables in the FDI equation.

Figure 5.3.1
Plots of CUSUM and CUSUMSQ statistics for Indonesia's FDI Model

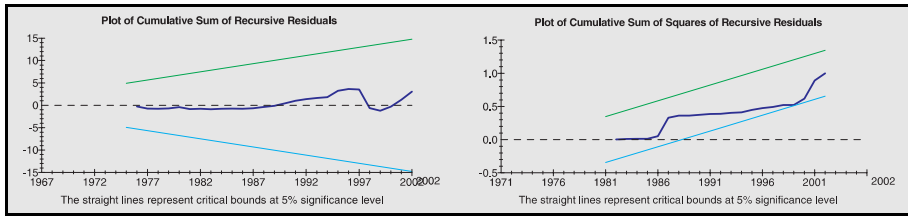


Figure 5.3.2
Plots of CUSUM and CUSUMSQ statistics for Malaysia's FDI Model

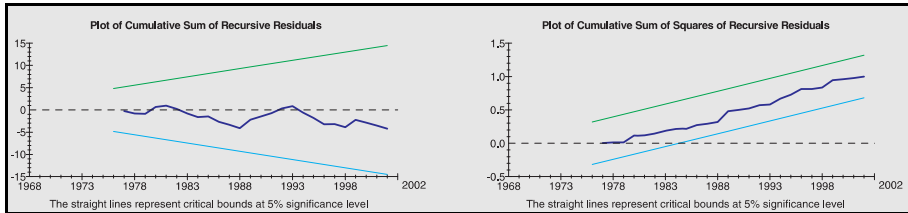


Figure 5.3.3
Plots of CUSUM and CUSUMSQ statistics for the Philippines' FDI Model

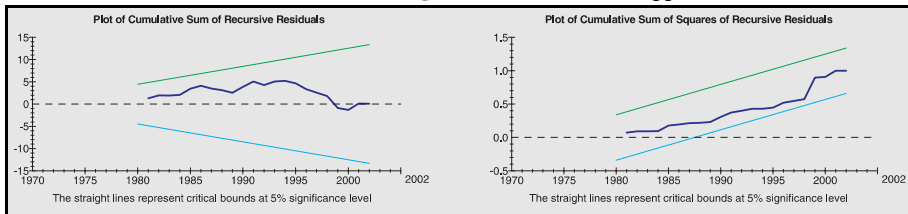


Figure 5.3.4
Plots of CUSUM and CUSUMSQ statistics for Singapore's FDI Model

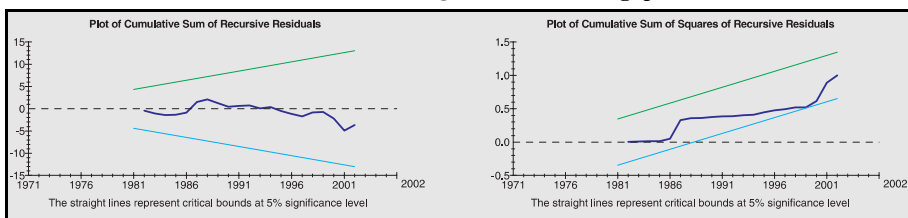
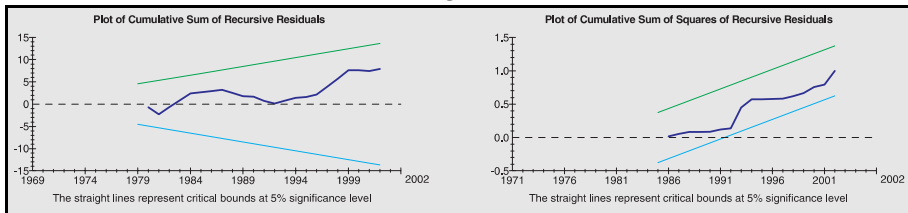


Figure 5.3.5
Plots of CUSUM and CUSUMSQ statistics for Thailand's FDI Model



The most robust finding in this paper is that the effect of human capital on economic growth depends not only on the growth of human capital but also on the development level of human capital. Improvement in human capital is crucial to encourage FDI. Baharumshah, *et al.* (2003); Chamarbagwala, *et al.* (2000); Bor-ensztein *et al.* (1998) and Booth (1999) seem to suggest that investment in human capital needs to precede stabilization policies that encourage FDI, foreign capital imports, domestic investment, and exports of goods and services and thereafter economic growth.

The results of this study also suggest that export expansion policies are

crucial for ASEAN-5 to enhance FDI. The growth of exports created profitable opportunities for investment, which encourage further investment that lead to further export growth and thereafter economic growth. This is known as “virtuous cycle of export-led growth”.

Finally, our study suggests that there is a positive effect in the depreciation of local currency on FDI inflows to ASEAN-5 countries because it lowers the cost of production and investment in these countries, and raises FDI profit. Also the wealth effect is another channel through which a depreciation of the real exchange rate could raise FDI, except in the case of Indonesia.

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الملخص

محددات الاستثمار الأجنبي المباشر في جنوب شرق آسيا: باستخدام منهجية (ARDL)

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استهدفت الدراسة التعرف عمليا على تأثير كل من: الاستثمار المحلي، ورأس المال البشري، والصادرات، والتمويل الوسيط والنمو الاقتصادي على تدفق الاستثمار الأجنبي المباشر (FDI) على دول جنوب شرق آسيا: أندونيسيا، ماليزيا، تايلند، سنغافورة، والفلبين، حيث استخدمت الدراسة منهجية حديثة لتحقيق هذا الهدف، ألا وهي منهجية Autoregressive Distributed Lag Approach (ARDL)، وذلك للتعرف على تأثير كل من هذه المتغيرات السابقة على الاستثمار الأجنبي المباشر في المدى القصير والمدى الطويل خلال الفترة الزمنية (١٩٦٨ - ٢٠٠٢). النتائج العملية لهذه الدراسة يمكن تلخيصها فيما يلي: (١) وجود علاقة مباشرة فيما بين الاستثمار الأجنبي ومحدداته التي سبقت الإشارة إليها. (٢) النمو الاقتصادي والاستثمار المحلي لهما تأثير إيجابي على زيادة تدفق الاستثمار الأجنبي المباشر إلى دول جنوب شرق آسيا. (٣) تطوّر كل من القطاع المالي ورأس المال البشري وتنميته لهما تأثير مهم في عملية جذب الاستثمار الأجنبي. (٤) سياسة تشجيع التصنيع لغاية التصدير مع الاستقرار في سعر الصرف العملة المحلية يسهمان في تشجيع الاستثمار الأجنبي. كما أوصت الدراسة بتشجيع الاستثمار الأجنبي المباشر جنبا إلى جنب مع الاستثمار المحلي؛ وذلك لإعادة النمو الاقتصادي في دول جنوب شرق آسيا إلى ما كان عليه قبل الأزمة المالية ١٩٩٧.

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