

**STUDY ON TRADE, INVESTMENT AND FINANCIAL INTERGRATION
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Foreign Capital Flows and Economic Growth in East Asian Countries

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Abstract

This paper provides a quantitative assessment of the effect of various types of capital flow on the growth process of the East Asian countries, including China. The empirical analysis was based on dynamic panel data and we found; first, that domestic savings contribute positively to long-term economic growth. Second, we confirmed that FDI is growth enhancing and that its impact is felt both in the short-and long run. Additionally, FDI influence on growth is much higher than domestic savings. Third, short-term capital inflow has adverse effect on the long-term as well as short-term growth prospects and it appears to be sensitive to long-term capital inflows. Fourth, long-term debt has positive effect on growth but its effect does somewhat disappear in the long-term. By and large, the observed positive contribution of FDI in the growth process of East Asian economies is a robust finding. For the policy perspective, the evidence convincingly suggests that countries that are successful in attracting FDI can finance more investments and grow faster than those that deter FDI.

JEL classification: F21, F23.

Keywords: foreign direct investment, short-term debt, economic growth

Introduction

The degree of integration in the global financial markets has increased dramatically in recent years. Net capital flows to developing countries have reached the highest level since the 1980s debt crisis. The composition of international capital flows to developing economies has also become more diverse in the last decade or so. There has been a shift from long-term loans, mainly to governments, to short-term loans to private sector, and from bank to non-bank sources such as direct investment flows and portfolio investments (equities, bonds and certificate of deposits)¹. From the macroeconomic perspective, this indicates that private capital flows are increasingly becoming a major source of financing of large current account imbalances in the developing economies. Indeed, the share of private borrowing increased from less than 25% in the 1980s to more than 50% in the 1990s. In other words, current account deficits in the 1990s were largely due to private saving-investment decisions. A major factor that has contributed to this trend is the liberalization policies on foreign capital adopted the developing countries.

The surge of foreign capital also carries an inherent risk. It exposes the recipient country to external shocks. Authors like [Kim \(2000\)](#) view the increase in capital mobility as a mixed blessing for developing nations. These scholars blame short-term capital flows (debt and equity) for the crisis in East Asia (e.g., [Furman and Stiglitz, 1988](#); [Radelet and Sachs, 1998](#); [Ito, 1999](#))². They have taken the view that short-term capital flows can increase the fragility of the financial system and destabilize the economy. The financial crises in the 1990s are a point in case - they not only pose a threat to the financial system but also undermine the economic progress of the developing nations. The financial turmoil was mainly triggered by capital reversal leading to the collapse of exchange rates and the fall of asset prices to unprecedented levels³. This in turn had an adverse impact on external debts obligations and undermined the stability of the financial system of the crisis- affected countries. Perhaps, an important lesson learned from the Asian (1997-98), Mexican (1994-95) and Brazilian (1999) crises is that foreign capital, especially short-term capital, can exit as easily as it enters in an open economy⁴. Additionally, it is more volatile than other categories of capital flows and its sudden reversal tends to have destabilizing effects on the host country.

¹The international capital inflows can be divided into four categories: short-term investment, long-term investment, portfolio investment and direct investment. Most of the earlier studies have assumed that they are perfect substitutes.

² On the other hand, some authors view portfolio flows and banking lending as performing better in countries with sound and deep financial markets and hence, growth-enhancing.

³Capital flight is generally taught as the cause of the collapse of exchange rate system in the 1990s. For more detailed accounts of the 1997 Asian financial crisis, see [Radelet and Sachs \(1998\)](#) and [Corsetti et al. \(1999\)](#).

⁴We note that a number of authors have argued that this view has yet to be supported by persuasive empirical evidence (see for example, [Chowdhry and Goyal, 2000](#)).

Meanwhile, there are other authors who have argued that FDI represents a more stable flow of capital. It is generally known that current account sustainability is enhanced when the external deficit is largely financed by foreign direct investment (FDI), relatively to the deficit financed by short-term flows that may reverse if market conditions and sentiments change. In contrast to short-term capital inflows (bonds and non-FDI equity investments), FDI is less volatile. It is usually seen as a safer form of finance since it involves long-term commitments to a country and as pointed by [Fernández-Arias and Hausmann \(2001\)](#) this type of foreign is “bolted down” in such a way that it cannot leave out at the first sign of economic crisis (see also [World Bank, 1999](#))⁵. For South Korea and Thailand, FDI as a fraction of current account deficits prior to the crisis was only a small fraction (in 1996, 10% for South Korea and 16% for Thailand). Other countries relied more on FDI—Indonesia’s FDI inflows were 60-90% of current account deficit between 1992-95. For Malaysia, the ratio stood well above the 90-100 % over the same period. The ratio was volatile in the case of the Philippines, but averaged to about 45% of the current account from 1990-1996 ([Corsetti et al., 1998](#)). For the developing countries, FDI is a medium for acquiring skills, technology, managerial practices and access to markets. China has been the largest developing country recipient of FDI, and is the second largest in the world behind the US (absorbing US \$ 53 billion in 2002). Hence, FDI have been quite large in the Asian countries, making the bulk of their capital inflows.

The present study analyzed the complexities relating to the interaction between foreign and domestic sources of investments in the growth process of the East Asian countries. Many studies have focused on the role of FDI in the growth process of emerging markets. In this paper, we make a distinction between the types of capital movement (FDI, short-term and long term debts). Specifically, we test for the interdependence of domestic savings and foreign savings on economic growth. Do different types of foreign capital have different impacts on economic growth? It can be added that there has been little empirical work on the impact of different types of capital flows on the economic growth in East Asia ([Sato, 2003](#) and [Gruben and McLeod, 1998](#)). The present study made an attempt to contribute to the literature in this field by examining the potential growth impact of the various categories of foreign capital during 1970-2000. To control for the global events in the last two decades, type of capital inflows and economic structure of the sample countries, the model was re-estimated using data from 1982-2001. The primary purpose is to show that our results are not time-specific due to the presence of outliers or the reasons mentioned earlier. We relied on a sample of eight Asian countries (China, South Korea, Fiji and five countries in ASEAN). Why these countries? Asian countries provide an interesting case to study the effect of foreign capital inflows since they received large capital inflows in the 1990s. Before the 1997 Asian financial crisis, these countries had been admired for their economic

⁵ In their article, [Fernández-Arias and Hausmann \(2001\)](#) find that an increase in non-FDI inflows increases the probability of default (crisis). For more discussion on sudden reversal of capital flows, see [Hernandez and Rudolph \(1995\)](#).

achievements: fast growth, low inflation, strong fiscal position, high savings rates, open economies and strong export sectors. The surge in capital inflows (except for China) fell drastically in the aftermath of the Asian financial crisis and this event led to negative growth rates for several quarters in the aftermath of the currency crisis.

Why does foreign capital matter? To preview the major empirical results, we found; first, that domestic savings (investments) contributes positively to long-term economic growth in the countries under investigation. Second, we confirmed that FDI is growth-enhancing, and importantly we show that its impact is felt both in the short- and long-run. Additionally, its influence on growth is found to be much higher than domestic savings. Third, short term capital inflow has an adverse effect on the long-term as well as short-term growth prospects of the East Asian countries. Fourth, long-term debt has positive effect on growth but its effect somewhat disappears in the long run. From the policy perspective, the evidence clearly suggests that countries that are successful in attracting FDI will grow faster than those countries that deter it. The evidence also raises important policy issues about the risk a nation exposes itself to if it becomes over-dependent on short-term capital.

Following this introduction, Section 2 provides an overview of the capital flows in the East Asian region. Section 3 examines the related literature on the host topic. Section 4 provides an overview of the methodology used to estimate the parameters of our model. Section 5 presents our findings and Section 6 concludes the paper.

Capital Inflows in Asian Countries

Foreign capital started to flow into Asian countries at accelerating rates in the 1990s after a large drop during the 1980s. International investors were attracted to these countries because of their good macroeconomic fundamentals. These economies had small fiscal deficits, stable exchange rates, high savings rates, and a highly regarded workforce. Another important domestic factor that has contributed to the huge inflows of foreign capital is the widespread liberalization of financial markets in these countries. Several decades of strong economic growth have made these countries an attractive region to international investors. A number of authors have also identified external factors that have jointly played a significant role in explaining the causes of the recent surge of capital inflows into Asian. These include a low world interest rate and recessions in industrial countries. In addition, the strong yen against US dollar during the period has also propelled Japanese investment in the region. Since the value of Asian currencies has been 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 American manufacturing base.

Exceptionally high leverage in open financial markets is a sign of excessive risk-taking, which leaves financial systems and economies vulnerable to loss of confidence. However, in virtually all recent cases, the major trigger that turned seemingly minor imbalances into a crisis is short-term debt. Short-term capital increased from 49 billion in 1991 and to 133 billion in 1997 and then reduced to 64 billion in 2000 in the aftermath of the Asian crisis. Among the Asian countries, China's short-term capital reduced from 23 billion to 13 billion, Malaysia's from 7.3 billion to 4.6 billion and Thailand's from 44 billion to 15 billion during the 1995-2000 period. In most cases, financial crises follow sustained periods of large increases in cross-border bank borrowing, with a high and growing proportion of these loans being short-term. By the time the Asian crisis began, short-term foreign bank debt in East Asia was measured at close to 65% of the total. The boom in short-term exposure continued in full swing until the very onset of each national crisis. In addition, commercial banks also account for the bulk of funds withdrawn during a crisis. For instance, more than 86 % of the capital that left Thailand in 1997 represented the withdrawal of credit by international commercial banks.

FDI plays an important role in the rapid economic development of the newly industrializing and developing economies of the Asian countries. A high percentage of FDI to net private capital flows in the 1990s is almost the norm for many developing countries, and this is true for Asia as well. The share of FDI inflows relative to other capital flows has increased since the 1980s, constituting slightly less than 30% of the world capital inflows in the 1990s. Between 1993 and 1998, FDI represented an annual average of 40% of the net resource flows to the ASEAN countries, with Malaysia, Myanmar and Vietnam having more than 50% FDI composition. This suggests the increasing importance of net private capital flows, particularly FDI and short-term borrowing, to the official flows for development finance. FDI stock in Asia (excluding Japan) grew tenfold from US\$ 79 billion from 1980-1990 to US\$ 583 billion from 1991-2000. Despite the soft condition in the global market, FDI flows to Asia in 2001 increased by 16%, up from US\$ 11.4 billion in 2000 to US\$ 13.3 billion⁶. This shows an improvement in investors' sentiments and confidence in the region. Among the Asian countries, China has become a very attractive destination for FDI by the second half of the 1990s. FDI in China in value term increased about tenfold in five years, from US\$3.4 billion in 1990 to 35 billion in 1995, before reaching a new peak of US\$47 billion in 2001⁷. Hong Kong's FDI increased from US\$ 4.2 billion to US\$ 6.2 billion and jumped to US\$ 62 billion in the same period.

Borrowers found that they could lower their financing costs by borrowing in yen or dollar rather than local currency. In the peak year of 1996, net private capital inflows

⁶ Net FDI to countries like South Korea and Thailand increased in the aftermath of the currency collapse due to gain in competitiveness through sharp fall in their currencies and liberalization of FDI regimes (Athukorala, 2003).

⁷ FDI flows made up 15% of gross fixed capital formation investment while foreign investment enterprises produced 15% of total industrial output and created 44% of China's exports.

reached as high as 12% of GDP. Foreign commercial banks provided the bulk of private external credit to these countries⁸. The combination of high saving rates and large capital inflows produced an investment boom across these countries. Foreign capitals not only fill the saving-investment gap but also facilitate the transfer of technology first to the exports sector and later to the non-exports sectors of the economy through its spillover effects. The saving-investment imbalance causes the current account to move in deficits. This gap needs to be financed by international debts and as these debts accumulate, it becomes increasingly more difficult to finance the current account imbalances, hence creating doubt on the ability of these countries to sustain and repay their external deficits.

Relevant Literature

The policy stance in Asia has long been one that assigns an important role to foreign capital flows; guided by the perception that opening up the capital markets offers a dynamic vehicle for achieving higher economic growth. However, recent literature has also raised concerns about the deleterious effects of flows of capital on the recipient countries. Specifically, FDI displaces domestic savings (e.g., [Reinhart and Talvi, 1998](#); [Fry, 1994](#); [Cohen, 1993](#); [Papanek, 1973](#)). In a seminal paper, [Papanek \(1973\)](#) showed the significant negative impacts of different types of capital on national savings. Based on a sample of 85 developing countries, Papanek found that foreign capital displaced domestic savings. Specifically, he showed that foreign aid, private investment and other capital crowded out national savings, and a reduction in domestic savings could lead to further increase on the dependency on foreign capital⁹. [Jomo \(1998\)](#) in his assessment of the Asian financial crisis pointed out that the crises were due to the opening up of stock markets and the quasi-peg to the US dollar encouraged inflow of foreign savings to supplement the already high domestic savings rate. These developments led to asset price inflation and excessive unhedged borrowing from abroad. In what follows, he argued that short-term capital inflows may temporarily supplement domestic savings, but their reversal can create severe disturbances on the functioning of an economy.

⁸ In the peak year of 1996, about \$90 billion flowed into South Korea, Indonesia, Thailand, Malaysia and the Philippines alone. Foreign commercial banks provided the bulk of the private external credit to these countries- \$8 billion out of the total new external credit of \$76 billion.

⁹ [Riedel \(1997\)](#) in his account of patterns of capital inflows to Asia emphasized the changing importance of FDI. Specifically, Riedel pointed out that there is a growing importance of equity and debt inflows into the region. The geographical distribution of portfolio investment in East Asia is different from that of FDI. The concentration is not in the largest, low wage country (China), but instead in the higher-income and more developed financial markets of South Korea, Malaysia, and Thailand. The increase in the relative importance of non-FDI has implications for exchange rate policy and macroeconomic management. Increase in portfolio capital inflows can pose a thrust on an export-led growth strategy, through real exchange appreciation and loss of international competitiveness- more so than FDI.

Another aspect that has received considerable attention in the recent literature is the impact of domestic savings on growth. Theoretically, the causal relationship between savings and growth can run in both directions. The life-cycle hypothesis predicts that causal direction runs from savings to economic growth. On the other hand, the permanent income hypothesis predicts reverse causality between the two variables. The hypothesis predicts a negative correlation between income growth and savings rate. Rational individuals in anticipation of declines in future income will increase savings. This saving for the rainy day (or permanent-income) hypothesis is illustrated by [Campbell \(1987\)](#) and also discussed in [Attanasio et al. \(2000\)](#), among others. Meanwhile [Loayza \(2000 a, b\)](#) pointed out that the reverse causation between savings and growth is also possible and this outcome occurs through physical capital accumulation (as discussed in

[Carroll and Weil \(1994\)](#) in a well-known article studied the dynamic relationship between savings and growth rates based on the analysis on 64 countries over the period from 1958-1987. Carroll and Weil demonstrated that growth Granger causes savings but not the other way round. On the other hand, the articles by [Levine and Renelt \(1992\)](#) and [Mankiw et al. \(1992\)](#), among others, showed that savings drive growth through the savings-investment link. Recent article by [Attanasio et al. \(2000\)](#) found a robust finding on the connection between savings and growth for a large panel data. They found that growth Granger causes savings. The evidence documented in [Rodrik \(2000\)](#) suggests that growth tends to lead savings, not the reverse. He argued that countries undergoing growth transitions, due to improved terms of trade or increase domestic investment, often recorded permanently higher savings rates¹⁰.

The neoclassical theory suggests that FDI is likely to be an engine of growth. This is because FDI (a) may enhance capital formation and employment augmentation; (b) may promote manufacturing exports; (c) may bring special resources such as capital, managerial skills, knowledge flows and others ([Grossman and Helpman, 1991](#), [Borensztein et al., 1998](#) and [Balasubramanyam et al., 1996](#)); and (d) results in technology and spillover effects ([Wei, 1995](#); [Markusen and Venables, 1999](#); [Zhang, 2001](#), to name a few). In the East Asian countries, FDI has expanded the manufacturing exports. The role of exports as an engine of growth has long been recognized in the literature (see [Feder, 1992](#); [Rodriguez and Rodrik, 1999](#)). FDI also has been the source of capital formation¹¹.

¹⁰ Transition here refers to sustained increase in savings (investment) rate or growth rate, a shift by more than 5% points in the national income for savings or 2.5% points in the growth rate of real GNP (see [Rodrik, 2000](#)).

¹¹Economic arguments for FDI to have negative effects are (a) FDI might lower domestic savings and investment; (b) in the long-term FDI may reduce foreign exchange earnings on both current account and capital account; and (c) management know-how and technology provided by MNCs may suppress or inhibit developing local sources of scarce skills and resources due to foreign dominance in the host country ([Zhang 2001](#)).

A recent article by [Rand and Tarp \(2002\)](#) has taken a different view. They found that FDI inflows are very volatile. In their assessment of the relationship between FDI and output, there is no general relationship between the two variables. Their results revealed no connection between domestic investment and FDI. Indeed, they showed that there are much volatility in FDI than foreign aid flows. As such, they argued that stabilizing FDI is essential in modifying business cycle fluctuations. In this line of research, [Razin et al. \(1999\)](#) developed a theoretical model with asymmetric information, in which FDI may give the wrong signals about the social rates of return of domestic capital. In the presence of well-developed domestic credit markets, the bad signal may lead to a decline of welfare in the host country. An important conclusion that emerged from the literature is that the effect of FDI on growth may be positive or negative. Therefore, the contribution of FDI on the growth process of the developing economy is an empirical issue and warrants further research.

A review of the literature on the host subject shows that studies on the role of FDI in China are limited; see [Zhang \(2001, 1999\)](#), [Lardy \(1995\)](#), [Pomfret \(1997\)](#) and [Wei \(1995\)](#). In their assessment of the role of FDI in China, [Lardy \(1995\)](#) and [Pomfret \(1997\)](#) concluded that no other transitional economy has played such a dynamic and significant role like China. [Zhang \(2001\)](#) based on the growth model employed in [Feder \(1992\)](#) and [Levin and Raut \(1997\)](#), reported that FDI contributes positively to growth and found that the marginal product of foreign capital to be significantly larger than that of domestic capital. Zhang went on to argue that FDI contributes positively to China's growth through direct effects (such as raising productivity and promoting exports) and positive externalities (such as facilitating transition and diffusing technology).

While the main body of empirical work on foreign capital has focused on FDI and aid flows, there is scarce evidence on short-term capital inflows and their impact on growth. [Rodrik and Velasco \(1999\)](#) highlight the negative effects that short-term flows may have on the economy¹². In their theoretical model, if domestic banks excessively incur short-term debt, they become highly prone to suffering bank runs. Accordingly, this would lead to costly asset liquidations, and thus a reduction in income and welfare.

Model and Data

In this paper, we have applied the Dynamic Generalized Least Squares (DGLS) methodology of [Stock and Watson \(1993\)](#) as described in [Campbell and Perron \(1991\)](#). This methodology corrects for (i) serial correlation where the sample residuals exhibit

¹²The risk of abrupt reversals in capital flows has raised concerns among policymakers around the world. Such concerns were heightened by several financial crises in the 1990s including the Mexican peso crisis of December 1994, the Asian crisis in July 1997, and the Brazilian real crisis of January 1999.

AR (1) using Generalized Least Square (GLS); and (ii) endogeneity of the regressors by including lags and leads of changes in the explanatory variables. Mark and Sul (1999) showed that there are sizeable gains from pooling the data. Kao and Chiang (1999) have compared different estimation techniques for panel data and have found that the DGLS easily outperforms both OLS and fully modified OLS (FMOLS). Also, while economic theory provides some guidance on long-run parameters, it is typically silent on short-run dynamics and the exact nature of the adjustment processes (see for example, Haque et al., 1999). To this end, we focus our analysis based on the panel dynamic generalized least square (DGLS) method to obtain the long- and short-run parameters of the model.

The long-run DGLS procedure involves running the following growth function (*GRO*) regression:

$$GRO_{ijt} = \pi_{ij} + \lambda_{ij} X'_{ijt} + \sum_{j=1}^{p1} \delta_{ij} \Delta X_{i, L_{t-j}} + \sum_{j=1}^{p1} \gamma_{ij} \Delta X_{i, L_{t+j}} + e_{ijt}, \quad (1)$$

where

$$\lambda_{ij}(L) = \sum_k \lambda_{ij} L^k \quad \text{for } m = X_{ij},$$

$$\gamma_{ijm}(L_{t+j}) = \sum_k \gamma_{ijk} L^k \quad \text{for } m = \Delta X_i, \text{ and}$$

$$\delta_{ijm}(L_{t-j}) = \sum_k \delta_{ijk} L^{-k} \quad \text{for } m = \Delta X_i.$$

where X_{ijt} are the regressors of the growth model in the level form L , $L_{t\pm j}$ denotes the lag and lead operator¹³ of the first difference parameters, and e_{ijt} is the error term to capture the unobserved effects and is assumed to have zero mean and constant variance. All variables are expressed in ratio of GDP, and t denotes time subscript. The lead and lags are included in the cointegration regressions in order to produce asymptotically unbiased estimators, and to avoid the likely problem of estimating nuisance parameters.

Finally, the short-run (DGLS for the growth equation is:

$$GRO_{ijt} = \eta_{ij} + \eta_{ij1} ECM_{ijt-1} + \eta_{ij2}(L_{t+j}) \Delta FDI_{ijt} + \eta_{ij3}(L_{t+j}) \Delta ASD_{ijt} + \eta_{ij4}(L_{t+j}) \Delta LD_{ijt} + \eta_{ij5}(L_{t+j}) \Delta SAV_{ijt} + v_{ijt} \quad (2)$$

The term ECM_{ijt-1} is the one period lagged error correction term from the long run growth equation (assuming one vector) and (L_{t+j}) is the parameter in the lead form only.

¹³Notice that the actual number of observations used in the analysis depends on the number of lag and lead variables used in the estimation. The integer k , the number of lags (or leads), is chosen as follows. Starting with a reasonable upper bound k , on estimation, if the variable (with the highest lag) is significant, then k is chosen as the optimal number of lags (or lead). If the variable is insignificant, the number of lags (leads) is reduced by one until the last lag (lead) is significant in the estimation.

The full panel consists of annual data from eight Asian countries - Malaysia, the Philippines, Singapore, Thailand, Korea, China, Myanmar, and Fiji. These countries were selected based on the availability of data for all the variables. Annual data were used because some of the relevant data are not available at higher frequencies. The data for the period from 1970 to 2001, for gross domestic saving (SAV; 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) were collected from Key Indicators of Developing Asian and Pacific Countries, 2003, Vol. XXXI, Oxford University Press, New York. All the variables are in ratio and at market prices in current local currency and converted to the US dollar. Capital inflows can be categorized in various ways. Our focus is on short-term, long-term and FDI inflows.

Empirical Results

Unit Root and Cointegration Tests

Time series regressions may generate spurious results if the series are not stationary. We begin our analysis by providing the univariate properties of the variables of interest using the standard Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) unit root tests. The tests allow for both the presence of a constant and a constant deterministic drift. As shown in Table 1, both the ADF and PPP tests fail to reject the null hypothesis of a unit root for all variables in the levels. However, the null hypothesis is overwhelmingly rejected for all the series in first-differences. Since all the variables are integrated to the same order, this allows us to proceed with the Johansen-Juselius cointegration test. [Insert Table 1]

To determine whether the non-stationary variables identified above are cointegrated, the multivariate cointegration technique developed by [Johansen \(1988\)](#) and its extension in [Johansen and Juselius \(1990\)](#) was employed. The Johansen methodology offers two likelihood ratio (LR) test statistics for determining the number of cointegrating vectors. In the first test, the null hypothesis is that there is at most r cointegrating vectors against the alternative hypothesis that there is 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 maximum eigenvalue (λ -max) statistic is generally considered more powerful because the alternative hypothesis is in equality. These two LR statistics have a non-standard distribution under the null hypothesis. The asymptotic critical values have been generated by Monte Carlo methods and tabulated in [Johansen \(1988\)](#), [Johansen and Juselius \(1990\)](#) and [Osterwald-Lenum \(1992\)](#). Results of the cointegration analysis are summarized in Table 2. The tests reveal that the null hypothesis of no co-integration ($r=0$) is easily rejected at the 5% significance level in the system of four variables. Notice that both the computed λ -max and trace statistics exceed their critical values. In addition, we observed 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

at the 5% level of significance. This result implies that domestic savings, FDI, long term- debt and short-term debt share a stable long-term relationship with economic growth. To see how sensitive the empirical results are to the sample of countries selected in the panel, we also delete China and Fiji and compare the results with the full panel (eight countries). We note that the above results continue to hold when China and Fiji were excluded from the panel data. This shows, therefore that our empirical results are fairly robust to the set of countries included in the panel (results not shown here).

At this point it is important to find out if each of the variables (including the short-term debt) enters the long-run relationship significantly. We apply the zero restriction on each of the coefficients derived from the Johansen-Juselius procedure. The LR statistics reveal that all five variables enter the cointegrating relationship significantly at the usual significant levels¹⁴. This finding implies that omission of any one of these variables may bias our empirical results. [Insert Table 2]

The Long-run Relationship

We estimated the model by using dynamic ordinary least square (DOLS) for all the countries taken together. Table 3 is divided into two columns reflecting the two different sample periods that are under investigation. The empirical results for the overall sample (1970-2001) are displayed in column (1) of Table 3. The numbers below the estimated long-run parameters are the asymptotic standard error. In general, the data fits the model reasonably well as indicated by the high R^2 . According to the regression results, short-term debt (SD) and long-term debt (LD) contribute negatively to economic growth, but LD is insignificant even at the 10% significance level. Hence, the evidence indicates that short-term capitals affect economic growth negatively in long-run. As expected, short-term capital inflow displaces domestic savings (credit and consumption booms) in the long run, and in what follows, it adversely affects economic progress. On the other hand, the sign on domestic savings rate and FDI are both positive, indicating that domestic savings and FDI contribute positively to growth. Both variables are statistically significant in the long-run equation at conventional significance levels. It is worth noting that the magnitude of the FDI coefficient (0.264) is higher than that of domestic savings (0.141), implying that FDI is more efficient than domestic investment. A question often raised in the literature is why should Asia incur risky foreign savings when it can finance development from domestic savings? Indeed, our results seem to suggest that foreign capital in the form of FDI has the potential to yield higher growth through higher efficiency in physical and human capitals. [Insert Table 3]

The results presented so far clearly highlight the importance of FDI as a major determinant of economic growth and is in line with the accumulated evidence that

¹⁴ 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.

points to a strong contribution of FDI to economic growth, especially to the Asian region. An interesting question addressed in this paper is how sensitive are the parameters of the model to the sample time period. To investigate this issue, the regressions in Table 3 were re-estimated using data over the 1982-2001 period. It is clear that capital mobility has significantly increased in all countries under consideration as they have gone through financial deregulation during in the 1980s and 1990s. [Athukoral and Rajapatirana \(2003\)](#), for instance pointed out that data from this period coincides with the second episode of capital inflow surge that started in the mid-1980s¹⁵. The results, reported in Table 4, are suggestive of increasing importance of FDI as a determinant of growth.

The estimated coefficient of FDI as well as the t-ratio increase in magnitude as the earlier sample period of the 1970's is omitted. This finding may suggest that the higher volume as well as quality of the FDI during the 1982-2001 period may have somewhat improved the contribution of FDI to the growth process in the sample countries. The Asian countries under study with the better quality infrastructure (roads, dependable energy, telecommunication, financial facilities etc.) and higher educated and skill workforce. are able to promote FDI inflow. Besides that the size of the coefficient of the short-term debt (SD) is found to be noticeable larger (in absolute term) than those based on the full sample period. It is interesting to note that the impact of short-term debts on the overall growth process is again negative and highly significant. Clearly, the results point to the weakness of over-dependency on short-term foreign debt as a determinant of long-term growth. The crises of Mexico in 1994, five crisis countries of East Asia in 1997 and Russia in 1998 are point in case. Large volume of short-term debts (portfolio inflows) is difficult to manage for countries with weak financial structure and government supervision. Empirical studies - including [Folkerts-Landau and Ito \(1995\)](#), [Goldstein et al. \(1991\)](#) and [Dooley \(1988\)](#) – have all found that capital inflows pose less problem if they are long-term, in the form of direct investment, induced by growth prospects of the economy, invested in physical assets than consumed and domestically induced.

Short-run Dynamics

In this section, we present the impact of capital inflows in the short-run. The purpose is to bring out the empirical distinction, if any, between the short and long-run relationships. The short run model for the full sample fits the data well and is consistent in showing a rapid adjustment to long-run equilibrium. The parsimonious model is obtained through a search procedure and the results of error correction equation are reported in Table 4 column (1) for the full sample while column (2) presents the results during 1982-2001. Notice that the error-correction (ECM_{t-1}) term carries the expected negative sign, indicating that the burden of short-run endogenous adjustment to bring the system back to its long-run equilibrium is borne by economic

¹⁵ There were some major economic developments during our sample that warrant investigation of sub-sample. The financial markets of most of the Asian countries become more tightly link in the last two with the opening-up of flow economies.

growth (GRO). This result reinforces the econometric evidence revealed by the Johansen-Juselius approach — a stable long-run relationship exist between economic growth and domestic and foreign savings. The speed of adjustment is -0.42 implying that almost 42% of the previous year's growth from its long run or equilibrium value will be corrected each year. In the present context, the finding suggests that capital reversal will show up quickly in the future growth records. [Insert Table 4].

Looking at the specific parameters, we found that short-term inflow (SD) carries a negative sign, suggesting that it also displaces domestic saving in the short-run, which in turn leads to negative effect on growth. As shown in Table 4, FDI and long-term debt contribute positively to progress in the economies of the Asian countries. The finding is directly comparable to those of Fry (1994), Boone (1994) and Gruben and Mcleod (1998), to name a few. We observed that the coefficient of domestic savings is insignificant at conventional significance levels in the short-run model. Again, our results highlight the importance of foreign capital (FDI and long-term debt) to jump-start the crisis-affected East Asian countries. [Insert Table 4].

The regression results from the reduced sample are also summarized in column (2) of Table 4. They show the contribution of foreign and domestic capital on economic growth. All in all, it should be acknowledge that the results from two sample periods are qualitatively similar but the size of the coefficients of repressors are noticeably larger in the for period 1982-2001.

Granger-causality tests

The cointegration test presented above implies that the five variables are bounded together by one long-run relationship. It does not, however, provide information about the causal relationship between these variables. In what follows, we proceed with the Granger-causality test by constructing an error-correction model with one error correction term. The results from the Granger causality tests given in Table 5 point to several interesting results about the causal relation in the Asian countries: first, there is sufficient evidence to support the hypothesis that FDI inflows Granger-cause economic growth, i.e., FDI is growth enhancing¹⁶.

Second, a unidirectional causality relationship is detected between economic growth and savings ratio. As such, the result supports the view that higher economic growth causes higher domestic savings. This finding is noteworthy as it helps to explain why these dynamic Asian countries with high savings rates have recorded high growth

¹⁶ The Granger-causality test is defined as follows: $F = \{(ESS_R - ESS_{UR})/q\} / \{-[ESS_{UR}/(n-k)]\}$, where ESS_{UR} is the ESS for the unrestricted model, and ESS_R is the ESS for the relevant restricted model. The parameter q is the number of restrictions and k is the total number of parameters in the unrestricted model.

rates over the past few decades. It is worth noting also that while some studies have found that increases in growth are followed by an increase in savings (see [Carroll and Weil, 1994](#) and [Gavin et al., 1997](#)), others support the reverse and even an absence of causality between the two variables. [Insert Table 5]

Third, a unidirectional causality relationship is detected between SD and LD, which seems to suggest that some long-term projects that were financed by “hot money” in Asian countries. In general, the causal relationships point to the fact that growth enhancing policies coupled with sound macroeconomic policies (low inflation) foster a healthy rate of returns to investment and hence attract FDI. Fourth, short-term debts appear to be exogenous to the system as we did not find any causal link running from GRO, S, LD and FDI to SD. Surprisingly, our results suggest that short-term investment appears to be insensitive to changes in other types of capital (long-term flows and FDI inflows). Long-term debt appears to be attributed to changes in other inflows while FDI and SD appear to be insensitive to other types of international inflows. Indeed, a strong feature of the result shown in Table 5 is that FDI appears to be insensitive to changes in all other types of capital inflow. In addition, we found no causal link between FDI and domestic savings even at 10% significant level. Interestingly, this finding implies that the size of the current account and hence FDI inflow, are not caused by an increasing domestic savings. These as well as other causalities among the variables are displayed in Table 5.

Concluding Remarks

This study has attempted to provide an analytical answer to the importance of foreign capital on the growth process in the Asian region. We model the relationship by distinguishing between the short-run dynamics and the long-run equilibrium relationship. The sample in this study consisted of eight Asian countries: China, South Korea, Fiji, Malaysia, Singapore, Thailand, Indonesia and the Philippines, covering the period 1970-2001. We applied the dynamic panel cointegration approach to deal with the nonstationary problem of the time series data. The empirical evidence strongly supports the widely held view that dynamic Asian economies, including the Great China, are largely driven by investment (investment-led growth hypothesis).

Numerous studies have found positive relationships between foreign capital and economic growth. In the present article, we extend the previous studies by identifying the different types of foreign capital. By using the panel approach we confirm the positive effect of FDI on economic growth. Additionally, we showed that the influence of FDI on growth is higher than domestic savings, providing some evidence in favor of the hypothesis that FDI inflows are more productive than domestic investment (both in the short and long-term). This is in contrast with the results found in [Sato \(2003\)](#) and [Aitken and Harrison \(1999\)](#). Hence, the evidence found in this study suggests that FDI has positive spillover effects on the economy. These finding

supports the popular view that suggests that knowledge embodied FDI may increase domestic productivity, and hence promote growth: See [Grossman and Helpman \(1991\)](#) and [Goodfreind and McDermott \(1998\)](#) for more discussion on the issue.

Our results find that FDI affects the growth process in the Asian countries both in the short-and long run. In a related line of study, several authors (e.g., [Borensztein et al., 1998](#); [Levine and Renelt, 1992](#)) have also documented the positive relationship between FDI inflows and economic growth¹⁷. They have shown that FDI located in countries with high human capital tends to contribute to economic growth. Thus, it is important especially in a context of increasing global competition for FDI that developing countries formulate policies that improve local skills and build up their human capital resource capabilities. This is necessary not only to raise the volume in order to close up the saving-investment gap but also to improve the quality of FDI that a country can attract (see [World Bank, 2000](#)). The analysis also detects a causal (positive) relationship that runs from FDI to economic growth. From the policy perspective, these observations suggest that it may be unwise to impose capital controls and other policies (e.g., high tariff rates) that may deter FDI inflows. The experience of the Asian countries suggests that the cost for such a policy can be high. Thus, the last type of capital control a country wants to adopt is the control of FDI flows.

In a well-known study, [Carroll and Weil \(1994\)](#) produced robust evidence to support a positive causal relationship that runs from growth to savings. Their results from the panel data also support the argument that a country's savings effort is closely connected to its growth prospects. Our investigation also presents a robust finding supporting a strong positive correlation between domestic savings and growth and the unidirectional relationship in Granger's sense running from growth to domestic savings, which emerged from the causality tests. Policies that enhance growth will have positive effect on national savings. Accordingly, this is not in line with the traditional view (life-cycle hypothesis) that suggests promoting savings would have favorable impact on growth.

In countries where capital inflows take the form of portfolio investment (as opposed to FDI), they are often associated with increase in consumption rather than investment. If this is so, such an outcome will lead to increase in expenditure on non-tradable goods, thereby leading to real appreciation of the domestic currency (see e.g., [Agénor and Hoffmaister, 1996](#)). But this is not the case for the Asian countries, where the large short-term inflows lead to an investment boom in the equity and real estate markets and increase the fragility of the financial system. As such, short-term capital inflows can be counterproductive as they may hinder economic growth through externalities emanated both during the surges and sudden reversals. This finding, however, is at

¹⁷ FDI inflows are part of private savings. They tend to contribute to investment, and hence, growth. In a related line of work, [Fan and Dickie \(2000\)](#) pointed out that FDI not only affects the level of investment but also the quality of investment.

odds with the results reported by authors like [Corbo and Hernandez \(1996\)](#) and [Gruben and Mcleod \(1998\)](#). The difference in the finding is attributed to the fact that the set of countries used in the present study differs from Corbo and Hernandez, and Gruben and Mcleod. By and large, the results also suggest that FDI is more efficient than the other types of capital (non-FDI inflows), including domestic investment. The results on long-term debts are less clear cut, with sign and significance depending on whether it is in the short-run or long-run. It appears to be positive and significant in the short-run but negative and insignificant in the long-run. For this reason, some countries have formulated policies that aimed at discouraging short-terms inflows but provide hospitable environment for FDI ([Corden, 2002](#); [Stiglitz, 2000](#))

We find substantial negative output effect on short-run inflows, and hence, the distinction between short and long-term inflows is important. The empirical result seems to suggest that the composition of foreign capital inflow does matter. This is a new result. Essentially, theory suggests that capital market liberalization facilitates market integration and overcomes the savings-investment gap to allow for higher growth and consumption, and hence, increased welfare. The evidence provided in this study based on panel of fast-growing Asian economy is not totally supportive of this theory. Indeed, our results suggest that there must be some level of disaggregation in the treatment of capital inflows. From a policy perspective, incentives or selective taxing of capital inflows may be justified in a volatile (uncertain) global capital market. This is because we found that short-term capital hinders economic growth while FDI has positive a spillover effect on the economy. It also cast some doubts on policy conclusions inferred from studies that have used capital account liberalization as a whole to examine the effect of foreign capital on growth.

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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
SC	-2.52	-1.63	-4.34	-4.93	-1.55	-1.74	-8.86	-8.91
SMY	-1.21	-1.78	-3.67	-4.01	-1.21	-1.89	-4.21	-4.41
SF	-1.00	-1.41	-3.44	-3.98	-1.98	-2.01	-5.21	-5.51
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
SDC	-1.38	-1.73	-3.88	-4.53	-1.48	-1.69	-4.72	-5.17
SDMY	-1.00	-1.31	-3.67	-4.01	-1.39	-1.53	-4.99	-5.71
SDF	-1.21	-1.54	-3.98	-4.61	-1.40	-1.65	-5.01	-5.22
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
FDIC	-1.00	-1.51	-7.78	-7.77	-2.28	-2.87	-6.04	-5.95
FDIMY	-1.23	-1.33	-5.33	-5.41	-1.54	-1.89	-5.95	-6.02
FDIF	-0.93	-1.02	-4.76	-5.21	-1.34	-1.781	-6.11	-6.53
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
GC	-2.33	-0.87	-3.94	-4.74	-2.55	-0.59	-6.01	-9.64
GMY	-1.56	-1.95	-4.89	-4.67	-1.47	-1.98	-5.78	-5.99
GF	-1.21	-1.67	-4.23	-4.55	-1.65	-1.76	-5.22	-5.95
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
LDC	-1.41	-2.88	-4.51	-4.38	-1.22	-2.43	-5.72	-5.68
LDMY	-1.45	-1.86	-4.32	-4.99	-1.67	-1.87	-5.22	-5.51
LDF	-1.34	-1.45	-4.11	-4.39	-1.55	-1.79	-4.88	-5.04

Notes: The denotation: SP, SK, SM, SS, ST, SC, SMY and SF are Saving/GDP ratios; SDP, SDK, SDM, SDS, SDT, SDC, SDMY and SDF are short-term debt/GDP ratios; FDIP, FDIK, FDIM, FDIS, FDIT, FDIC, FDIY and FDIF are foreign direct investment/GDP ratios; GP, GK, GM, GS, GT, GC, GMY and GF are growth rate of GNP; LDP, LDK, LDM, LDS, LDT, LDC, LDMY and LDF are Long-term debt/GDP ratios of the Philippines, Korea, Malaysia, Singapore, Thailand, China, Myanmar and Fiji respectively. The null hypothesis is that series is non-stationary. The critical values for rejection are the same for both Dickey-Fuller and Phillip-Perron (PP) test. At 5% significance level, the critical value 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-Juselius Method

Tests Variables: GRO S FDI SD LD									
Hypothesis		Korea ⁺	Malaysia	Philippine	China	Singapore	Thailand	Myanmar	Fiji
H ₀	H _A	k=1 r=1	k=1 r=1	k=1 r=1	k= r=1	k=1 r=1	k=1 r=1	k=1 r=1	k=1 r=1
λ -max									
r = 0	r = 1	69.7896*	52.757	38.542	73.598*	26.614**	65.588*	36.22*	54.78
r ≤ 1	r = 2	20.008	24.004	28.270	18.845	24.656	21.588	22.35	27.93
r ≤ 2	r = 3	12.793	19.110	10.611	13.699	10.699	10.780	11.67	12.65
r ≤ 3	r = 4	4.989	4.617	8.567	5.589	7.574	7.011	8.32	8.65
r ≤ 4	r = 5	3.054	3.389	3.854	3.936	5.704	2.485	3.79	2.33
Trace									
r = 0	r ≥ 1	110.632*	103.879*	90.467	115.66	75.248	107.399*	89.54*	99.21
r ≤ 1	r ≥ 1	40.845	51.121	51.924	42.060	48.634	41.812	59.43	52.55
r ≤ 2	r ≥ 2	20.838	27.117	21.923	23.215	23.977	20.276	34.21	32.76
r ≤ 3	r ≥ 3	8.044	8.006	12.420	9.515	13.277	9.496	12.98	11.72
r ≤ 4	r = 4	3.054	3.389	3.854	3.926	5.704	2.485	3.99	3.11

Notes: Asterisks (*) and (**) denote statistically significant at the 5% and 10 % level. (Critical values are taken from Osterwald-Lenum, 1992; Table 1*, 1).

Table 3: Long Run Estimation Results of Growth, Savings Ratio and Foreign Capital for the Periods 1970-2001 and 1982 - 2001 using Dynamic GLS

Variables	Time Period: 1970 - 2001		Time Period 1982 - 2001	
	Equations			
	DGLS		DGLS	
	Estimated coefficients			
Short term debt/GDP(SD)	-0.183 (0.086)*	-0.936 (0.062)**		
Saving/GDP(S/GDP)	0.141 (0.000)**	0.279 (0.007)*		
FDI/GDP	0.264 (0.022)**	0.799 (0.002)**		
Long term Debt/GDP (LD/GDP)	-0.227 (0.385)	0.555 (0.363)		
	$\bar{R}^2 = 0.810$		$\bar{R} = 0.799$	
	Countries = 8		Countries = 8	
	Log Likelihood = 565.341		L.K = 421.472	

Notes: Figures in parentheses are the standard errors. The eight Asian countries in the panels are China, South Korea, Malaysia, Indonesia, Thailand, the Philippine, Singapore and Fiji. The dependent variable is growth rates and all the regressors are defined in the text. Asterisks (**) and (*) denote statistically significant at 5 % and 10 % significance levels, respectively.

Table 4: Short Run Estimation Results of Growth, Savings Ratio and Foreign Capital for the Periods 1970-2001 and 1982 - 2001 using Dynamic GLS

Variables	Time Period 1970 - 2001	Time Period 1982 - 2001
	Equations	
	DGLS	DGLS
	Estimated coefficients	
Short term debt/GDP (SD)	-0.198 (0.033)**	-0.815 (0.175)**
Saving/GDP (S/GDP)	-0.069 (0.072)*	-0.129 (0.002)*
FDI/GDP	0.493 (0.026)**	1.037 (0.066)**
Long term Debt/GDP (LD/GDP)	0.253* (0.059)*	0.401 (0.367)*
ECM _{t-1}	-0.419 (0.019)**	-0.610 (0.023)**
	$\bar{R}^2 = 0.652$ Countries = 8 L.K = 668.32	$\bar{R} = 0.69$ Countries = 8 LK = 437.19

Note: Figures in parentheses are the standard errors. Asterisks (**) and (*) denote statistically significant at 5 % and 10 % significance levels, respectively.

Table 5: Granger Causality Test

Dep. Var.	S/GDP	GRO	FDI/GDP	SD/GDP	LD/GDP
S/GDP	-	0.429 (0.009)**	0.032 (0.958)	6.435 (0.452)	-0.258 (0.886)
GRO	0.105 (0.157)	-	0.643 (0.155)**	0.187 (0.612)	0.482 (0.013)**
FDI/GDP	0.035 (0.102)	0.066 (0.026)*	-	0.056 (0.602)	0.298 (0.337)
SD/GDP	-0.009 (0.512)	0.021 (0.346)	0.097 (0.243)	-	0.321 (0.202)
LD/GDP	0.034 (0.000)**	-0.029 (0.21)	0.099 (0.026)**	0.459 (0.000)**	-

Notes: Asterisks (**) and (*) denote statistically significant at 5% and 10% significance levels, respectively. We used the [Mark and Sul \(1999\)](#) methodology, that is, level of the variable + first difference lead one year + first different lag one year.

The Impact of Domestic and Foreign Direct Investments on Economic Growth: Evidence from ASEAN Countries

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Abstract

This paper examines the relationships between foreign direct investment (FDI), domestic investment as well as other determinants of economic growth. Both the short-run and long run growth processes are modelled during the 1968-2002 period for five ASEAN countries. The results can be summarized as follows: (i) domestic investment, FDI, human capital and financial intermediation significantly affect growth; (ii) FDI has a positive and significant effect on growth but is of lesser magnitude compared to domestic investment; and (iii) the level of financial and human capital development also contributes to the long-term growth process. All in all, our empirical results suggest that investment and exports are the engine of growth and it is worthwhile for the authorities to encourage domestic as well as foreign capital to put these countries back on their pre-crisis growth paths.

Keywords: Growth Domestic Investment, FDI, Exports, Autoregressive Distributed Lags

Introduction

Foreign capital started to flow to Malaysia and its neighbouring countries (Singapore, Thailand, Indonesia and the Philippines) at accelerating rates since the early 1980s. Investors were attracted to these countries because of their sound macroeconomic fundamentals¹⁸. These dynamic Association of Southeast Asian Nation (ASEAN) economies had small fiscal deficits, stable exchange rates, high savings rates, and highly regarded labor work force. Other domestic factors that could have contributed to the surge of foreign capital include the widespread deregulation in the financial markets and the easing of restrictions on capital inflows. More than two decades of rapid economic progress had made the region an attractive location for foreign capital, particularly FDI. Besides these domestic factors, the external factors like low world interest rates and economic recession in the industrial countries had contributed to the massive influx of capital inflows. In addition, the strong yen-dollar rate propelled Japanese investment into the ASEAN region. Since the currencies of these countries were more or less tied to a basket of currencies, primarily to the US dollar, Japanese companies found that they could use them as a low-cost substitute for their US manufacturing base¹⁹.

The inflows of Japanese capital and technical know-how boosted the host country's output. Japanese multinationals shifted unprofitable production to the low-wage neighboring countries and hence provided a growth stimulus to its smaller neighboring countries. In the mid-1990s, however, several external events began to adversely affect the competitive position of the ASEAN-5 countries. Early in 1994, China devalued its currency by 35%. Additionally, the dollar began to appreciate globally after mid-1995. Together, these events produced overcapacity problems in the region. When Thailand was forced to devalue its currency, the pressure spread contagiously to Indonesia, Malaysia, South Korea, the Philippines as well as other countries in the region that led to the regional economic crisis.

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 the financial crisis that broke out in 1997 in Asia is which investment contributes more in the process of economic growth – FDI or domestic investment. Meanwhile, several authors have argued that foreign capital (including FDI) crowded-out domestic investment. For this reason, and in the aftermath of the currency crisis the focus of attention has shifted to domestic investment as the main engine of growth. Second, economists and

¹⁸ The five countries – namely Singapore, Malaysia, Indonesia, the Philippines and Thailand – are the founding members of the ASEAN. In a seminal paper, Sachs (2000) found these five countries as belonged to the list with the most successful export-promotion policies and attracting FDI. They also had won the race of absorbing technologies from abroad.

¹⁹ The inflow of FDI to these countries accelerated with the yen appreciation because production and investment in Japan itself became relatively more expensive.

policymakers have long conjectured the idea that financial development can affect economic growth. Empirical evidence remains ambiguous as to whether financial deepening contributes positively or negatively to growth. It is generally recognized that this issue is fundamentally empirical in nature. Nevertheless, the policy concern of this finding is clear: if it is negative (positive) then financial development may lead to capital flight (flow). Consensus on financial development in the process of economic growth, for the ASEAN countries in particular, does not exist so far. The ambiguous results of existing studies mainly stemming from the inappropriate testing framework, call for further study of methodology and empirical model building. The empirical results from the bounds tests and the Autoregressive Distributed lag (ARDL) approaches due to Pesaran et al. (2001) are more likely to be more persuasive than its predecessors.

The objective of this paper is two-fold: first, to investigate the long and short-run impacts of FDI, domestic investment, financial intermediation, exports and human capital on economic growth 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 also FDI has been drawn to these countries 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)²⁰. Second, to seek evidence in support of the domestic-led-growth and export-led growth hypotheses. Earlier works used a shorter sample, which excludes the post-crisis period. The remarkable growth records over the three decades, driven by exports and private investments as well as the financial crisis that have severely affected these countries offers a remarkable opportunity to test some of the well-known hypotheses in the growth theory. The Asian financial crisis has severely affected the growth rates of the countries included in our sample. We believe that our results can be more informative than those provided earlier by Tongzon (1998), Marwah and Tavakoli (2004), Chambarbagwala et al. (2000), Fase and Abma (2002), to name a few.

The rest of the paper is organized as follows. Section 2 provides a brief summary of the empirical issues and Section 3 contains a description of the model used in the analysis. The data and estimation technique are given in Section 4. Section 5 presents the results, and Section 6 summarizes the principal findings of this study and draws some policy implications.

²⁰ Looking at the gross domestic investment (GDI) ratios, 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.

Empirical Evidence

The extent to which FDI contributes to growth depends on several factors. These include rate of savings in the host country, the degree of openness and the level of technological development, among others. FDI will have a positive effect on the growth prospect of the recipient economy if the host country has a high savings rate, an open trade regime and high technology (see Akinlo 2004)²¹. Most studies have reported that FDI inflows led to higher per capita income increase, increase in economic growth and higher productivity growth. Other channels through which FDI enhances growth include higher exports as well as its spillover effects on the rest of the economy in the host country. (Markus and Venables, 1999).

In a panel data study of a group of 69 developing countries, Borensztein et al. (1998) uncovered the following evidence; first, FDI is an important vehicle for transfer of technology, contributing more growth than domestic investment. However, this result is conditional on the minimum threshold stock of human capital available in the recipient country. They went on to say that FDI contributes to economic growth only when a sufficient absorptive capability of advance technologies is available in the host country. Second, they showed that FDI is more productive than domestic investment only when the country has the minimum threshold of human capital. All in all, the statistical evidence reveals that economic growth, FDI and human capital has a robust relationship.

The sign on financial depth can be either positive or negative, depending on whether financial development reduces or increases capital flight. If it reduces capital flight then it will have a positive sign; otherwise the variable will carry a negative sign. Levine et al. (2000) showed that there was a strong positive relation between financial intermediary development and long-run economic growth. In a related work, Beck et al. (2000) found a robust, positive link between financial intermediary development and both real per capita GDP growth and total factor productivity. Several studies, however have given contradictory results. For example, Darrat (1999) and Fase (2001) in their articles argued that the benefits of higher levels of financial development could be realized in the short-run while in the long-run as the economy becomes mature these effects somewhat disappear. Meanwhile, Singh (1997) found that financial development might not be beneficial for growth. These findings suggest that to examine the effect of financial development on economic growth, one needs to consider the short- and long-run relationships.

In the case of exports, the empirical evidence is that countries that experience phenomenal growth rates are also countries that are successful exporters. The

²¹ Interestingly, Akinlo (2004) made a distinction between FDI concentrated on manufacturing industries (manufacturing FDI) and the FDI that focuses on extraction industries. In this article he argued that FDI flows to Nigeria (mostly in the oil sector), which belongs to the latter category, do not enhance growth as much as the manufacturing FDI.

theoretical argument is that export orientation increases the openness of the economy and, by exposing it to foreign technology and foreign competition, provokes a rapid rate of technological progress. The empirical evidence provides strong support of the export-led growth hypothesis (see Bahmani-Oskooee and Alse, 1993; Doraisami, 1996; Ghatak et al., 1997; Baharumshah and Rashid, 1999)²². An important conclusion that emerged from all these studies is that countries with higher export growth over an extended period tend to grow faster than others.

The Model

A number of models have been employed in the literature to explain the economic growth in developing countries. In this line of research, most researchers have included all or a subset of the following variables as the exogenous variables in the growth equation: FDI, domestic investment, financial intermediation, exports and human capital (see for example Romer, 1990; Fry, 1998; Borensztein, et al., 1998; Levine, 1997; King and Levine, 1993; Beck, et al., 2000; Xu, 2000; Prodrecca and Ford 2001; Hecht et al., 2002; and Akinlo, 2004).

We follow closely the theoretical exposition of Borensztein, et al. (1998) and more recently, Akinlo (2004) is specifying a model to identify determinants of economic growth²³. While earlier articles identify initial condition as an important variable in the growth equation for the developing countries, we consider an open economy where technical progress is the outcome of both foreign and domestic capital deepening. We begin with a simple production function in which investment is an important factor of production.

$$Y_t = AH_t^\alpha K_t^{1-\alpha} \quad (1)$$

where A represents the exogenous state of the environment, H denotes the human capital, and K denotes physical capital. Here, the total capital consists of a continuum of a variety of capital goods $x(j)$, and it is given by²⁴:

$$K = \left\{ \int_0^N x(j)^{1-\alpha} dj \right\}^{\frac{1}{1-\alpha}} \quad (2)$$

Suppose the domestic firms invest (k) out of the total capital (K), and foreign firms invest (k^*), then the total capital invested is:

²² Some earlier studies that have detected positive and significant effects of export expansion on growth are found in Feder, 1983 and Ram, 1985, to name a few.

²³A variant of the model is used by previous researchers such as Romer (1990), Grossman and Helpman (1991) and Barro and Sala-I-Martin (1995).

²⁴This formulation is due to Ethier (1982).

$$K = k + k^* \quad (3)$$

Taking the differential of Eq. (1) and rearranging the result, yields the demand $m(j)$ for each type of capital goods $x(j)$ ²⁵:

$$\frac{\partial Y_t}{\partial K} = (1 - \alpha)AH^\alpha K^{-\alpha} \quad \text{Or } m(j) = A(1 - \alpha)H^\alpha x(j)^{-\alpha} \quad (4)$$

To start the production a fixed set-up cost (F) is needed. The model assumes that the fixed set-up cost depends negatively on the ratio of foreign capital to the total capital invested in the host country (k^*/K) and also negatively to domestic capital compared with the rest of the world's capital (K^*), (k/K^*). That is, the higher the domestic capital (k/K^*) the lower is the cost of adopting new technology. Thus, the set-up cost function is

$$F = F(k^*/K, k/K^*); \quad \text{where: } \frac{\partial F}{\partial(k^*/K)} < 0, \quad \frac{\partial F}{\partial(k/K^*)} < 0 \quad (5)$$

Following Borensztein et al. (1998), we assumed that there is constant marginal cost of production of $x(j)$ equal to 1, and that capital goods depreciate fully and, assuming a steady state where the interest rate (r) is constant, profits for the producer of a new variety of capital j is:

$$\Pi(j)_t = -F(k_t^*/K_t, k_t/K_t^*) + \int_t^\infty [m(j)x(j) - x(j)]e^{-r(s-t)} ds \quad (6)$$

Maximization of Eq. (6) subject to the demand of Eq. (4) leads to the following equilibrium level for production of each goods $x(j)$:

$$x(j) = HA^{1/\alpha}(1 - \alpha)^{2/\alpha} \quad (7)$$

Substituting Eq. (7) into the demand function given by Eq. (4), we obtained the following expression for rental rate:

$$m(j) = 1/(1 - \alpha) \quad (8)$$

By assuming that there is free entry, and the rate of return (r) will be such that the profits are equal to zero, and solving for the zero profits condition yield:

²⁵ See: Borensztein, *et al.* (1998).

$$r = A^{1/\alpha} \phi F(k^*/K, k/K^*)^{-1} H, \text{ where } \phi = \alpha(1 - \alpha)^{(2-\alpha)/\alpha} \quad (9)$$

Individuals maximize their utility due to the standard intertemporal utility function, and the rate of consumption growth must, in steady state, equal to the rate of growth of output. Given a rate or return equal to r , the optimal consumption path is given by the standard condition²⁶:

$$\frac{\dot{C}_t}{C_t} = \frac{1}{\sigma}(r - \rho) \text{ Or } g = \frac{1}{\sigma}(r - \rho) \quad (10)$$

Substituting Eq. (9) into Eq. (10), we arrived at the following expression for the rate of economic growth:

$$g_y = g_c = \frac{1}{\sigma}[A^{1/\alpha} \phi F(k^*/K, k/K^*)^{-1} H - \rho] \quad (11)$$

Eq. (11) identifies the factors that affect economic growth. In this model, FDI and domestic investment are the important factors that have a positive impact on the economic process, which are measured by foreign capital, (k^*/K) and domestic capital (k/K^*) , which are invested to produce products (k/K^*) . Foreign and domestic investments reduce the cost of introducing new varieties of capital goods, thus increasing the rate at which new capital goods are introduced. Furthermore, the effect of both types of investments on the growth rate of the economy is positively correlated with the level of human capital, that is, the higher the level of human capital (H) in the host country, the higher the effect of foreign and domestic capitals on the growth of the economy.

Besides the variables mentioned above, Eq. (11) introduces a set of variables (A) that may affect the growth rate in developing countries. Among the set of variables, financial intermediation and export of goods and services, are the most likely variables to encourage economic growth in the ASEAN-5. In the empirical assessment of the dynamic impact of the above-mentioned variables on the ASEAN-5's economic growth, we used the following specification:

$$y_t = \alpha_0 + \alpha_1 FDI_t + \alpha_2 FI_t + \alpha_3 GDI_t + \alpha_4 FI_t + \alpha_5 H_t + \varepsilon_t \quad (12)$$

$$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5 > 0$$

²⁶ See Borensztein, *et al.* (1998).

where, y denotes growth rate of real GDP per capita, FDI denotes logarithm of foreign direct investment, FI denotes the logarithm of financial intermediation (M2/GDP), GDI denotes the logarithm of gross domestic investment, H denotes human capital as proxied by secondary school attainment and X is export of goods and services. The error term \mathcal{E} is added to the model to capture the unobserved effects and is assumed to be white noise. It is thus Eq. (12) that constitutes the final estimating regression. We note the choice of variables was guided by previous studies as well as data availability²⁷.

There are a number of concerns with previous empirical works that have attempted to model Eq. (1) or its variants. First, while the nature of I(1) variable has received due recognition, and proper estimation techniques has been used, the short data span typically used in these studies may distort the power of standard tests, and lead to misguided conclusions. Second, time series analysis of individual country data can be much more insightful than cross-country growth equation because it allows for different economic structures²⁸. Third, it is important to distinguish between long run and short-run relationships. The distinction is important as some variables mentioned in the earlier section could be important in the short-run, while in the long-run, as the economy grows and becomes more matured, these effects may slowly disappear.

Data and Estimation Techniques

Source of Data

The sample used in this study consists of annual data for five ASEAN countries: Indonesia, Malaysia, the Philippines, Thailand and Singapore and it covers the period 1968 to 2002. The annual data are drawn from two main sources: a) the International Financial Statistics database, International Monetary Fund (IFS, IMF various issues) and the Asian Development Bank database (ADB, various issues). For detailed definitions and the source of the variables used in the analysis, see Appendix 1.

Estimation Techniques

To examine the dynamic relationship between the growth rate and its determinants, we deployed the autoregressive distributed lag (ARDL) cointegration procedure introduced by Pesaran et al. (1996, 2001). First, we tested for the null hypothesis of no long-run relationship against the alternative that there exists a long-run relationship between economic growth and its determinants. One important difference between ARDL and other cointegration techniques such as Johansen's procedure is that the

²⁷ Recent studies have included the catch-up effect by adding initial income in the model. Preliminary results show that the variable is insignificant and sometimes carry the wrong sign. Since it is insignificant in the preliminary results, we have dropped the variable from estimation. The overall results without the initial income variable did not change much.

²⁸ Most of the earlier studies relied on cross-sectional data and only a few employed time-series data. Estimates derived from cross-sectional data can only be valid if the institutional and the other features that determine growth are invariant across countries.

procedure does not require pre-testing for unit roots. It is generally known that different unit root tests yield different conclusions not only due to their different powers, but also due to different lag length selected in each test²⁹. Hence, ARDL has the advantage of avoiding the classification of variables into I (0) or I (1) since there is no need for unit root pre-testing.

Furthermore, as long as the ARDL model is free of residual correlation, endogeneity is less of a problem. Pesaran and Shin (1999) demonstrated that the appropriate lags in the ARDL model corrected both serial correlation and endogeneity problems. The ARDL method can distinguish between dependent and explanatory variables. Indeed, one of the important advantages of the ARDL procedure is that the estimation is possible even when the explanatory variables are endogenous (see Alam and Quazi, 2003). Consider a model with y, x and z. The variables can be distinguished by estimating each equation with each of the variables as a dependent variable as shown below³⁰:

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

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

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

To test the existence of a long-run relationship between y, x and z, Pesaran et al., 2001 considered two alternatives: First, an F-test of joint significance of lagged level of the variables involved. Second, a t-test for the significance of the lagged level of the dependent variable (See, Banerjee et al., 1998). The null hypothesis for testing the non-existence of first long-run relationships (Eq.2) i.e. $H_0 : \alpha_0 = \gamma_{1y} = \gamma_{2y} = \gamma_{3y} = 0$ is denoted by $F_y(y; x, z)$. The F test for the null hypothesis for testing the non-existence of second long-run relationship (Eq.3) is $H_0 : \alpha_0 = \gamma_{1x} = \gamma_{2x} = \gamma_{3x} = 0$ denoted by $F_x(x; y, z)$ and the F-test for the null hypothesis for testing the non-existence of third long-run relationship (Eq.4) is $H_0 : \alpha_0 = \gamma_{1z} = \gamma_{2z} = \gamma_{3z} = 0$ denoted by $F_z(z; y, x)$. Similarly, we can denote the test statistic for the three equations based on the t-test as $t_y(y; x, z)$, $t_x(x; y, z)$ and $t_z(z; y, x)$, respectively. If the $F_y(y; x, z)$ and $t_y(y; x, z)$ are shown to be greater than the upper bound of the critical values (tabulated by Pesaran et al., 2001) while $F_x(x; y, z)$, $F_z(z; y, x)$, $t_x(x; y, z)$ and $t_z(z; y, x)$ are lower than the lower bound of the critical value, then there exists a “unique and stable long-run”

²⁹ This issue is relevant in the present context as several authors have pointed out some of the variables used in the growth equation is stationary.

³⁰ See also Siddiki (2000) for more detail on the application of the model.

relationship. In this relationship y is the dependent variable and x and z are “long-run forcing variables” or exogenous variables. Conversely, if the computed F-and t-statistics fall within the band, prior information on the order of integration of the variables is necessary to make a decision on long-run relationships (see: Sidiki, 2002; Alam and Quazi, 2003). If the F-and t-statistics are supportive of the existence of a long-run relationship, then a further three-step procedure to estimate growth model is carried out. In the first step, maximizing the AIC and SBC criteria select the order of the lags in the ARDL model. In the second and third steps, the long and short-run parameters are estimated, respectively.

Empirical results

Estimating the long-run relationship

To ascertain the existence of long run relationships among the variables given in (I), the following ARDL model is estimated:

$$\begin{aligned} \Delta GDP = & \alpha_0 + \alpha_1 GDP_{t-1} + \alpha_2 GDI_{t-1} + \alpha_3 X_{t-1} + \alpha_4 FI_{t-1} + \alpha_5 H_{t-1} + \\ & \sum_{j=1}^{k1} \beta_1 \Delta GDP_{t-j} + \sum_{j=0}^{k2} \beta_2 \Delta FDI_{t-j} + \sum_{j=0}^{k3} \beta_3 \Delta GDI_{t-j} + \sum \beta_4 \Delta X_{t-j} + \\ & \sum_{j=0}^{k5} \beta_5 \Delta FI_{t-j} + \sum \beta_6 \Delta H_{t-j} + \varepsilon \end{aligned} \quad (5)$$

Accordingly, the null hypothesis of no cointegration, i.e., $H_0: \alpha_0 = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = 0$ is tested against the alternative of $H_1: \alpha_0 \neq 0, \alpha_1 \neq 0, \alpha_2 \neq 0, \alpha_3 \neq 0, \alpha_4 \neq 0, \alpha_5 \neq 0, \alpha_6 \neq 0$ in (5) by means of the standard F-test. The distribution of the F-statistic is non-standard, and critical values (CVs) are tabulated in Pesaran et al. (2001)³¹. Alternatively, the null hypothesis of no cointegration i.e. $H_0: \alpha_{t-1} = 0$ against the alternative $H_1: \alpha_{t-1} \neq 0$ can be tested by using the t-ratio test.

The test for long-run relationship consists of a two-step strategy: first, the selection of the optimal number of first difference of the variables to include in Eq. 5. For this purpose, we followed Pesaran et al. (2001) and used multiple criteria to choose the lag lengths for each first differenced variables in each model based on Schwarz Bayesian

³¹ The test is further subjected to potential ambiguity, in the sense that the test has an upper bound and a lower critical bound. As long as the computed statistic exceeds the upper bound, the null of no cointegration can be unambiguously rejected. Similarly, as long as the computed statistic falls below the lower bound, the null of no association cannot be rejected. However, where the test statistic fall between the upper and lower bounds, it is indeterminate.

(SBC) and Akaike information (AIC) criteria. Additionally, we relied on the Bruesch-Pagan LM test to check for serial correlation and ensure that the selected model is free of autocorrelation. Second, we obtained the F- and t-statistics, this is conducted by testing the null of no cointegration against the alternative by computing the F-statistic, which is needed to estimate the significance of the lagged level of the variables in Eq. (5) and a t-ratio for the significance of the lagged level of the dependent variable.

Results of the F- and t-statistics are reported in Table 2 for each of the countries under investigation. The calculated $F_{\Delta GDP}$ statistics are 9.554 (Indonesia), 6.456 (Malaysia), 3.388 (Philippines), 8.417 (Thailand) and 3.571 (Singapore). Notice that all of the statistics are higher than the upper bound CV (2.08-3.00) at 10% significance level or better. Meanwhile, the t-ratio tests show that, with the exception of the Philippines, the calculated $t_{\Delta GDP}$ statistics are higher than the upper bound CV (-2.27, -3.86) at 10% significance level.

To investigate the uniqueness of the long-run relationship between the variables, we repeated the same exercise by treating each of the variables in Eq. (5) as the dependent variable and computed the corresponding F- and t-statistics³². It is worth noting that the corresponding estimated F-values for $F_{\Delta GDI}$, $F_{\Delta FDI}$, $F_{\Delta FI}$, $F_{\Delta X}$, $F_{\Delta H}$, and t-ratios for $t_{\Delta GDI}$, $t_{\Delta FDI}$, $t_{\Delta FI}$, $t_{\Delta X}$, $t_{\Delta H}$ are found to be lower than the lower bound of CVs or fall within the inclusive range of the CVs. Similar results were observed based on the t-statistics. Additionally, the integration test indicates that all variables that fall within the inclusive range are integrated at the order one, I(1). To conserve space, these results are not reported here but are available upon request. Two important conclusions have emerged from the analysis so far; first, the test statistics point to the fact that there exists a “unique and stable long-run relationship” between per capita GDP and its determinants. Second, the five independent variables in Eq. (5) can be treated as exogenous variables in the growth model. **[Insert Table 2]**

The Long-Run Relationships

Given the evidence presented in Table 2, we next proceeded with the estimation of long-run parameters of the growth model for the ASEAN-5. We noted that the ARDL method has an additional advantage of yielding consistent estimates of the long-run parameters that are known to be asymptotically normal irrespective of whether the variables are I(0), I(1) or mutually integrated. Additionally, Pesaran and Pesaran (1999) and Pesaran et al. (2001) have demonstrated that appropriate lags in the ARDL is important as it corrects for both serial correlation and problems associated with endogeneity. The Schwarz Bayesian Criteria (SBC) selects an ARDL (1,1,1,0,0,0) for Indonesia, (1,0,0,1,0,0) for Malaysia, (1,0,1,0,1,0) for Singapore, (1,0,0,0,0,1) for Thailand, and (1,0,0,0,0,0) for the Philippines.

³² Pesaran et al. (2001) noted that the bound test procedure is based on a single equation approach and it is inappropriate to apply this test when there exists more than one long-run relationship.

The results clearly highlight the importance of domestic investment and exports in the growth process of the ASEAN countries. Notice that the coefficients are statistically significant at conventional significance levels and both carry a positive sign. The coefficient for domestic capital varies from 0.027 (Indonesia) to 0.501 (Singapore), and for FDI, from 0.032 (Thailand) to 0.094 (Indonesia), excluding the Philippines where the coefficient is found to be insignificant. For Indonesia, Malaysia, Thailand and Singapore, restrictions and barriers to foreign capital were modified or removed in the 1980s. In the Philippines, the Foreign Act of 1991 only relaxed the rules and regulations on FDI. Additionally, net FDI to GDP (0.8%) in the Philippines is relatively low compared to Malaysia (4.3%). The Philippines also does not have a good infrastructure for FDI (see Marwah and Tavakoli, 2004). Thus, the lack of openness to capital inflows (technological diffusion) into the Philippines accounts for the relatively poorer growth rates. Thus policies that tend to limit the free flow of capital (FDI) may adversely affect economic growth. We also notice that growth is more responsive to domestic investment than FDI in the long-run model, the sole exception is Indonesia.

With the sole exception of Indonesia (positive but insignificant), human capital (H) has a positive effect on growth and it is significantly different from zero. Human capital (skill and educational levels) directly affects growth. It emerged as the most important variable for Malaysia (0.394), the Philippines (0.383) and Thailand (0.682). This finding seems to demonstrate the importance of human capital in the growth prospects of the ASEAN economies over the past decades³³. There is a large literature following the works of Barro (1991, 1997) and Gemmell (1996), which consistently revealed that human capital is growth-enhancing. It plays a significant role in determining growth in the developing economy. It must also be pointed out that researchers including Easterly and Levine (2000) and Bils and Klenov (2000) among others have stressed that that human capital is not important to growth. Also, Canlas (2003) using the Solow-type of growth model for the Philippines found that human capital (or education) is insignificant. However, for the ASEAN countries, our finding is more consistent with the argument reported in Barro and Gemmell.

Finally, financial intermediation (M2/GDP) enters with positive significance in three countries – Singapore, Malaysia and Indonesia. Thus, the fact that the financial sector matters in the growth process provides some support to the old Schumpeter hypothesis. From a policy perspective, this means that financial reforms undertaken in the post-crisis period by these countries are expected to improve the real sector of the crisis-affected countries. The variable appears to have the most impact on the growth of Singapore (0.999) and Indonesia (0.197). Interestingly, we found that financial

³³The Philippines exhibited some favourable educational trends in relation to the other ASEAN countries. Secondary enrolment in the early 1990s exceeded those of Indonesia and Thailand. At the tertiary level, the percentage exceeded that of Malaysia, Thailand and Indonesia (see Canlas, 2003). There is a need to explore alternative proxies of the education variable and its role in facilitating technological progress. Unfortunately, data limitations preclude us from pursuing this extension.

intermediation played an important role for the matured economy like Singapore. This may not be consistent with the argument made in Fase (2001) and Darrat (1999); as the country matures, the relationship between financial and economic growth disappears³⁴. For the case of Thailand and the Philippines, financial development appears to have no significant effect on growth. Therefore, the evidence between the relationship on financial development and economic growth in the region is mixed. We believe that the conflicting results may arise due to the different stages of development in the financial markets in the countries under investigation. We notice that despite the rapid development in the financial structure in Thailand, it is still dominated by a small group of banks, limited availability of financial instruments and thin capital market with the exception of the stock market³⁵.

In general, our long-run results are consistent with previous literature in that foreign and domestic investments, financial intermediation, exports and human capital are primary sources of economic growth (Borensztein, et al., 1998; Levine, 1997; King and Levine, 1993; and Beck, et al., 2000, to name a few). The statistical evidence found in this study is not supportive of the notion that financial deepening encourages capital flight as claimed by authors like Akinlo (2004) and Lensink et al. (1998). [Insert Table 3]

The short-run Dynamics

The short-run dynamics of the economic growth based on ARDL models for Indonesia, Malaysia, the Philippines, Thailand and Singapore are displayed in Table 4. A battery of diagnostic checks indicates that the models selected are adequately specified. None of the statistics shown in the table are significant at the 5% level. The models satisfy the conditions of non-autocorrelation, homoskedasticity and normal disturbance. The adjusted R^2 ranges from 0.756 (Thailand) to as high as 0.959 (Philippines) suggesting that the error correction models (ECM) fitted the data reasonably well for all the countries under considerations.

As shown in Table 4, the estimated value of the lagged error-correction term (ECM_{-1}) based on the ARDL method is negative and less than unity. The coefficient is statistically significant, implying that the ECM tends to cause per capita GDP to converge monotonously to its long-run equilibrium path in relation to changes in the exogenous “forcing variables”. This finding further strengthens our earlier results on the long-run equilibrium relationship between per capita GDP and GDI, FDI, FI, X, and H. The coefficients of the lagged ECM range from as high as 0.696 (Malaysia) to as low as 0.393 (Indonesia) indicating that the speed of adjustment back to equilibrium following a disturbance is fairly rapid. For Malaysia, for instance, more than 69 % of the adjustment was completed in a year.

³⁴ In any case, we caution the reader that the data used by Fase ranged from 1900 to 2000 (over a century).

³⁵ The banking system is highly concentrated with about two-thirds of the total bank assets being accounted by the five largest banks. For a more detailed discussion on the financial structure in Thailand, see Chowdhury (1997).

The coefficients of domestic investment and FDI are positively signed and the size of the coefficient of domestic investment is noticeably larger than FDI in four out of five countries, indicating that domestic investment is more effective in boosting economic growth than FDI, even in the short-run. The literature has suggested that domestic capital is largely used in lower industrial activities and that foreign capital is usually invested in high technology innovations. Our results suggest that this may not be the case for the ASEAN countries. **[Insert table 4]**

The results in Table 4 show a statistically and economically significant relationship between financial intermediation and economic growth in Singapore, Malaysia and Indonesia. The effect is more pronounced in a country with a larger and more efficient capital market. It is worthy to note that recent literature points to the fact that the financial intermediary sector can alter the path of economic progress, but the dispute is on the fundamental channels in which financial intermediaries are connected to growth. According to the Schumpeterian view, the financial intermediary sector alters the path of economic progress by affecting the allocation of savings and not necessarily by altering the rate of savings. This view highlights the impact of financial intermediaries on the growth of total productivity. Alternatively, a vast development economics literature argues that better financial intermediaries influence growth primarily by raising domestic savings rates and attracting foreign capital (see Beck, et al. 2000). Thus, our result is consistent with the view that financial intermediation exerts a significant impact on economic growth. This could be through one or both channels that connect financial intermediaries to growth.

The results confirm the existence of the export-led-growth hypothesis, as there is a positive and significant effect of exports on economic growth as shown in Table 4. Given that the pattern of FDI flows to ASEAN countries is mostly in manufacturing (manufacturing FDI), it is expected that FDI inflow would lead to higher growth. Thus, our findings broadly support the argument that FDI has made a positive contribution to the economic growth of the ASEAN countries. It is worthwhile to note that a large body of literature suggests that there exists a complementary relationship between FDI and exports, particularly if this FDI inflow is from developed to developing countries (see Marchent et al., 2002). Thus, export-expansion oriented policies are crucial in stimulating both domestic and foreign investments and thereafter economic growth. This is in line with the argument made in Sachs (2000) that countries that are successful in export-promotion policies and attracting FDI can earn foreign exchange reserves as well as facilitate the upgrading of the nation's technologies (see also Marwah and Tavakoli, 2004).

We also investigated the impact of human capital on per capita GDP. The results reveal that human capital has a positive and significant effect on enhancing economic growth in all countries except Indonesia. The implication of this is that the presence of a sufficient level of human capital in the host economy increases the capability of the economy to receive more advanced technology and thereby enhances the process

of the productivity growth. Thus, our result is consistent with the literature in that human capital is one of the major determinants of a long-run growth rate³⁶. In the case of Indonesia, the result is rather surprising. Perhaps it is a result that indicates that the manufacturing sector in Indonesia is still focusing on low-technology (or simple electronics) products.

The period of our analysis covers a long, 35-year interval. They can be inter-temporal differences in the macroeconomic performance for the industrial countries. We examine the stability of the long run parameters together with the short-run movements for each equation. To this end, we rely on cumulative sum (CUSUM) and cumulative sum squares (CUSUMSQ) tests proposed by Brown et al. (1975). The same procedure has been utilized by Pesaran and Pesaran (1997), and Bahmani-Oskooee et al. (2002) to test the stability of the long-run coefficients. The tests applied to the residuals of the ECM models (Table 5) along with the critical bounds are graphed in Figures 1-5. As can be seen in Figures 1-5, the plot of CUSUM and CUSUMSQ statistics stay within the critical 5% bounds for all equations. Neither CUSUM nor CUSUMSQ plots cross the critical bounds, indicating no evidence of any significant structural instability even with the sampling period extended after the crisis period. **[Insert Fig. 1]**

To sum up, the results presented so far suggest that per capita GDP is primarily caused by high growth rates of domestic investment, FDI, export, human capital and financial intermediation in all ASEAN countries except financial intermediation in both the Philippines and Thailand, and human capital in Indonesia. These results suggest that the investment climate as well as the openness of these countries during the last three decades have contributed to phenomenal growth records. These observations are in accordance with the investment-led growth (see Borensztein, et al., 1998; Madsen, 2002 and Alguacil et al., 2002) and export-led growth hypotheses (Bahmani-Oskooee and Alse, 1993; Doraisami, 1996; Ghatak et al., 1997; Baharumshah and Rashid, 1999, among others).

Concluding Remarks

In this article, we examined the factors that determine economic growth. The analysis provides some insight and perspective on the relationship between economic growth and various variables, which affect it in the ASEAN-5 countries — Malaysia, Singapore, Thailand, Indonesia and the Philippines. An important conclusion that emerged from the bound tests is that all the ASEAN-5 countries generally share a common set of determinants of growth. The results presented in this paper show that FDI (especially manufacturing FDI) and domestic investment are important variables that propel growth in the region. This, suggests that policies that seek to enhance investments are effective means of promoting economic growth (i.e., investment-led growth hypothesis). This outcome is in line with the findings of Levin and Renelt

³⁶ See more discussions in Borensztein, *et al.* (1998).

(1992) and Gruben and Mcleod (1998), which have shown the existence of a robust relationship between economic growth and FDI. In fact, Gruben and Mcleod concluded that if a country is planning to impose capital control, the last type of capital it ought to control is FDI. Such a control may lead to significant costs in terms of growth.

The results of this study indicate that domestic investment plays a more important role than FDI, in explaining economic growth in the ASEAN countries. This result however, is in sharp contrast with that found in Borensztein et al. (1998), where the opposite is true for the developing economies. One possible explanation for this is that domestic firms in the ASEAN countries have better knowledge of and greater access to domestic markets. Grahan and Krugman (1991) explain that if a foreign firm decides to enter the market, it must compensate for the advantage enjoyed by domestic firms. Another important point to note is that the share of public investment to the total investment for the ASEAN countries in the past two decades was considerably high compared to the other developing countries. For Malaysia and Thailand public investment grew much faster than private investment, and the reverse is true for Singapore. The Governments' involvement in productive activities such as electricity generations and water supply has contributed to the fast growth in the region (see also Wong, 2002). From a statistical point of view, it can also be argued that due to heterogeneity in the panel countries, the results reported in Borensztein et al. may also be biased. We note that our evidence is based on country by country using the pure time-series approach.

The empirical results also indicate, among other things, that financial intermediation is crucial to economic growth in countries like Singapore, Malaysia and Indonesia – supporting the growth-enhancing hypothesis of financial development. Policies that foster financial deepening would likely raise economic growth. By and large, the results reveal that the impact of financial development is largest in Singapore, a country with the most sophisticated and highly developed financial market in the region. We found that the variable is positive but insignificant for two ASEAN countries – Thailand and the Philippines. There is however, no evidence to suggest capital outflow from these capital-scarce countries to capital abundant countries with better financial institutions for the sample period ending in 2002.

With respect to human capital, this paper finds that the effect of human capital on economic growth is dependent not only on the growth of human capital but also on the development level of human capital. Improvement in human capital through educational policies that raise the supply and quality of human capital increases the capability of the economy to receive advance technology that enhances both domestic and foreign investment and in turn lead to sustainable economic growth. We note that Philippines is the exception, since the human capital effects on growth is not persuasively (positive but insignificant) shown by the econometric results, even from the long-run model.

The evidence presented in this paper suggests that export expansion policies are crucial to stimulate economic growth. The results hold for a large economy like Indonesia as well as the smaller ASEAN economies, namely Malaysia and Thailand. This finding is in line with much of the empirical studies that have demonstrated the role of exports in fostering growth. For instance, the World Bank (1987) study of 41 countries concluded that growth performance was superior in countries that were relatively outward (open) as opposed to inward-oriented (closed) economy. This clearly points to the weakness of countries pursuing inward-oriented strategies. The growth of exports creates profitable opportunities for investment, which encourages further foreign and domestic investment. This leads to further export growth and thus economic growth – export-led growth. We consider this a critical factor that will determine the short-term and long-term growth success in the new millennium for the ASEAN.

Finally, the evidence provided suggests that the public policy aimed at enhancing domestic investments, FDI, human capital (education) and exports will continue to be relevant for long-term as well as short-term growth in the ASEAN countries.

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Table 2: F-and t-statistic for the Analysis of the Existence of Long-Run Relationship

	Indonesia	Malaysia	Philippines	Thailand	Singapore
$F_{\Delta GDP}$ (ΔGDP ; GDI, FI, FDI, X, S, H)	9.5548***	6.4560***	3.3880*	8.4168***	3.5708*
$t_{\Delta GDP}$ (ΔGDP ; GDI, FI, FDI, X, S,	-5.2211***	-3.9810**	-2.0393	-3.9711*	-4.9131***
$F_{\Delta GDI}$ (ΔGDI ; GDP, FI, FDI, X, S,	1.1694	1.9238	2.3860	1.1892	2.5828
$t_{\Delta GDI}$ (ΔGDI ; GDP, FI, FDI, X, S, H)	-0.2637	-0.2862	0.4415	-2.4407	-0.6017
$F_{\Delta FDI}$ (ΔFDI ; GDI, FI, GDP, X, S,	2.0895	2.2262	2.4407	2.3132	1.1833
$t_{\Delta FDI}$ (ΔFDI ; GDI, FI, GDP, X, S, H)	-2.2516	-1.9101	-2.6703	-2.8675	-2.1844
$F_{\Delta FI}$ (ΔFI ; GDI, FDI, GDP, X, S,	2.2407	2.8318	2.3887	2.3255	1.8097
$t_{\Delta FI}$ (ΔFI ; GDI, FDI, GDP, X, S, H)	0.2820	-0.4927	-1.1261	0.3657	-0.2801
$F_{\Delta X}$ (ΔX ; FDI, GDI, FI, GDP, S, H)	2.0043	2.1330	1.4246	2.8204	2.2792
$t_{\Delta X}$ (ΔX ; FDI, GDI, FI, GDP, S, H)	-3.0628	-2.3797	-2.0766	-1.6213	-1.0028
$F_{\Delta H}$ (ΔH ; FDI, GDI, FI, GDP, S, X)	2.0083	1.2928	1.0318	2.6996	2.0672
$t_{\Delta H}$ (ΔH ; FDI, GDI, FI, GDP, S, X)	-2.2488	0.2820	-2.0371	-1.6974	-0.7887

Note: the lag order (p) of the underlying ECM was selected using the Schwarz Bayesian Criteria (SBC), the Akaike Information Criteria (AIC) and the LM tests for testing residual correlation of order 2. The F-statistics is compared with the critical bound of the F_{ii} statistic for zero restriction on the coefficient of the lagged level variables provided in Pesaran et al. (2001) Table C1.ii. The t-statistic is compared with the critical bounds of the t_{iii} statistic for zero restriction on the lagged level of the dependent variable provided in Pesaran et al., 2001, Table C2.iii. Number of regressors =5. Asterisk *, **, *** denotes that F-statistics and T-statistics is above the 10%, 5%, 1% upper bound CV, respectively.

Table 3: Long-Run Coefficients Estimates for Economic Growth Model

Regressors	Dependent Variable Per Capita GDP				
	Indonesia	Malaysia	Singapore	Philippines	Thailand
	SBC Selected model				
	(1,1,1,0,0,0)	(1,0,0,1,0,0)	(1,0,1,0,1,0)	(1,0,0,0,0,1)	(1,0,0,0,0,0)
GDI	0.0266 [2.2051]**	0.1198 [4.3619]***	0.5058 [6.3362]***	0.2072 [2.8395]***	0.4596 [4.5518]***
FDI	0.0938 [2.1594]**	0.0316 [3.1237]***	0.0578 [1.7973]*	0.0058 0.0249	0.0447 [1.7470]*
FI	0.1965 [5.0628]***	0.1406 [2.2288]**	0.9988 [12.278]***	-0.1472 -[1.3115]	0.0012 [0.0076]
X	0.1803 [2.3424]**	0.2404 [5.8473]***	0.3427 [3.5837]***	0.3171 [2.6012]**	0.1533 [1.7700]*
H	0.0866 [1.4767]	0.3941 [2.5580]**	0.1021 [1.7402]*	0.3833 [2.3630]**	0.6824 [3.8951]***
C	-1.0238 -[1.2163]	-6.8715 [-5.6539]***	-3.4903 [8.8317]**	9.3996 [6.9918]***	-17.354 [-7.5677]***
Sampling Period	1969-2002	1968-2002	1969-2002	1970-2002	1968-2002
No. of Obs.	34	35	34	33	35

Note: Following [Pesaran and Shin \(1997\)](#), lag order of the ARDL model was selected using the Schwarz Bayesian Criteria (SBC) and the LM tests for testing residual correlation. Asterisks ***, **, * represent 1%, 5%, 10% significant levels, respectively. The t-ratios are reported in square brackets. The following notation applies: GDP, denotes per capita gross domestic product; GDI, gross domestic investment; FDI, foreign direct investment; FI, financial intermediation (M2/GDP); H: human capital; X: exports of goods and services.

**Table 4: Error Correction Models based on the ARDL approach:
Short-Run Estimations for Growth Model**

Regressors					
ECM (-1)	-0.3925 [-4.7028]***	-0.6962 [-5.6081]***	-0.4207 [-3.3369]***	-0.42488 [-5.2792]***	-0.5572 [-8.4403]**
Δ GDI	0.0105 [2.1041]**	0.0834 [3.7962]***	0.0872 [2.5975]**	0.19526 [8.1840]***	0.2818 [5.2877]***
Δ FDI	0.0858 [5.4458]***	0.0220 [3.4693]***	0.0024 [0.0250]	0.0194 [1.9392]*	0.0321 [1.7618]*
Δ X	0.0707 [2.7272]**	0.2610 [6.8167]***	0.1334 [3.0802]***	0.0651 [1.8744]*	0.4120 [4.7810]***
Δ FI	0.18294 [4.5136]***	0.0979 [1.8942]*	0.0264 [0.5055]	0.0051 [0.0076]	0.3281 [4.5409]***
Δ H	0.0340 [1.5946]	0.2744 [2.6411]**	0.1613 [1.7119]*	0.2830 [5.3624]***	0.0569 [1.7131]*
C	-0.4018 [-1.3263]	-4.7838 [-3.4964]***	3.9548 [2.9760]**	-7.3737 [-8.0814]***	-1.9448 [-6.6420]***
\bar{R}^2	0.77	0.94	0.96	0.76	0.79
	Diagnostic Tests [p-value]				
h-statistic	-1.4853 [0.137]	1.3569 [0.189]	-0.7795 [0.436]	0.5804 [0.562]	0.9963 [0.319]
A: AR (1)	2.0540 [0.152]	1.3777 [0.241]	1.6015 [0.206]	0.3081 [0.579]	0.9699 [0.325]
B: RESET (1)	0.7706 [0.689]	1.3454 [0.246]	1.8860 [0.170]	0.0313 [0.842]	0.0342 [0.853]
C: Norm. (2)	0.8876 [0.642]	0.1087 [0.947]	0.8806 [0.642]	0.1559 [0.925]	0.2362 [0.889]
D: Hetero. (1)	0.32812 [0.567]	0.9235 [0.337]	0.5226 [1.045]	1.1073 [0.293]	0.8474 [0.357]

Notes: Following Pesaran and Shin (1997), lag order of the ARDL model was selected using the Schwarz Bayesian Criteria (SBC), and the LM tests for testing residual correlation. The t-ratios are represented in square brackets. Asterisks ***, **, * represent 1%, 5%, 10% significant levels, respectively. Δ Denotes the first difference of each variable. The following notation applies: GDP, denotes per capita gross domestic product; GDI, gross domestic investment; FDI, foreign direct investment; FI, financial intermediation (M2/GDP); H: human capital. X: export of goods and services. The probabilities of χ^2 for the diagnostic tests are represented in square brackets. A: Lagrange multiplier based on the Breusch-Pagan test for 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.

Figure 5.2.1 Plot of CUSUM and CUSUMSQ statistic for Indonesia

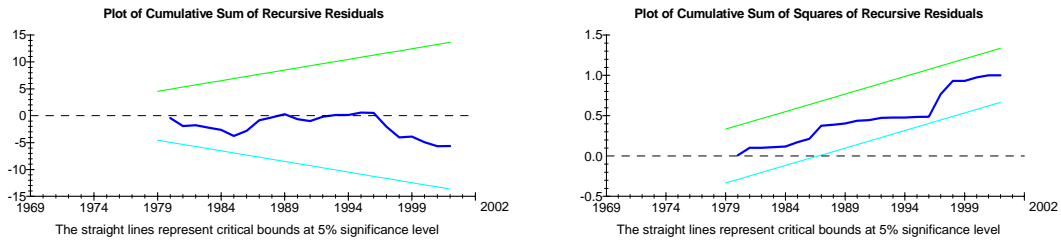


Figure 5.2.2 Plot of CUSUM and CUSUMSQ statistic for Malaysia

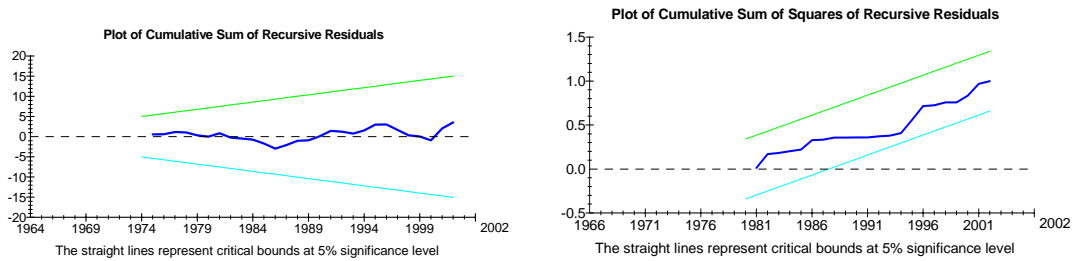


Figure 5.2.3 Plot of CUSUM and CUSUMSQ statistic for Philippines

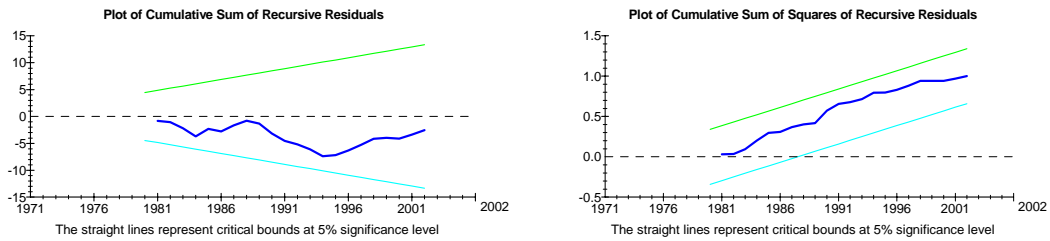


Figure 5.2.4 Plot of CUSUM and CUSUMSQ statistic for Singapore

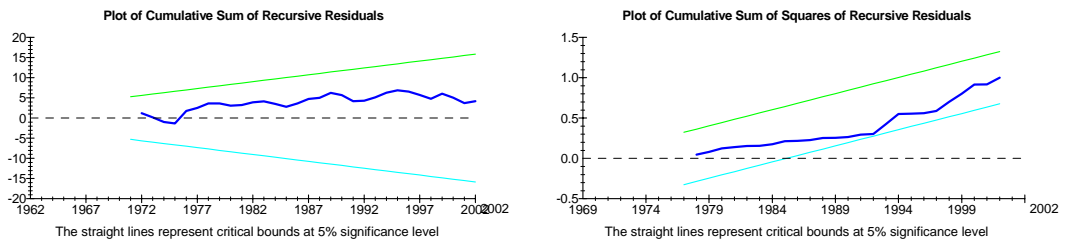
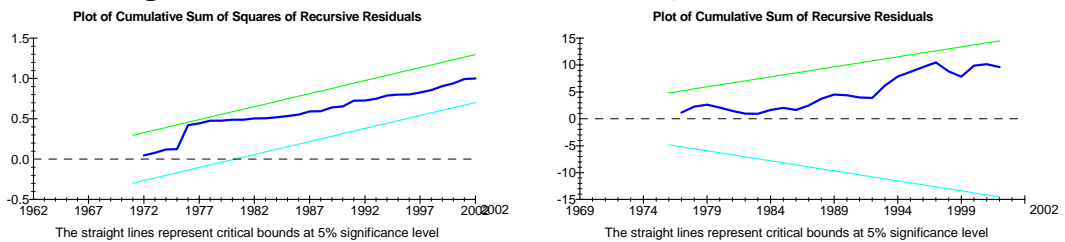


Figure 5.2.5 Plot of CUSUM and CUSUMSQ statistic for Thailand



Appendix 1

Data Sources

Variable	Description of the Data	Source
GDP	Real per capita GDP	IFS, IMF
FDI	Foreign Direct Investment	IFS, IMF
GDI	Gross Domestic Investment	IFS, IMF, ADB
FI	Financial intermediation proxied by M2/GDP	IFS, IMF, ADB
H	Human capital proxied by secondary school enrolment	UNESCO, DS
X	Export of goods and services	IFS, IMF
GDPD	GDP deflator	IFS, IMF
POP	Population	IFS, IMF, ADB

Note: ADB, denotes Asian Development Bank; DS, Departments of Statistics in each country. International Monetary Fund, International Financial Statistics (various issues). Oxford University Press, New York.
United Nations, UN International Trade Statistics Yearbook (various issues), Oxford University Press, New York.
World Bank, World Development Report (various issues), Oxford University Press, Washington, DC.

ASIA'S ECONOMIC BLOCS: A SURVEY OF EMPIRICAL EVIDENCE

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Introduction

The adoption of Euro in 1 January 2002 in the European Union (EU) has re-initiated interest in the study of monetary, or generally, economic unions around the world. Many economies are eager to heed the same path as the EU in the name of promoting trade, reducing cost and sustaining economic growth. The idea of economic integration within the East Asian region was formally put forward by the former Prime Minister of Malaysia, Tun Dr Mahathir Mohamad when he first proposed the formation of East Asia Economic Caucus (EAEC) in late 1990s. The reason behind the proposal was to integrate nations within the region to encourage trade, increase exchange of money, people and information, (including ideas, culture and language). Furthermore, according to Naoko (2002), integrating countries with diverse economic background will promote trade and sustainable economic growth.

Nevertheless, Tun Dr Mahathir's proposal to form EAEC came untimely and had no chance of being implemented due to several reasons. Firstly, the US was not included in EAEC, unlike the Asia-Pacific Economic Co-operation (APEC). Eventually, the US disapproved of EAEC. Secondly, Japan, which would not compromise its close alliance with the US and was not supportive of the idea of forming an economic bloc without the participation of US. Finally, there was no consensus among ASEAN members on the leadership of EAEC (Naoko, 2002).

However, the situation now has changed, mainly due to the economic problems faced by individual economies, which needed multilateral co-operation within neighbouring countries for solutions (Day and Herbig, 1995; Naoko, 2002). Take for instance the Asian financial crisis, which began in Thailand and spread to other Asian economies in late 1997 and the transnational issues of international terrorism as well as the outbreak of Severe Acute Respiratory Syndrome (SARS). These recent events have highlighted the swift transmission of economic shock and regional economic co-operation is therefore necessary to avoid or mitigate the aggravation of adverse shocks.

In addition, with technological advancement in information technology, communication and transportation (ICT) one country is much more connected with another, motivating trade, development and growth (Day and Herbig, 1995). At the same time, however, economies that are closely linked today are also much more vulnerable to economic shocks transmitted from other parts of the world. Economic union is therefore a possible and reasonable defend against any adverse shocks.

There is only a thin line that differentiates economic integration from globalisation. Globalisation refers to the process of the increasing bond among national economies through market integration, expansion of world governance and global society, as well as increased mobility of people and information. Economic integration, on the other hand, focuses on the strengthening existing and new international linkages of commerce and trade (Daniels and VanHoose, 2001). Economic integration or union refers to economic linkages or interdependence between states, countries, grouping of countries or regions. The flow of trade (exports and imports of goods and services), capital (direct and portfolio investments), labour and technology across countries are evidence of economic linkages (O'Neill, 2002). The theory of economic integration further explains that the reduction or elimination of trade barriers among nations (Salvatore, 2004) will eventually bring together the commodity market, financial market (Coleman, 1999; O'Neill, 2002) and labour market (O'Neill, 2002) of the economies involved.

Many studies had addressed the issue of economic union with regards to the optimum of currency area (OCA) criteria (see Bayoumi and Eichengreen, 1994; Silvapulle, *et al.*, 1999; Dueker and Wesche, 2001; Hallett and Piscitelli, 2002; Mongelli, 2002; Xu and Voon, 2003). Early views of the OCA theory stressed on the importance of labour mobility (Mundell, 1961), openness of an economy (McKinnon, 1963) and product differentiation (Kenen, 1969) as criteria necessary to form an OCA. Based on these fundamental criteria, recent researchers proposed other essential elements that are prerequisites to form an OCA, namely having stable or fixed exchange rate, facing symmetrical shocks, increasing trade and capital flows, experiencing coherent macroeconomic activities through fiscal and monetary co-ordination.

It follows that, the theory of OCA also forms a framework to assess the costs and benefits of monetary integration (Bayoumi *et al.*, 2000). Firstly, information about the benefit of a monetary union is ascertained from the importance and composition of intra-regional trade. Lower transaction costs and maintaining a stable bilateral exchange rate between potential common currency member nations encourage greater intra-regional trade. For instance, nations with higher share of trade in manufacturing products, at similar prices determined by producers will find adopting a common currency more appealing. The reason being that bilateral exchange rates will have

greater impact on intra-industry trade of differentiated but substitutable products (Bayoumi *et al.*, 2000).

Secondly, economic shocks and resource mobility will indicate the potential costs of losing monetary policy independence when a common currency is adopted. The costs of adopting a common currency are higher when potential member countries experience larger and more dissimilar economic shocks, soliciting an independent exchange rate as a stabilising policy. As suggested by Mundell (1961), resource immobility would not be able to take over the role of exchange rate as a tool of economic adjustment, making giving up monetary independence more costly.

Thirdly, the similarity of past macroeconomic policies, stage of economic development and financial systems would increase the suitability of countries to be integrated. Bayoumi *et al.* (2000) reasoned that a more flexible and sustainable fiscal policy would reduce the need to rely on monetary policy to respond to shocks. Moreover, countries with similar level of economic development like a significant degree of convergence in output, intra-regional trade, and investment, would ease the process of adopting a common currency. It also follows that a country with high inflation and macroeconomic instability may find it difficult to be accepted by other potential countries to form a currency union. Likewise, financial systems that work in a similar manner, where changes in the stance of monetary policy that do not differ significantly (in term of amplitude and timing on output across countries), indicating a suitable candidate of OCA.

Besides assessing these OCA criteria to determine the possibility of an economic union, another approach is assessing the marginal benefits gained by member countries versus the marginal cost of integration. Should the benefits (increased trade, foreign direct investment and economic growth) exceeds the cost (of giving up monetary policy independence), then member countries should proceed to form an economic union. If otherwise, then countries involved should shun the idea of forming an economic bloc.

As for the EU, it evaluates the compatibility of economies through institutional convergence criteria. The EU established a set of "convergence criteria" to be fulfilled by countries desired to adopt the common currency Euro. Countries that fulfil the convergence criteria that are specifically spelt out in the Maastricht Treaty, will be eligible to form Euro area.

Hence, there is no single "best" approach to evaluate to eligibility of economies to form an economic union. However, meeting some of these criteria would indicate the compatibilities of economies concerned to establish an economic union.

Background

In the world today, generally, there are four main groups of economic blocs. Firstly, the Asia Pacific, European and North American economic blocs. Secondly, is the Latin American and Caribbean economic blocs. Third in line is the African economic blocs, followed by the Middle East and Asia economic blocs. The focus of my study will be the Asian economic blocs, which consists of four official economic organisations. They are the *Association of Southeast Asian Nation (ASEAN³⁷)*, the *Economic Co-operation Organisation (ECO³⁸)*, the *Gulf Co-operation Council (GCC³⁹)*, and the *South Asian Association for Regional Co-operation (SAARC⁴⁰)*.

The European Union (EU)

The formation of an economic union is a long and intricate process. The European Union (EU) is an initial unification of 6 countries, namely, France, Belgium, Luxembourg, Netherlands, Germany and Italy, formed in 1950. The EU membership grew to 9 countries in 1973 (Ireland, Denmark and UK joined), to 10 in 1981 (Greece joined), 12 in 1986 (Spain and Portugal joined), and 15 in 1995 (Austria, Sweden and Finland joined). Out of these 15 members, 12 joined the Euro, leaving the UK, Denmark and Sweden out of the monetary union.

The EU now has 25 members. The ten new members were Poland, Czech Republic, Hungary, Slovakia, Lithuania, Latvia, Slovenia, Estonia, Cyprus and Malta, formerly from the Eastern Bloc, joined the EU on the 1st of May 2004. The main agenda of EU is to form a Europe-wide economic union in order to promote economic integration through common objectives of democracy, stability and growth among EU members.

³⁷ **Association of South-East Asian Nation (ASEAN)** consists of Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam.

³⁸ **Economic Co-operation Organisation (ECO)** is the formation of Afghanistan, Azerbaijan, the Islamic Republic of Iran, Kazakhstan, the Kyrgyz Republic, Pakistan, Tajikistan, Turkey, Turkmenistan and Uzbekistan.

³⁹ **Gulf Co-operation Council (GCC)** is the formation of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

⁴⁰ **South Asian Association for Regional Co-operation (SAARC)** consists of Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

According to the Maastricht Treaty, in order to join the Euro, members have to achieve a high degree of sustainable economic convergence. This entailed meeting four tests of the so-called "convergence criteria". In no particular order, the first criterion is the "price stability" criterion which requires EU members to achieve an average inflation rate of within 1.5% of that of the three best performing member states. Second, to eliminate excessive public sector debt and maintain budget deficit of under 3% of the GDP. The government debt should be under 60% of GDP. Thirdly, there should be exchange rate stability with low exchange-rate variability (and no devaluation) against the other currencies in the exchange rate mechanism. Finally, long-term interest rates should be within 2 percentage points of the average for the three best performing EU member countries.

These criteria were criticised by the UK for omitting real economic yardsticks such as employment, productivity trends and unfunded pension liabilities. As such, the British government set out its own convergence tests to be met before the UK decides to join the European and Monetary Union. Firstly, it is the compatibility of business cycles and economic structures, to be followed by having sufficient flexibility to meet any problems. Third, is to have better conditions for capital investment in the UK. Next, the formation of an Euro Area has to have a positive impact on UK, as well as to have the capability to promote growth, maintain stability and create jobs. The sixth criterion is political, where the electorate is required to approve abolishing the pound in a referendum.

A Treasury assessment by the UK in 1997 concluded that without sustainable convergence with continental economies, European and Monetary Union would do UK more harm than good, even though the European and Monetary Union has the potential to enhance growth and employment. Although the Treasury paper did not mention the risk of exchanging the pound for the Euro at an uncompetitive rate, the Treasury viewed that the present convergence need did not exist for the UK.

Association of Southeast Asian Nation (ASEAN)

Unlike the EU, the level of economic development differs among nations of the Southeast Asian region. As depicted in Table 1, all ASEAN nations, except for Brunei (as data were unavailable), shows a steady increase in population with Indonesia being the most populated nation in ASEAN, recording a 211.1 million people in 2002, and Singapore the least, of 4.16 million people in 2002.

Referring to Table 1, the structure of output measured as the percentage of GDP at market prices also varies among ASEAN nations. Cambodia's output structure was 55.6% agricultural, 11.2% industrial and 33.2% services in 1990 but became less agricultural-base in 2002 where its output structure was 35.6% agricultural, 28%

industrial and 36.4 services. However, there are not much changes in the output structure for Indonesia where 19.4%, 39.1% and 41.5% of its GDP in 1990 were made up of the agriculture, industry and service sectors respectively, as compared to 17.5% agricultural, 44.5% industrial and 38% services in 2002.

As for Malaysia, the structure of output measured as the percentage of GDP at market prices revealed a fall in the contribution of agriculture output, from 15% in 1990, to 12% in 1995 and 9% in 2002. Malaysia's output structure is geared towards industrialisation, 41% in 1995 and 48% in 2002, as well as the service sector, 47% in 1995 and 46% in 2002. Nonetheless, Myanmar remained as an agricultural based economy since 1990 where 57%, 10% and 32% of its GDP came from the agricultural, industrial and services sector, respectively in 2001.

The service sector continued to be the main contributor of the Philippines, Singapore, Thailand and Vietnam's GDP, recording 52.8%, 66.6%, 49% and 38.5% in 2002 respectively. The agriculture sector of these countries was less eminent. However, the level of development and industrialisation of Singapore are more prominent than others like Vietnam. Singapore is a leader of high-tech industries, while Vietnam exports low-tech manufactured goods.

Table 1: Key indicators of selected ASEAN countries.

Country	Year	Population (Million)	Structure of output, % of GDP at market prices.			External Debt as % of GNI
			Agriculture	Industry	Services	
Cambodia	1990	8.60	55.6	11.2	33.2	165.51
	1995	10.47	50.4	15.0	34.6	78.60
	2002	13.50	35.6	28.0	36.4	N/A
Indonesia	1990	179.38	19.4	39.1	41.5	63.98
	1995	194.75	17.1	41.8	41.1	63.41
	2002	211.06	17.5	44.5	38.0	97.2
Laos	1990	4.14	N/A	N/A	N/A	204.51
	1995	4.60	N/A	N/A	N/A	123.18
	2002	5.53	N/A	N/A	N/A	N/A
Malaysia	1990	18.10	15.0	42.0	44.0	36.36
	1995	20.69	12.0	41.0	47.0	40.55
	2002	24.53	9.0	48.0	46.0	N/A
Mynmar	1990	41.00	57.0	11.0	32.0	N/A
	1995	45.00	60.0	10.0	30.0	N/A
	2001	51.00	57	10	32	N/A
Philippines	1990	62.05	21.9	34.5	43.6	69.36
	1995	70.27	21.6	32.1	46.3	49.67
	2002	81.78	14.7	32.5	52.8	N/A
Singapore	1990	3.05	0.3	33.0	67.7	12.37
	1995	3.53	0.2	33.3	65.3	9.77
	2002	4.16	0.1	33.6	66.6	N/A
Thailand	1990	56.00	12	37	50	33.00
	1995	59.00	11	39	50	61.00
	2002	63.00	9	43	49	N/A
Vietnam	1990	66.00	39.0	23.0	39.0	384.00
	1995	72.00	27	29	44	124.00
	2002	79.70	23.0	38.5	38.5	38.00

Note : N/A means data not available.

Source: Asian Development Bank Key Statistics 2003.

Besides the incomparable product market, another obstacle to integrate ASEAN economies is the unequal financial markets advancements among member countries. The financial system in Singapore and Malaysia, for instance, are much more

liberalised and developed, as compared to other ASEAN member countries like Vietnam, Laos and Myanmar (Bayoumi *et al.*, 2000).

The dissimilarity of the level of economic development and monetary systems is therefore said to be the main obstacle to the adoption of policies to support economic and monetary integration (Bayoumi *et al.*, 2000). However, countries with diverse economic background and comparative advantage will complement one another, promote trade and maintain a sustainable economic growth. It was based on this argument that EAEC was proposed in the early 90s.

Nevertheless, ASEAN consists of developing nations. Economic co-operation within the region in the form of free-trade areas (FTAs) and other special regional or preferential trading arrangements has proven favourable results as seen in intra-ASEAN trade. Without much estimation, the comparison of ASEAN's trade in Table 2 revealed a gradual increase in intra-ASEAN trade, in value, from 1995 to 2000, except for the financial crisis year 1998. Still, the September 11 event in 2001 had also adversely affected the intra-ASEAN trade for all ASEAN countries, except for Brunei and Myanmar.

Table 2 : Intra-ASEAN export (1995 - 2001).

		Brunei	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Singapore	Thailand	Total
<i>(Value in Million US \$)</i>										
1995	Total	2770.98	N/A	45417.98	67147.82	N/A	17394.19	104618.69	59347.01	296696.69
	Intra-ASEAN (In value)	529.66	N/A	6475.86	18435.59	N/A	2357.51	31770.69	10609.57	70178.88
	Intra-ASEAN (%)	19	N/A	14	27	N/A	14	30	18	24
1996	Total	2493.25	N/A	53844.52	74246.66	N/A	19533.01	117349.38	55894.70	323361.52
	Intra-ASEAN (In value)	446.38	N/A	8310.13	22693.95	N/A	2970.33	34441.43	12111.50	80973.73
	Intra-ASEAN (%)	18	N/A	15	31	N/A	15	29	22	25
1997	Total	2714.16	N/A	51274.31	77457.64	N/A	25227.70	128174.29	57822.03	342670.14
	Intra-ASEAN (In value)	496.42	N/A	8850.95	23248.72	N/A	3436.16	35793.85	13525.72	85351.82
	Intra-ASEAN (%)	18	N/A	17	30	N/A	14	28	23	25
1998	Total	1923.65	N/A	48847.64	77098.63	N/A	29496.35	109802.92	49481.58	316650.78
	Intra-ASEAN (In value)	220.83	N/A	9346.73	21611.41	N/A	3821.03	25998.24	8314.67	69312.91
	Intra-ASEAN (%)	11	N/A	19	28	N/A	13	24	17	22
1999	Total	2340.66	N/A	48665.45	84287.91	738.04	35036.89	114625.14	56110.88	341804.98
	Intra-ASEAN (In value)	375.14	N/A	8278.31	21885.04	236.81	4989.13	29269.34	9901.92	74935.68
	Intra-ASEAN (%)	16	N/A	17	26	32	14	26	18	22
2000	Total	2169.15	1367.53	62124.02	98154.48	1193.85	38078.25	138352.46	69254.04	410693.78
	Intra-ASEAN (In value)	639.49	76.03	10883.68	24408.64	393.46	5982.57	37783.96	15099.70	95267.54
	Intra-ASEAN (%)	29	6	18	25	33	16	27	22	23
2001	Total	3530.45	1495.09	56317.62	88031.61	2218.37	32150.20	121686.82	65117.83	370547.98
	Intra-ASEAN (In value)	774.81	72.57	9507.07	21024.15	951.27	4986.04	32815.39	14356.59	84487.90
	Intra-ASEAN (%)	22	5	17	24	43	15	27	22	22

Note : N/A means data not available

Source : ASEAN secretariat.

From 1995 to 2001, Singapore is the main intra-ASEAN exporter, to be followed by Malaysia and third Thailand, except for 1998, where Thailand's economy was badly hit during the 1997/1998 financial crisis. In 1998, Indonesia came in third and Thailand fourth. Table 2 provides the figures for intra-ASEAN export for all ASEAN countries, except for Vietnam and Laos, for the period from 1995 to 2001.

As for imports, Singapore remained as the main intra-ASEAN importer since 1995 up to 2001, to be followed by Malaysia and third Thailand. Table 3 provides the figures

for intra-ASEAN import for all ASEAN countries, except for Vietnam and Laos, for the period from 1995 to 2001.

Therefore, realising the diverse social and cultural background as well as the level of economic development among nations the Southeast Asian region, three supporting bodies were established within ASEAN to expedite the formation of an ASEAN community. One is the ASEAN Security Community (ASC), formed to bring about greater ASEAN political and security co-operation in a just, democratic and harmonious environment. Two, is the ASEAN Socio-Cultural Community (ASCC) that aims to promote human development and establishing a community of caring societies. Finally, it's the ASEAN Economic Community (AEC). AEC aims to be a single market and production base of free movement of goods, services, investment and capital in ASEAN by 2020.

Table 3: Intra-ASEAN import (1995 - 2001).

		Brunei	Cambodia	Indonesia	Malaysia	Myanmar	Philippines	Singapore	Thailand	Total
(Value in Million US \$)										
1995	Total	2132.66	N/A	40654.13	71439.9	N/A	21639.95	110115	72572.8	318554.8
	Intra-ASEAN (In value)	1013.02	N/A	4218.95	12522.58	N/A	2489.13	24537.6	8820.75	53602.06
	Intra-ASEAN (%)	47.50	N/A	10.38	17.53	N/A	11.50	22.28	12.15	16.83
1996	Total	4434.84	N/A	46618.48	75303.1	N/A	28392.56	123411	72445.58	350606.2
	Intra-ASEAN (In value)	2848.6	N/A	5549.04	14682.33	N/A	4011.81	27362.2	9757.22	64211.19
	Intra-ASEAN (%)	64.23	N/A	11.90	19.50	N/A	14.13	22.17	13.47	18.31
1997	Total	2310.69	N/A	41679.79	76988.3	N/A	35932.51	135972	63087.78	355971.8
	Intra-ASEAN (In value)	976.75	N/A	5413.05	14840.08	N/A	4872.82	30396.9	8121.65	64621.23
	Intra-ASEAN (%)	42.27	N/A	12.99	19.28	N/A	13.56	22.36	12.87	18.15
1998	Total	1276.25	N/A	27336.87	60976.5	N/A	29659.89	101495	38711.55	259456.9
	Intra-ASEAN (In value)	591.07	N/A	4559.23	12940.02	N/A	4428.89	23647.6	5438.07	51604.9
	Intra-ASEAN (%)	46.3	N/A	16.7	21.2	N/A	14.9	23.3	14.0	19.9
1999	Total	1720.35	N/A	24003.28	63677.8	1883	30742.46	110998	48318.01	281342.87
	Intra-ASEAN (In value)	895.62	N/A	4783.57	12412.84	1038.64	4461.01	26241.0	7987.39	57820.049
	Intra-ASEAN (%)	52.1	N/A	19.9	19.5	55.2	14.5	23.6	16.5	20.6
2000	Total	1067.61	1404.59	33514.81	79647.5	2219.4	31387.4	134680	61905.7	345827.1
	Intra-ASEAN (In value)	534.35	549.14	6781.21	15934.85	1113.29	4955.44	33291.3	10475.89	73635.48
	Intra-ASEAN (%)	50.1	39.1	20.2	20.0	50.2	15.8	24.7	16.9	21.3
2001	Total	1309.97	1501.99	50962.14	73097.9	2811	29550.8	115919	62072.29	337225.1
	Intra-ASEAN (In value)	544.79	1091.72	5726.81	15254.3	1319.18	4664.79	28991.0	10046.96	67639.54
	Intra-ASEAN (%)	41.6	72.7	11.2	20.9	46.9	15.8	25.0	16.2	20.1

Note : N/A means data not available

Source : ASEAN secretariat.

The AEC carries out strategic steps to broaden and deepen liberalisation of trade in goods, services and investment, as well as mobility of resources such as capital and skilled labour within the Southeast Asian region. Specifically, the AEC's support for economic integration began with the introduction of "Preferential Trading Arrangement" that encourages intra-regional trade and wider economic space while remaining committed to multilateral trading system. AEC indicates ASEAN's commitment to remain open and outward looking.

Secondly, AEC ascertains bilateral and collective free-trade arrangements and facilitates ASEAN's current efforts in establishing closer economic ties with its neighbours like China, Japan, South Korea and India, as well as with other economic giants like the US and the EU. Thirdly, AEC promotes community and regional identity among Southeast Asia and maintain regional stability. This is part of ASEAN's contribution to promote peace and security in the broader Asia Pacific region. Finally, AEC encourages intergovernmental and co-operation mechanism of all ASEAN member countries.

South Asian Association for Regional Co-operation (SAARC)

In contrast to ASEAN, the South Asian Association for Regional co-operation (SAARC) that was set up in 1985, has similar cultural background and socio-economic condition. Although member nations of the SAARC are relatively poor, the feasibility to form an economic bloc is rather unique. This is due to the fact that intra-SAARC trade were quite small due to its low level of industrialisation of member countries and unexplored trade opportunities. Integration of South Asian markets by agreeing to institute a mechanism for expanding trade will provide a better basis for industrialisation and unexplored trade, leading to faster expansion of trade and other linkages among themselves (Hassan, 2001). As such, SAARC has boldly announced their deadline to form a common currency union by 2010, a considerably challenging quest.

Within the SAARC member nations, India has the most population of 1.055 billion people, to be followed by Maldives of 280.05 million people, Pakistan 143.71 million people and Bangladesh 131.2 million people in 2002. In contrast to most popular believe, SAARC are not all agricultural-based economies.

The output structures of South Asian countries are largely service based, except for Bhutan and Nepal. Bhutan is gradually reducing its agriculture sector, expanding progressively on its industrial and service sector. The contribution of its agriculture

sector measured as the percentage of GDP at market prices was 43%, 40% and 33% in 1990, 1995 and 2002 respectively. Bhutan's industrial sector made up of 25%, 34% and 37% of its GDP in 1990, 1995 and 2002, respectively.

As for Nepal, the economy is shifting from an agricultural based to a service based economy. Its agriculture sector consists of 51%, 41% and 40% of its total GDP at market prices for 1990, 1995 and 2002 respectively. Nepal's service sector's contribution towards GDP was 34%, 37% and 40% for 1990, 1995 and 2002 respectively.

Except for Maldives, where data for 2000 were unavailable, external debt measured as the percentage of gross national income (GNI) for Bangladesh, India, Nepal and Sri Lanka had reduced since 1995. Bangladesh's external debt was 42% of GNI in 1995, as compared to 32.8% in 2000; Nepal's 53.7% in 1995, and 46.7% in 2000; Sri Lanka's 64.99% in 1995 and 52.4% in 2000. However, Bhutan and Pakistan's external debt measured as the percentage of GNI has increased in 2000 as compared to 1995. Bhutan's external debt has increased from 34.55% of GNI in 1995 to 48.46% in 2000. Pakistan's external debt was 49.45% of GNI in 1995 as compared to 55.4% in 2000. Some key information on SAARC is provided in Table 4.

Gulf Co-operation Council (GCC)

The optimum currency area criteria are related to decisions on economic integration, so that the desirability of a monetary union becomes a function of the underlying political choices. That is why economic unions generally correspond to national borders. The political commitment to establish further economic co-operation is an important criterion for a monetary union (Bayoumi *et al.*, 2000).

Table 4 : Key Indicators of SAARC.

Country	Year	Population (Million)	Structure of output, % of GDP at market prices			External Debt as % of GNI
			Agriculture	Industry	Services	
Bangladesh	1990	108.70	29.4	20.9	49.7	41.50
	1995	119.90	25.3	23.6	51.1	42.00
	2002	131.20	21.9	25.5	52.6	32.80
Bhutan	1990	-	43.0	25.0	32.0	29.33
	1995	0.58	40.0	34.0	27.0	34.55
	2002	-	33.0	37.0	31.0	48.46
India	1990	835.13	31.0	29.3	39.7	26.70
	1995	921.99	28.4	28.0	43.6	26.80
	2002	1055.00	25.0	25.9	49.1	20.50
Maldives	1990	0.214	N/A	N/A	N/A	40.20
	1995	0.245	N/A	N/A	N/A	43.70
	2002	0.281	N/A	N/A	N/A	N/A
Nepal	1990	18.11	51.0	16.0	34.0	44.40
	1995	20.34	41.0	22.0	37.0	53.70
	2002	23.67	40.0	21.0	40.0	46.70
Pakistan	1990	108.04	26.0	25.2	48.8	52.92
	1995	122.36	26.1	23.8	50.1	49.45
	2002	143.71	24.2	22.4	53.4	55.40
Sri Lanka	1990	17.02	22.9	27.3	49.8	74.50
	1995	17.25	19.0	28.0	53.0	64.90
	2002	19.01	20.1	26.3	53.6	52.40

Note : N/A means data not available

Source : Asian Development Bank Key Statistics 2003.

However, that was not the case for GCC. GCC was initially a military alliance among the oil-rich Arab countries. It was not until recently that GCC, being the main oil producers and exporters, began to reformulate their stance. Since any adverse economic shocks that relate to transportation and oil prices are directly transmitted to these wealthy GCC economies, economic co-operation among GCC is necessary.

Information on the structure of output for the United Arab Emirates (UAE) was unavailable. However, based on the information of all the other members of GCC illustrated in Table 5, it was obvious that none are agricultural based economies. The output structure for Bahrain and Oman were largely derived from the service sector while Saudi Arabia, Qatar and Kuwait were mainly from the industrial, mainly oil and oil related production, sector.

Ignoring the amount of exports of petroleum by UAE, Saudi Arabia is the main intra-GCC exporter, as well as exports to the EU, US and Japan. Saudi Arabia's intra-GCC, EU, US and Japan export was 3.9 billion US dollars, 10.8 billion US dollars, 12.4 billion US dollars and 10.4 billion US dollars for 2001, respectively. Oman came in second, in terms intra-GCC exports with 1.031 billion US dollars of exports in 2001, to be followed by Bahrain, with 523.9 million US dollars of intra-GCC exports and fourth Qatar, with 337.5 million US dollars.

The amount of total exports is highest for Saudi Arabia, exporting approximately 68 billion US dollars of goods and services in 2001. Second in line was UAE with 48.8 billion US dollars of exports and third Kuwait, with 16.2 billion US dollars of exports for 2001. As for imports, UAE's imports of approximately 37.3 billion US dollars was the highest among the GCC member nations, second was Saudi Arabia with 10.44 billion US dollars of imports and third Kuwait, with 7.87 billion US dollars of imports.

Economic Co-operation Organisation (ECO)

ECO members largely consists of nations from the New Independent States (NIS) of the former USSR. Data on the background of some of countries like Tajikistan and Uzbekistan are unavailable. However, based on the information gathered, the percentage of output structure of GDP for Azerbaijan and Turkmenistan are largely contributed by the industrial sector while Kazakhstan, Turkey, Pakistan and Iran are largely service based economies. Table 6 revealed the output structure for Azerbaijan in 2001 was 15.2% agricultural, 49.5% industrial and 35.3% services, while Turkmenistan was 22.5% agricultural, 42.4% industrial and 35.1% services.

Table 5 : Key Indicators of GCC.

Country	Year	Population (Million)	Structure of output, % of GDP at market prices			Direction of Export (in Million US \$)				Total Import (Mn US\$)	Total Export (Mn US\$)
			Agriculture	Industry	Services	GCC	EU	US	Japan		
UAE	1999	3.03	N/A	N/A	N/A	294.2*	344.7*	119.7*	143.4*	31,720.0	36,495.0
	2000	3.25	N/A	N/A	N/A	270.1*	381.88	174.8*	155.9*	35,009.0	49,878.0
	2001	3.49	N/A	N/A	N/A	314.7	339.6*	157.8*	122.6*	37,293.0	48,773.0
Bahrain	1999	0.62	0.9	36.6	62.5	531.9	148.9	260.6	74.5	3,698.0	4,363.0
	2000	0.64	0.7	44.5	54.8	428.7	141.0	375.0	93.1	4,634.0	6,195.0
	2001	0.65	0.7	42.3	57.0	523.9	138.3	454.8	61.2	4,263.0	5,545.0
Saudi Arab	1999	21.33	5.8	45.6	48.6	3554.6	8,488.4	9,929.2	7,609.1	28,011.0	50,757.0
	2000	22.01	5.0	54.3	40.7	4,270.2	13,485.2	15,709.5	12,302.8	30,238.0	77,584.0
	2001	22.69	5.3	53.1	41.6	3,941.4	10780.7	12,411.8	10,440.3	31,223.0	68,064.0
Oman	1999	2.33	3.1	45.3	51.8	8,84.1	126.6	86.4	7.1	4,674.0	7,239.0
	2000	2.40	3.0	44.7	52.4	1,003.1	138.8	107.0	7.5	5,040.0	11,319.0
	2001	2.48	3.0	44.3	52.6	1,031.1	129.5	98.5	7.5	5,798.0	11,074.0
Qatar	1999	0.56	0.6	59.1	40.3	637.1	74.2	250.5	1,105.8	N/A	7,214.0
	2000	0.58	0.4	70.7	28.9	578.4	77.2	354.2	1,489.0	N/A	11,594.0
	2001	0.60	0.4	69.4	30.2	337.5	79.2	378.8	2,010.1	N/A	871.0
Kuwait	1999	1.48	0.5	63.4	36.2	305.5	105.1	54.7	13.2	7,616.0	12,276.0
	2000	1.40	0.4	64.3	35.2	306.5	150.3	46.7	18.5	7,157.0	19,478.0
	2001	1.39	0.5	63.4	36.2	254.7	276.2	14.8	8.6	7,869.0	16,167.0

Note : * Excluding petroleum

Sources : 1. Economic Intelligence Unit

2. GCC Secretariat

For the same year, output structure for Kazakhstan was 7.8% agricultural, 35.5% industrial and 56.6% services; Turkey was 11.9% agricultural, 29.5% industrial and 58.5% services; Pakistan was 24.2% agricultural, 22.4% industrial and 53.4% services; and Iran was 11.8% agricultural, 38% industrial and 50.2% services. Afghanistan and Kyrgyzstan's output structure was contributed largely by its agriculture sector. Afghanistan's output structure was 52% agricultural, 24% industrial and 23.9%

services for 2001 and, output structure for Kyrgyzstan was 38.6% agricultural, 24.9% industrial and 36.5% services.

Regional integration of ECO is motivated by internal processes such as high levels of intra-regional trade leading to integration, reaction to geopolitical shifts, and problem solving efforts by politicians resulting in co-operation through spill-over dynamics.

Table 6 : Key Indicators of ECO.

Country	Year	Population (Million)	Structure of output, % of GDP at market prices			External Debt as % of GDP
			Agriculture	Industry	Services	
Afghanistan	1990	17.30	35.7	23.7	40.6	140.42
	1995	19.10	65.7	10.5	23.8	172.64
	2002	21.80	52.0	24.1	23.9	N/A
Azerbaijan	1990	7.18	30.8	30.8	38.4	N/A
	1995	7.69	27.3	33.6	39.1	9.47
	2002	8.17	15.2	49.5	35.3	23.33
Kazakhstan	1990	16.35	41.8	37.0	21.2	N/A
	1995	15.82	12.3	30.0	57.7	14.17
	2002	14.85	7.9	35.5	56.6	67.88
Kyrgyz	1990	4.34	33.6	35.0	31.4	N/A
	1995	4.62	43.9	19.5	36.6	41.84
	2002	4.98	38.6	24.9	36.5	117.61
Tajikistan	1990	5.30	N/A	N/A	N/A	N/A
	1995	5.84	N/A	N/A	N/A	28.18
	2002	6.44	N/A	N/A	N/A	105.86
Turkmenistan	1990	3.76	N/A	N/A	N/A	N/A
	1995	4.53	16.1	58.6	25.3	9.21
	2002	5.79	22.5	42.4	35.1	N/A
Uzbekistan	1990	20.52	N/A	N/A	N/A	N/A
	1995	22.79	N/A	N/A	N/A	5.20
	2002	25.37	N/A	N/A	N/A	N/A
Turkey	1990	57.59	17.5	31.8	49.8	N/A
	1995	63.07	15.7	31.8	52.3	N/A
	2002	70.29	11.9	29.5	58.5	N/A
Pakistan	1990	108.04	26.0	25.2	48.8	52.92
	1995	122.36	26.1	23.8	50.1	49.45
	2002	143.71	24.2	22.4	53.4	55.40
Iran	1990	56.70	18.6	28.6	53.5	17.70
	1995	62.38	17.7	35.8	47.3	38.00
	2002	68.07	11.8	38.0	50.2	8.10

Note : N/A means data not available

Sources : 1. Asian Development Bank Key Statistics 2003

2. Economic Intelligence Unit

Motivation

If Euro took more than 50 years to materialise, it is hard to say how long it will take the Asian economies, or perhaps a sub-group of Asian economies, to be integrated. That is to say, the targeted date of 2010 for SAARC and GCC to adopt a common currency, which is in about 6 years' time from now, is rather far-fetched. Not to mention ASEAN's aspiration to be a fully integrated economy by 2020, this is only about 16 years from now. The achievability and sincerity of each economic bloc, with regards to these targeted dates are doubtful.

Are Asian countries really intergratable? Besides having a diverse economic, social and geographical background, we do not know which Asian economies are compatible to form a union, when should they form a union, and which economies should not form a union, at least not now. What we know is that it is necessary for member states to exhibit a strong fundamental relationship that binds them together in order to form an effective economic bloc.

The motivation of this study is to address issues with regards to a diverse economic background of ASEAN, ECO, GCC and SAARC, in the context of the theory of optimum currency area as the benchmark for forming an Asian-wide economic union and to provide empirical evidences that support for regional integration.

Asian Economic Integration: A Survey of Empirical Evidence

Economic integration is an effort of constituting policies to reduce or eliminate trade barriers among nations joining together to form a union (Salvatore, 2004). Economic integration occurs when several countries form a group in order to discriminate between economic units belonging to different member nations and promoting various economic and political activities to benefit citizens of member countries (Balassa, 1961). The degree of economic integration, however, ranges from establishing free trade areas, customs unions, common markets, economic and political unification among member nations.

The loosest degree of economic integration is in the form of reduced trade barriers established among two or more nations to form a *free trade area*. Example of such trade arrangements include the European Free Trade Association (EFTA) formed in 1960 by the UK, Austria, Denmark, Norway, Portugal, Sweden and Switzerland; the North America Free Trade Agreement (NAFTA) formed in 1993 by the US, Canada and Mexico; the ASEAN Free Trade Area, commonly known as AFTA formed in 1992; as well as the SAARC Preferential Trading Arrangement, formalised as the South Asian Free Trade Area (SAFTA) in 1998. From a free trade area, a *custom union* is formed

when member nations begin to harmonise trade policies toward the rest of the world to create a duty-free economic zone. An example of a custom union is the European Common Market (ECM) formed by West Germany, France, Italy, Belgium, the Netherlands and Luxembourg in 1957. A matured custom union provides the foundation for the formation of a *common market* where a high degree of free trade movement of labour and capital among member nations occurs. The ECM achieved the status of a common market in 1993.

Economic integration also relates to the integration of commodity market, financial market (Coleman, 1999; O'Neill, 2002) and labour market (O'Neill, 2002). In a more advance stage of economic integration of an *economic union*, monetary and fiscal policies of member states are harmonised and unified (Salvatore, 2004). Therefore the adoption of a common currency is only part of the preparation for a wider scope of economic integration.

Next, in this chapter, a brief discussion on the background of EU, ASEAN, ECO, GCC and SAARC will be provided. This is followed by a brief account on the Optimum Currency Area (OCA) Theory and review of some studies relating to OCA. A discussion on studies related to examining economic integration in Europe, the Middle East and Asia will end the review of past literatures.

Background on Economic Blocs

The World Bank has classified economies based on gross national income (GNI) per capita, as well as geographical regions and levels of external debt. Economies are classified as low income, lower and upper middle income, as well as high income. The low and middle-income economies are also known as developing economies (The World Bank, 2003). Based on the World Development Indicators (2000), there are four main groups of economic blocs, namely, the Asia Pacific, European and North American bloc, the Latin American and the Caribbean, African, as well as the Asian economic blocs.

The Asia Pacific, Europe and North American economic blocs consists of the *Asia Pacific Economic Co-operation (APEC)*, *European Union (EU)* and the *North American Free Trade Association (NAFTA)*. The Latin American and the Caribbean blocs have the *Andean Group*, the *Central American Common Market (CACM)*, the *Caribbean Community (CARICOM)*, the *Latin American Integration Association (LAIA)*, the *Southern Common Market (MERCOSUR)*, and the *Organisation of Eastern Caribbean States (OECS)*. As for the African economic blocs, there are the *Economic and Monetary Community of Central Africa (CEMAC)*, the *Economic Community of the Great Lakes Countries (CEPGL)*, the *Common Market for Eastern and Southern Africa (COMESA)*, the *Economic Community of Central African States (ECCAS)*, the *Economic Community of West African States (ECOWAS)*, the *Mano*

River Union (MRU), the Southern African Development Community (SADC), the West African Economic and Monetary Union (UEMOA) and the Arab Maghreb Union (AMU). bloc. Lastly, the official economic organisation in Asia is the Association of Southeast Asian Nation (ASEAN), the Economic Co-operation Organisation (ECO), the Gulf Co-operation Council (GCC), the South Asian Association for Regional Co-operation (SAARC).

The European Union (EU)

The European Union, (EU) was set up in 1950 where six countries, namely, Belgium, Germany, France, Italy, Luxembourg and the Netherlands were the initial members. As at date, the EU has 25 member states (Denmark, Ireland and the United Kingdom joined the EU in 1973; Greece in 1981; Spain and Portugal in 1986; Austria, Finland and Sweden in 1995, Poland, Czech Republic, Hungary, Slovakia, Lithuania, Latvia, Slovenia, Estonia, Cyprus and Malta, joined on 1 May 2004).

The EU seeks to establish social, economic and to some extent, political co-operation for the benefit of all member countries. The EU is run by five institutions. They are the *European Parliament* (elected by the peoples of the member states); the *Council of the Union* (composed of the governments of the member states); the *European Commission* (the driving force and executive body); the *Court of Justice* (comply with the law); and the *Court of Auditors* (sound and lawful management of the EU budget). Besides that, there are another five bodies that are part of the institutional system. They are the *European Economic and Social Committee* which expresses the opinions of organised civil society on economic and social issues; the *Committee of the Regions* which expresses the opinions of regional and local authorities on regional policy, environment, and education; the *European Ombudsman* which deals with complaints from citizens concerning mal-administration by an EU institution or body; the *European Investment Bank* which contributes to EU objectives by financing public and private long-term investments; and the *European Central Bank* which is responsible for monetary policy and foreign exchange operations.

The Association of Southeast Asian Nation (ASEAN)

Five countries, namely, Indonesia, Malaysia, Philippines, Singapore, and Thailand, initially established the Association of Southeast Asian Nations or ASEAN on 8 August 1967 in Bangkok. Brunei Darussalam joined on 8 January 1984, Vietnam on 28 July 1995, Laos and Myanmar on 23 July 1997, and Cambodia on 30 April 1999.

ASEAN was set up to accelerate economic growth, social progress and cultural development in the Southeast region through economic and political co-operation. The Framework Agreement on enhancing economic co-operation was adopted at the fourth ASEAN summit in Singapore in 1992, which included the launching of a scheme towards an ASEAN Free Trade Area, commonly known as AFTA. The strategic objective of AFTA is to increase the ASEAN region's competitive advantage as a single production unit. The elimination of tariff and non-tariff barriers among the member countries is expected to promote greater economic efficiency, productivity, and competitiveness. The fifth ASEAN summit held in Bangkok in 1995 adopted the agenda for greater economic integration to accelerate the realisation of AFTA from the original 15 years time frame to 10 years, that is in 2005.

The highest decision-making organ of ASEAN is the Meeting of the ASEAN Heads of State and Government. The ASEAN Summit is convened every year. The ASEAN Ministerial Meeting (Foreign Ministers) is held on an annual basis to discuss on economics and social issues affecting the region. ASEAN maintains contact with several other economic organisations, namely, the Economic Co-operation Organisation, the Gulf Co-operation Council, the South Asian Association for Regional Co-operation, and the South Pacific Forum (ASEAN, 2003).

The South Asian Association for Regional Co-operation (SAARC).

The SAARC comprises of seven South Asian countries, namely Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka. SAARC was established in 1985 to hold periodic, regional-level consultations among countries in South Asia on matters of mutual interest and possible social, cultural and economic co-operation. The rationale of such co-operation was due to successful regional outcome experienced elsewhere in the world, like the EU, NAFTA and arguably, ASEAN.

The objectives of SAARC are to promote economic growth and social welfare of the peoples of South Asia. The highest authority of SAARC rests with the Heads of State or Government, who meet annually at Summit level. To date, eleven meetings of the Heads of State or Government have been held within the region. Economic co-operation of SAARC is based on respect for the principles of sovereign equality, territorial integrity, political independence, non-interference in the internal affairs of other states and mutual benefit among member countries (SAARC, 2002).

The Committee on Economic Co-operation (CEC) comprising Commerce or Trade Secretaries of the SAARC member nations was mandated to formulate and oversee implementation of policies, to enhance intra-regional trade and economic co-operations among SAARC members. Among others, CEC is to provide recommendations and guidance on standards and policies with regards to *South Asian*

Free Trade Area (SAFTA), which was formalised in the Tenth Summit held in Colombo, 1998.

The Economic Co-operation Organisation (ECO)

Regional Co-operation for Development, RDC was formed in 1964 between Iran, Pakistan and Turkey to increase trade by elimination of trade barriers and other economic co-operation such as tourism, transportation and communication. RDC was dormant for several years, especially due to the Iran-Iraq war. In 1985, RDC was renamed ECO with a new set of objectives to promote economic, technical and cultural co-operation among its members. In 1992, seven other members, namely, Afghanistan, Azerbaijan, Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan joined the ECO (The Secretariat of ECO, 2001).

The present regional integration is based upon unilateral trade liberalisation with regards to the WTO principles. Given the limited resources which ECO members are prepared to devote to preferential tariff reduction and the establishment of common institutions, ECO will have to focus on other means of promoting integration. One recommendation is the ASEAN model of the 1980s and 1990s multilateral non-preferential trade liberalisation fits the current development strategy of ECO members (Pomfret, 1997). The positive point drawn from the Singapore-Riau-Johore experience is that intra-regional trade can flourish if the obstacles of trade are lowered, for instance, the liberalisation of goods and factor flows across the borders of Malaysia and Indonesia on a multilateral rather than a preferential basis. Other similar co-operation that would facilitate trade among member nations includes simplification of visa requirements, special arrangements among customs and immigration officials. Other than trade facilitation, transport projects, trade liberalisation and co-operating with other organisation remains top priority of ECO.

The Gulf Co-operation Council (GCC)

At present, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates are members of GCC. Unlike ASEAN, SAARC, ECO and other regional blocs, the formation of GCC was not due to a shared vision of unity. Being located within the same region in the Middle East, members of GCC are some of the richest oil producing nations in the world. Unfortunately, they have long histories of regional tensions and persistent obstacles to co-operation. The formation of GCC was initially in response to perceived regional security threats. It was the external economic forces like global oil price fluctuations and the loss of international trading opportunities, especially from rising protection tendencies of EU, that forced economic co-operation among members of GCC (Cammatt, 1999).

There were several issues that dominated the GCC agenda in the quest for enhanced economic security through regional integration. Firstly, GCC emphasised on co-ordination of industrial development to reduce oil dependence and excessive exposure to international economic shock. In this case, GCC has established a free trade area. Secondly, to seek long-term goal of a regional custom union and set external tariff levels. Thirdly, GCC will co-ordinate oil pricing and production policies to compensate for the lack of unity in Organisation of Petroleum Exporting Countries (OPEC), (Cammett, 1999). In addition, GCC countries share several similar characteristics, namely, all member countries are mainly oil producers, dependent on oil exports, share a common language, enjoy high living standards and have relatively stable currencies and price levels. These are existing elements essential for a successful economic union (Abed *et al.*, 2003).

Earlier views of Theory of Optimum Currency Area (OCA)

It would be inappropriate to analyse economic integration without prior review on the Theory of Optimum Currency Area. The theory is concerned with optimising a region's economy with countries within the region giving up their own independent currency in order to form a monetary integration with another to share a common currency. Being part of international macroeconomic theory, the OCA theory was extensively discussed by Mundell (1961).

In international trade, the use of different currencies with different values results in imbalances in a country's balance of payment. As such, currency can be a policy tool to offset imbalances in the balance of payment when it is allowed to appreciate and depreciate in value relative to other currencies. However, a small economy sometimes finds it difficult to allow its currency to float freely in the money market. Currency depreciation may increase the country's export and improves its balance of trade but, a small economy may not be able to sustain the pressure of deteriorating value of its currency before it is stabilised again. Depreciation of domestic currency will reduce the purchasing power of locals while enhancing that of foreigners. As such, many smaller economies, like Malaysia opt to maintain a fixed exchange rate where their currency is pegged to another, usually USD. If that is the case, should all small nation adopt a fixed exchange rate to stabilise the value of their currency?

Mundell (1961) proposed that monetary union should be formed within a fixed exchange rate regime where nations within a region will share a common, fixed, currency. The formation of monetary union also means that a larger currency area will have a larger exchange market for the common currency. This is an advantage because currency speculation and volatility will be reduced. Reserves for participating nations in the monetary integration could also be pooled together to maintain a fixed and stable exchange rates. The criterion that the region should possess to form an

OCA is to have sufficient *inter-regional labour mobility* that will take over the role of flexible exchange rate to correct any imbalances in the balance of trade. Mundell argued that labour mobility between countries that are participating in a monetary union would be able to mitigate any negative asymmetric shocks, previously absorbed by the flexible exchange rate (Bayoumi and Eichengreen, 1997).

In response to Mundell's (1961) inferences, McKinnon (1963) argued that labour mobility is necessary but insufficient condition for an OCA. McKinnon introduced a second criterion to the OCA theory namely, the *openness of an economy (or trade)*. The openness of an economy can be measured by the ratio of tradable goods to non-tradable goods. According to McKinnon (1963), the more open the prospective member nations are to each other, the more the incentive they have to form an OCA. McKinnon reasoned that a larger country would be more diversified in its production and therefore, is less dependant on imports and exports. Meaning, the larger the economy, the less open it would be. As a result, a larger economy would be self-sufficient and have less incentive to peg its currency to another or enter into a monetary union. Only a small country's economy will be more open, and therefore, be willing to peg its currency to another and enter into a monetary union (Bayoumi and Eichengreen, 1997).

Both Mundell and McKinnon agreed on the notion that smaller economy will have more incentive to enter into a fixed exchange rate regime and thus, enter into a monetary union. However, Kenen (1969) proposed that the study of OCA should focus on *product diversification* instead, where an economy with a high degree of diversification will be less affected by any adverse economic shock than an economy with a low degree of diversification. Kenen (1969) reasoned that as the degree of diversification increases, any negative economic shocks will affect products that make up of a smaller share of total exports. The more diversified the economy is, the less pronounced the effects of a shock and the less the economy is dependent on the exchange rate policy tool for stabilisation. Therefore, it would be appropriate for a well diversified economy to adopt the fixed exchange rate for a well-diversified economy and form a monetary union (Bayoumi and Eichengreen, 1997).

In summary, Mundell (1961), McKinnon(1963) and Kenen (1969) all agreed that countries that were less dependent on exchange rate as a policy tool would be a more favourable OCA. Mundell proposed factor (labour) mobility to take over the role of exchange rate to stabilise the economy. On the other hand, McKinnon suggested that smaller economies that are more open to trade should form a monetary union because they are more vulnerable to economic shocks transmitted to trade. Kenen (1969) further supports McKinnon's view by saying that less diversified economies will be more likely to be affected by economic shocks because each product produced constitutes a larger percentage of the total trade.

These early OCA theory provides a theoretical basis from which the formation of monetary integration is examined, although they did not provide a comprehensive framework in determination of whether one country should join a monetary union or otherwise. It is also not an easy task to formulate Mundell's labour mobility criterion, let alone to model and measure the degree of economic integration. Most researchers agreed that the degree of integration and openness of the economy are two basic criteria of an OCA. A high degree of integration and openness will encourage extensive trade among economies. A high volume of intra-regional trade will act as a shock transmitter, necessitate economic co-operation (Trivisvavet, 2001).

In recent studies, more criteria were introduced and other measures were designed to test the compliance of OCA theory among countries wanting to form a common currency.

Recent Studies with Regards to OCA Criteria

In the span of the last two decades, OCA properties were reviewed but there was still no "one" simple clear cut OCA-test to operationalised all OCA criteria at one go. Most studies re-tested the existing criteria while others proposed additional criteria complementing the existing OCA properties. Research on OCA that examined the impact of removing geographical borders to create a free trade zone, a custom union, a common market, as well as sharing of a single currency on trade and overall economic integration found more criteria that complements the earlier OCA criteria (Mongelli, 2002). They include trade intensity, measured through export and trade; price integration, validated by the generalised purchasing power parity, as well as the fiscal policy (proxied by government debt and budget deficit) and monetary policy (proxied by M1, M2, interest rates and monetary bases) co-ordination. Some studies focused on the analysis of business cycle synchronisation or co-movement of macroeconomic aggregates such as output, inflation and employment.

Kose and Engel (2002) examined if existing currency unions replicate the desired features of OCA set by Mundell (1961). Annual data of 210 countries that are or have been members of international currency unions for the sampling period between 1960 to 1996, were extracted from the World Bank Development Indicators (WDI) CD ROM. Kose and Engel was interested in examining the currency unions, namely the CFA Franc Zone and the East Carribean Currency Area, and not the political union formed by the United States, France and the United Kingdom, with sovereign monies.

Firstly, Kose and Engel wanted to know if currency unions were more open than countries with their own currency, since both exports and imports were expected to be larger as the percentage of GDP. Secondly, production structures were compared to check for the level of specialisation. More specialisation and fewer export goods were expected of currency union countries because of their small economic sizes. Thirdly,

trade integration was examined using a gravity model to measure bilateral trade between two countries by employing distance, income yields, and country trade flows. Bilateral trade should be higher for countries of a potential OCA. Next, Kose and Engel (2002) examined the price integration criterion where real exchange rates in currency unions were deemed more stable because they converged more quickly and had lower short run volatility. Finally, business cycle synchronisation was analysed.

Since countries with highly synchronised business cycles forgo little monetary independence if they shared a common currency, highly synchronised business cycles will have better potentials to adopt a common currency. Kose and Engel estimated the correlation between detrended real GDP for country *i* and detrended real GDP for country *j*. From their empirical findings, they concluded that members of international currency tend to experience more trade, less volatile exchange rate, and experienced more synchronised business cycles than countries with their own currency.

However, Kenen (1969) argued that the increase in trade linkages would increase production specialisation and reduced synchronisation of business cycles, especially when industrial-specific technology shocks occurred (Kenen, 1969). Frankel and Rose (1998) further explained that when intra-industry trade was more prominent than inter-industry trade, business cycles would be more positively correlated as trade becomes more integrated. Nevertheless, Choe (2001) contested that economic fluctuation would likely increase as economies are trade interdependent. As such, Shin and Wang (2003) attempted to clarify these contradicting results by studying the *trade integration and business cycle synchronisation* in five East Asia countries (China, Hong Kong, Japan, Korea, Taiwan), five Southeast Asia countries (Indonesia, Malaysia, Singapore, Philippines, Thailand) and two South Asian countries (Bangladesh, India). Annual data are obtained for sampling period between 1976 and 1997 from the International Monetary Fund, International Financial Statistics CD-ROM.

Variables used in Shin & Wang's study were real GDP, proxy of macroeconomic aggregate output; ratio of total trade to GDP, proxy for trade intensity; ratio of budget deficit to GDP between country *i* and country *j*, proxy for fiscal policy co-ordination; and M2 growth rate (proxy for monetary policy co-ordination). Empirical finding suggested that increased trade increased the degree of economic integration within region. Business cycle was continuously affected by other economy in Asia and intra-industry trade was the major channel for East Asia economy to synchronise. Therefore, the cost of joining a currency union was reduced when intra-industry trade dominates.

In addition, the openness of an economy can be read in terms of the intensity of trade an economy is involved in. Smaller economies are less diversified and thus more open or dependent on export and import (trade). This means, smaller economies are more vulnerable to exchange rate fluctuations and will be more willing to maintain or peg

its currency to a fixed rate. Their suitability to join an economic union can be determined by analysing the *variability* of the real *exchange rate* (Vaubel, 1976). Vaubel discovered that stable real exchange rates between two countries meant that very few shocks which caused the rates to adjust and thus, the cost of giving up the exchange rate was minimal.

Bayoumi and Eichengreen (1997) supported Vaubel's view and tested on the theory of OCA by analysing the determinants of exchange rate volatility. They reasoned that the variability of real and nominal exchange rates was itself the outcome of the choice of exchange rate regime and as such should contain information of what arrangement to adopt. Bayoumi and Eichengreen (1997) constructed an OCA index based on empirical specification that summarises countries' readiness for European Monetary Union. They measured the importance of trade linkages using data on bilateral trade, computing the average value of exports to the partner country, scaled by GDP for the two countries concerned. The costs of a common currency in terms of macroeconomy policy independence foregone should be balanced against the benefits. Small countries should benefit the most from the unit of account, means of payment, and store of value services provided by a common currency. The benefit from a more stable currency was measured by including the arithmetic average log of real GDP in USD of two countries, as a measure of country size.

The empirical results showed that European countries are divided into three groups, those exhibiting a high level of readiness, those with a tendency to converge and those with little or no evidence of convergence. They also found that France's OCA index did not indicate that the country's structural characteristics and cyclical performance were consistent with a high level of bilateral exchange rate stability. This finding indicated that the desire for monetary unification in France is driven by political rather than economic considerations.

Moreover, Bayoumi and Eichengreen (1997) discovered that countries with single market had led to greatest increased in bilateral trade, experienced the greatest increase (OCA index and) in their readiness for OCA. Economic integration increased countries' readiness for monetary integration and as stable exchange rate encouraged trade, monetary integration led to advancement of economic integration. Intrinsically, European Monetary Union and the Single Market system constitute a revolving circle.

By using the nominal bilateral exchange rates of 21 industrial countries, Bayoumi and Eichengreen (1998) also found that countries with more variable exchange rates are subjected to larger asymmetric shocks. The asymmetric shocks increase exchange rate variability by magnifying exchange rate market pressure. Those with **unstable** rates suffer greatest reduction in transaction value of their domestic currency when their exchange rates vary because they are small in size and are dependent on trade. Therefore, smaller size and trade dependent economies are found to encounter less exchange rate variability, prompting support to the OCA theory.

In a Cobb-Douglas production function analysis, Nadenichek (2000) examines the interaction between output, the real exchange rate and trades in the US and Japan by using a structural vector autoregression. Identification of the cause of the persistent US bilateral trade deficit with Japan is obtained by using long-run restriction generated from a two-country real business cycle model. Monthly data from 1974 : 01 through 1996 : 12 is obtained from Citibase to estimate the model.

Output is found to be driven primarily by permanent productivity innovations. Such innovations generate a depreciation of the real exchange rate and a worsening of trade balance. Nadenichek rationalised that exogenous real exchange rate innovations are important source of relative price and trade movements. An appreciation of the real exchange rate causes an improvement of the trade balance and an increase in output. The continual depreciation of the US real exchange rate is found to be the primary cause of the US bilateral trade deficit with Japan. Any attempt to improve the competitiveness of US goods by encouraging the dollar to depreciate against yen is likely to worsen rather than improve the US trade deficit (Nadenichek, 2000).

On the other hand, the *purchasing power parity (PPP)* theory states that the equilibrium value of an exchange rate is determined by the changes in the relative national price levels. Say the UK price level rose by 5% over a year, while Singapore's price level rose by 3%. The relative PPP predicts that the British pound will depreciate against Singapore dollar by 2%. The 2% depreciation against the Singapore dollar is just sufficient to cancel out the differential in the inflation rates, leaving the relative purchasing power of both UK and Singapore unchanged. In other words, PPP states that exchange rates adjust to reflect differences in price levels across countries.

However, when PPP are applied on empirical studies, it does not hold when bilateral real exchange rates series are not stationary. In the long run, relative PPP states that the change in exchange rate over time is proportional to relative change in the price levels between countries over the same period of time. Relative PPP for a successful currency area suggests that real exchange rates between member countries are stationary to a long run mean or common trend over time (Bernstein, 2000).

Enders and Hurn (1994), proposed the *generalised purchasing power parity*, GPPP hypothesis that recognise bilateral real exchange rates as non-stationary because real fundamental variables are generally non-stationary. If that is the case, then there is a possibility that real fundamental variables of some countries share common trends and real exchange rates may be co-integrated in the long run. When there is a common trend, and exchange rates are co-integrated, there will be at least one stationary linear combination of the real exchange rates. PPP is therefore, just a special case of GPPP. GPPP will hold within the domain of a currency area since the individual nations will

experience a set of common real macroeconomic shocks. Using data for Canada, France, Germany, Italy, Japan, UK, and the base country US, Enders and Hurn (1997), showed that GPPP hold among G-7 and G-3 countries. The existence of long run relationship means that a shock in any one real exchange rate will affect other bilateral exchange rates.

When considering which countries should form a currency union, another necessary condition is that the shock experience by the system should be symmetric rather than idiosyncratic (Liang,1999). A positive finding of GPPP among a group of countries' real exchange rates is an indication of common trends in their real macroeconomic variables, a sign of potential formation of an optimum currency area. Using USD as the base currency, Liang (1999) explores the long run relationship between real exchange rates of Hong Kong and China. Liang did not find empirical support for Hong Kong and China to adopt a common currency. Should Hong Kong and China choose to peg to a single currency, there would be potential adjustment cost involved.

In another study, Bernstein (2000) examined whether creating a currency area for EU would be successful, a study conducted prior to the adoption of Euro in 2002. Bernstein argued that if EU had sufficiently integrated the fundamental within the EU, then real exchange rates between member countries would share a common stationary trend when denominated by a common outside currency. Developing common fiscal and monetary policy with regards to GDP, interest rates and inflation rates were necessary to keep exchange rates within band and allowing for factor mobility to avoid asymmetric demand shocks within the economic bloc. The development of these policies would facilitate the transition process of forming a common currency, central bank and a unified monetary policy.

Using quarterly data of EU currency per US dollar and CPI for the sampling period from 1979:2 to 1996:2, Bernstein discovered that GPPP did not hold for Germany, the UK and the US. However, there was evidence of cointegration when these countries were combined with some smaller countries like Austria, Belgium, Denmark, France, Greece, Italy, Portugal and Sweden. The long run expectation that the real exchange rate of smaller EU countries follow a time path, determined by events in the larger EU countries.

Nonetheless, some researchers supported for an endogenous causal relation between trade or market integration and greater cyclical or structural convergence, while others oppose. Hallett and Piscitelli (2002) examined the conditions when *endogenous convergence* would and would not occur by using a simple general equilibrium explanation of the economy. They examined the impact of market integration of convergence between business cycles.

The endogenous OCA hypothesis stated that an increasing degree of trade integration between two countries would increase the degree of convergence between their

business cycles. Therefore, if the correlation itself fell as trade integration proceeds, then increasing trade would not lead to convergence in economic performance. Hallett and Piscitelli (2002) found that large, stable economies with integrated structures were likely to diverge, but smaller, more volatile or less well integrated economies will converge. The symmetry of shocks was not an important cause of convergence.

Moreover, significant progress in terms of monetary convergence was deemed necessary for the establishment of a common monetary union. By using the Johansen and Juselius (1990) multivariate cointegration approach, Bredin and Fountas (1998) tested on the number of common stochastic trends of seven EU, namely Belgium, Denmark, France, Germany, Ireland, Italy and the Netherlands. By dividing the monthly data from March 1979 and August 1992 into two, one from March 1979 to January 1987 and another from February 1987 to August 1992, Bredin and Fountas tested for the increase in convergence of EU monetary policy. The proxies used for monetary policy were short term (overnight) interest rates and monetary base. The monthly data were obtained from the International Financial Statistics data published by IMF.

Short term interest rates was used because it reflects short run actions through the resulting change in the domestic money market interest rates. As for monetary base, it reflected the actions being taken by the Central Bank to affect reserves in the banking system. Using VAR, empirical results indicated that there was little progress made on the issue of convergence of monetary policy within the EU. Although there was a slight improvement in the second period for interest rates, there is still no full monetary policy convergence. Germany, Netherlands and France were found to play an important role in the EU where these countries achieved full convergence in the second period of study (Bredin and Fountas, 1998).

Business Cycles Synchronisation : The EU experience

The study of business cycle synchronisation of macroeconomic aggregates is an effort to operationalise several OCA criteria like the labour mobility, openness of the economy through trade as well as fiscal and monetary policy co-ordination, concurrently. The level of economic integration or disintegration within and between an economic bloc could be determine since economic integration explains the economic interdependence or linkages of macroeconomic aggregate such as trade, capital, labour and technology between states, countries, grouping of countries or regions (O'Neill, 2002). However, prior to the adoption of Euro, most studies on synchronisation of business cycles centred around European countries and the US, to determine the compliance of OCA theory. For instance the study of economic interdependence between Turkey and the EU examined by Sayek and Selover (2002) to see if the Turkish and the EU business cycles move together, or, are the EU business cycles transmitted to Turkey.

Sayek and Selover (2002) used the IS-LM structural VAR estimation to determine the linkages and co-movements of output, prices, interest rates and money supply between Turkey and Europe. Data for Germany is used as a proxy for EU and all data are obtained from the International Monetary Fund's (IMF) International Financial Statistics (IFS). Sayek and Selover (2002) discovered that the Turkish business cycles did not synchronise with that of EU. The Turkish business cycles were non-coincident with business cycles of Europe, although they may sometimes appear to lead European cycles. European and Turkish real GDPs were not cointegrated. Moreover, European and Turkish real GDP growth rates were uncorrelated or negatively correlated. Granger causality test and regression analysis revealed no Granger causality between Turkish and European business cycles or between Turkish and Germany blocs. The SVAR analysis revealed slight income transmission from Germany to Turkey, but not enough to bring about business cycles synchronisation. In addition, the composition of Turkey's export was in relatively income inelastic goods, further weakening the transmission effect.

The divergence of business cycles between Turkey and Europe was due to domestic and regional shocks specific, for instance, domestic political conflicts, economic and financial crisis, domestic economic political mistakes and war such as the Iran-Iraq and the Gulf war. These shocks were specific to Turkey and unfelt in Europe. The divergence between Turkish and the EU business cycles increased the possible cost to Turkey of a potential future entry into the EU and reduced possibility that Turkish entry into EU. At present, the lack of business cycle synchronisation meant that Europe investors might benefit by diversifying their assets through investment in Turkey (Sayek and Selover, 2002).

In an earlier study, Lewis and Kwarteng (1995) warned of the immense competition among developing countries, as well as between EU and non-EU members when the EU is formed. Developing nations have to take initiative to react positively to issues related to EU so as to enable negotiation for better bargaining power for fairer terms of trade. Besides, the likelihood to replicate the EU model and to establish a common market within the Pacific rim, was seen as dim, owing to the immense differences between the member economies and the lack of experience in working together as an economic unit for mutual regional gain, instead of national interest (Day and Herbig, 1995).

The EU took more than four decades to be united, even though their size and locality provided them the incentive to work together for the good of a common market. In addition to that, most Europeans are of similar cultures, they are from the Roman and Greek origins, embrace Christianity as the main religion, adopt the democratic economic system and are well-developed economies. In addition, EU is a rather balanced community where no one single economy dominates another. The four major members of EU, namely, UK, France, Italy and Germany, have comparable

population, size, resources and economies. No individual economy is seen dominating another (Day and Herbig, 1995).

In the case of Middle East and Asian economies, their characteristics may initially seem very diverse as compared to the EU, but they do have some common grounds. These economies are mainly developing economies, located within the Asian region, and have a huge market opportunities that could bring about the possibilities of working together for a common good. Even though the prime advantage of maintaining a separate currency across countries is the ability to smooth business cycle fluctuations through independent and counter-cyclical monetary policy, the high degree of correlation of business cycles between countries signals for a possible monetary union. If monetary union leads to greater trade and greater trade leads to a greater correlation of business activity, entering a monetary union will enhance the harmonisation of business cycles (Coleman, 1999).

In addition, Dueker and Wesche (2001) examined the co-movement of output, income, employment and sales of Germany, France and Italy, as well as the UK and US to analyse whether intra-EMU business cycles appeared more closely correlated with each other than with significant outside countries such as the UK and the US. They constructed a business cycle index of industrial production, real personal income, real retail sales and employment to measure the cycle to cycle comparison within a country, cross-country correlation and simple aggregation. The evolution of correlation was found to be consistent with the claim that the European economies were becoming more harmonised over time, but there was no guarantee that this pattern will hold in the future. If looser policy co-ordination was better able to dampen economic shocks, then Dueker and Wesche suggested that the common monetary policy, in combination with the policy constraints from the Growth and Stability pact, could lead to more divergence among national business cycles in Europe in the future.

Moreover, Ravn (1997) investigated whether multi-country international business cycle models could account for the cross-country co-movements for OECD economies. The analysis was carried out on data for a panel of ten OECD countries, namely Australia, Canada, France, Germany, Italy, Japan, Sweden, Switzerland, the United Kingdom and the United States for the sampling period between first quarter of 1970 and second quarter of 1992. All data was de-seasonalised and rendered stationary by applying the Hodrick-Prescott filter. Ravn focused on the international co-movement of output components, employment levels and productivity levels.

The empirical findings seemed to be a clear pattern of international co-movements. Output levels were typically the most closely related variable across countries followed relatively closely by productivity, employment and investments. Consumption levels and exports were typically less closely related across countries

and government spending was typically unrelated. The standard multi-country international business cycle model is typically inconsistent with both the ranking of these correlations and in many cases also with the sign of the cross-country correlation, especially the case with investment levels and hours worked.

Correlation shocks, or the ratio of symmetric to asymmetric shocks was studied by Bayoumi and Eichengreen (1994) to test the suitability of various regions to monetary integration. They argued that the more the uncorrelated the shocks in a group of countries, the higher is the cost of losing the exchange rate and monetary policy tools. The shock correlation criterion measured the cost of monetary integration in terms of the likelihood of symmetric shocks. They discovered that the groups of countries with highly correlated shocks would be appropriate to form a monetary union.

Furthermore, Clark and Wincoop (2001) examined national border effects on production structure, trade, monetary policy and fiscal policy co-ordination among Europe and the US. They compared within-country and cross-country correlations, as well as examined the sources of international, nation-specific, region-specific and industry-specific variation among EU. What was interesting was that, Clark and Wincoop had explicitly control for exogenous factors that were unrelated to national borders, namely distance and size, to measure the effect and source of national borders on business cycle co-movement.

Using generalised method of moments (GMM) estimation, Clark and Wincoop (2001) regressed the annual data of average of sector output shares of GDP (proxy for production structure) and bilateral trade for the sampling period from 1980 to 1993. For the same sampling period, the nominal interest rate differential (average overnight money market rates) and bilateral exchange rates were used as proxies for monetary policy while annual budget deficit is used to represent fiscal policy. With regards to business cycle correlation analysis, the US regions are found to be correlated significantly higher than European countries. There was also no direct link between the higher degree of monetary and fiscal policy co-ordination among the US regions and their higher business cycle correlations. Clark and Wincoop (2001) concluded that the adoption of Euro was not likely to increase the extent of European business cycle synchronisation, except possibly indirectly in the long run through the effect of Euro on trade.

An economy is also deemed fully integrated when prices for similar assets in different regions would be the same and agents in different regions will have access to and use financial assets from different regions to save, borrow, invest and insure (Coleman, 1999). Trade volumes, prices of commodities and the exchange rate volatility determine the degree of commodity markets integration. Coleman (1999) explained that the commodity market is deemed integrated if people in different regions have

access to the same goods at similar prices. In addition to having similar products at similar prices, trade in these products is also necessary for successful product market unification. Therefore, when goods are transacted between countries with their own currency, the cost of exchange rate will hamper economic integration. Lower trade may occur due to higher cost associated due to the need to make currency transaction or the uncertainty associated with the possibility of future exchange rate changes.

Silvapulle *et al.* (1999) measured the asymmetric relationship between the Malaysia business cycles and the stock market via monthly Malaysian industrial production and KLCI returns for the sampling period from September 1974 to December 1997. They tested a range of hypotheses of equality restrictions against inequality constraints and the composite null hypotheses along steepness in business cycles. Their findings revealed that negative returns had steeper effects on the business cycles than do positive returns. Silvapulle *et al.* (1999) prompted that incorporating the effect of returns into modelling the relationship between industrial production and the stock market will improve prediction of business cycles, especially during downturns.

Artis and Zhang (1999) extended their previous study on the relationship of the exchange rate mechanism (ERM) of the European Monetary System (EMS) to the international business cycle in terms of linkages and synchronisation of cyclical fluctuations between countries. They expand their previous study by using an updated monthly data (obtained from OECD), increasing sample size from 15 to 19 countries for the sampling period between 1961:01 to 1995:10, and measured the exchange volatility using non-parametric rank correlation.

Artis and Zhang (1999) divided their study into two sampling period of pre-ERM and the ERM period, as well as ERM and non-ERM countries. Using the US cycle and German cycles are both used as benchmarks, they found that business cycles of ERM countries are more synchronised with the German cycle and less synchronised with the US cycle in the ERM period. However, this situation does repeat itself between ERM and non-ERM countries. Their results were robust to detrending by different filters.

Moreover, they found that successful exchange rate regimes impose policy were likely to lead to conformity in business cycles of participating countries. Business cycle affiliation of ERM member countries shifted from the United States to Germany since the formation of the ERM, strengthened the growing links in trade between EU countries. There was also clear evidence that the synchronisation of business cycles was linked to lower exchange rate volatility.

Business Cycles Synchronisation : The Asian experience

Above and beyond, studies on business cycles synchronisation of potential Asian economies is in an attempt to seek the possibility of forming an economic union. Discussion in this section will focus on literatures with regards to business cycle analysis of Asian economic blocs.

East Asia, Asia-Pacific Economic Co-operation (APEC) and the Association of Southeast Asian Nation (ASEAN)

Economies heading towards an economic integration were advised to work together for mutual regional interest and not of national and political interest. The Asia Pacific rim, for example, should pursue the success factors of EU, where Japan ought not to be allowed to dominate and unification should be inclusive (of Vietnam, for instance) and not exclusive. In addition, unlike the EU and the North America blocs, the formation of a Pacific Rim common market is said necessary to include the US to offer balance and offset potential Japanese domination (Day and Herbig, 1995).

Dent (1998) examined the creation of AFTA and formation of sub-regional economic zones, ASEAN and APEC, on EU. Dent suggested that the balance effect of firms established within ASEAN, will vary less as compared to firms established outside ASEAN. Greater participation of business representation in EU-ASEAN economic relations will enable EU firms familiarise themselves with the evolving form and shape of Southeast Asia's regionalism.

The composition of ASEAN's trade by type of product was also relatively favourable to consider for the formation of a currency union. Its exports of manufactured goods had increased for the past two decades, which amounted to four-fifths of total exports, slightly lower to the corresponding import ratio. ASEAN's trade was highly diversified and the major currency areas like the US, the EU and Japan, were important trading partners for most ASEAN. This was an implication that ASEAN countries' exposure to fluctuations among major currencies is relatively high and none of the major currencies was an obvious candidate for a common peg. Unlike the eastern and central European countries, ASEAN trades about one half with EU. But, within the same time frame, EU was more ready to peg its currency to another, namely the US dollar, than ASEAN (Bayoumi and Maoro, 1999).

The effect of bilateral trade dependence on the co-movement of business cycles for 10 East Asian countries was investigated by Choe (2001). Specifically, Choe examined if the synchronisation of business cycles among East Asian economies was affected by the evolution of economic integration through trade. The relationship between the co-movement of cyclical components of income and bilateral trade dependence was tested based on 45 pairs of cross-sectional data for 10 East Asian countries over the

periods 1981 – 1995 by OLS estimation. The empirical findings suggested that economic fluctuations tend to be more synchronised within the region as trade interdependence among them deepens. The findings suggest that the necessary co-operative efforts to prevent or adjust unfavourable future economic crisis in East Asia.

Ling (2001) examined the suitability of the East Asian economies for a regional monetary arrangement, using annual data from 1967 – 1997 for twelve countries, namely Japan, Korea, Taiwan, Hong Kong, Singapore, Indonesia, Malaysia, Philippines, Thailand, China and two Asia-Pacific economies, Australia and New Zealand. All data were obtained from the World Bank's World Development Indicators CD-ROM, except for Taiwan, data are extracted from local sources. Using the structural VAR that was based on AD-AS premise, Ling stated the incidences of underlying macroeconomic disturbances or shocks of real output, measured by real GDP, price level integration, proxied by GDP deflator, among East Asian economies to assess the suitability of different groups of economies for potential monetary union. Due to the diverse economic circumstances of the region, Ling suggested that regional monetary integration would be to start with smaller currency areas. A multi-speed strategy towards monetary integration in East Asia was recommended where smaller sub-groupings could first focus on internal harmonisation with each other and then external harmonisation with the other regional sub-groupings as the intermediate and longer-term strategies. In the long run, economies participating in various regional currency areas may consider forming a single currency area once sufficient degrees of harmonisation and convergence was achieved. At the mean time, Ling suggested that East Asian economies should focus on promoting greater economic integration through higher levels of trade and investment liberalisation.

Chow and Kim (2003) also studied the possibility of East Asian economic co-operation by examining the symmetry of shocks among East Asian economies. Chow and Kim (2003) used the structural VAR approach, developed by Blanchard and Quah (1989) to run their analysis. They used quarterly data from IMF International Financial Statistics in their study and discovered that East Asia are structurally different and are more likely to face asymmetric shocks. As such, they felt that economic integration in East Asia would be more costly and more difficult to sustain.

Supporting Chow and Kim's findings, Kwak (2004) reviewed East Asian economies and found that East Asia were vulnerable to disturbances from abroad and they faced a high degree of capital mobility across countries. Since each of East Asia economies also encounters symmetric disturbances, they are of potential to form a currency union. However, the lack of political commitment and experience among East Asian economies makes the formation of a currency union quite impossible in the near future.

Kwack (2004) suggested that East Asia should consider forming a quasi-monetary block instead. Kwack reasoned that the majority of East Asian economies have a

weak banking system and have a huge external debt denominated in various foreign currencies. Kwack suggested more free trade agreements, more foreign capital investment, more comprehensive swap arrangements and establishing an organisation to better co-ordinate institution work towards monetary integration. In addition, Kwack also suggested that the main players in East Asian economy, China and Japan, to lead in promoting regional monetary integration and policy co-operation.

Bayoumi and Mauro (1999) used the standard deviation of the difference in growth rates across two economies and the dissimilarity of the composite of trade as proxies for the costs associated with asymmetric shocks. They established the level of bilateral trade and the size of two economies as proxies for the benefits from stabilising exchange rates with close trading partners and across larger grouping of countries. A lower expected level of bilateral exchange rate variability indicates greater ability to forego the benefits of a flexible exchange rate, hence possible formation of a common currency.

Using the 1995 data for ASEAN, although the differences was not very large, ASEAN was less suitable for a currency union than the continent of Europe in 1987, a few years before the Maastricht treaty was signed. ASEAN's expected level of exchange rate variability, the variance of the annual real bilateral exchange rate, were higher than those of major European economies calculated in 1987.

Macroeconomic stability, flexible and sustainable fiscal policy was said to lighten one's own monetary policy in responds to shocks and inflationary pressures in a currency union. A similar level of economic development and similar financial systems would ease the process of forming a currency union. However, economic integration was not a necessary precondition for a currency union, although it may create a favourable condition for launching a currency union. Bayoumi and Maoro (1999) stressed that political commitment is an important criterion for a currency union. It should be noted that the European Monetary Union process is associated with a steady loss of national sovereignty, such as losing more and more monetary independence, constraint fiscal policy, opening capital and labour markets to other member countries and harmonisation of commercial standards.

However, linkages among economies tend to be more significant within defined geographical boundaries than between regions or economic blocs (Bayoumi and Klein, 1997; O'Neill, 2002). With regards to the Asia-Pacific economies, Crosby (2003) examined the correlations of Asia-Pacific economies since 1970 to explain the reaction of domestic economy to disturbances in the US and economies in close geographic proximity. The variable used to explain business cycle synchronisation include trade linkages (ratio of trade with reference to GDP), the similarity of monetary policy (measured by interbank rates and standard deviation of the bilateral exchange rate) and structural variables such as the size of the manufacturing sector, geographical proximity and common language.

Crosby explained that closer trade links will lead to more closely synchronised business cycles. Ricardian analysis would suggest that more trade would lead to more specialisation, resulting in larger structural differences between economies, and sector specific shocks in one economy would be less likely to affect other economies. Closer trade linkages would lead to stronger demand linkages across countries, as one economy moved into recession, the demand for other countries exports would fall, inducing a fall in other countries output. That is why some studies on the OCA tried to explain cross-country business cycle correlations, of participating economies in order to predict the impact that changes in formation of a currency union and trade integration on business cycles.

The dependent variable in Crosby's regression model was the bivariate correlation between filtered GDP (via Hodrick-Prescott filter). Data for the analysis was obtained from IFS for sampling period between 1980 – 1999. Empirical findings implied that trade did not appear to be very strongly associated with higher correlations between filtered GDP. However, structural similarity between countries was positively associated with the business cycle correlation.

Sharma and Chua (2000) used the gravity model to study the economic integration of ASEAN-5 and its ability to promote intra-member trade in the Asia Pacific. Based on annual data published by the International Monetary Fund, International Financial Statistics CD-ROM, they examine GDP, GDP per capital (as proxy for level of development and infrastructure to facilitate trade), export and import and the distance between 2 country's ports measured in nautical miles (proxy for transportation costs).

Their empirical findings suggest that trade in ASEAN increases with the size of the economy. However, ASEAN integration scheme did not increase intra –ASEAN trade. As such, the recent development of the ASEAN free trade area was said to have very little economic impact since less than one-fifth of their trade was among themselves. However, the prospect of a closer economic co-operation in ASEAN remains bright and the successful development of smaller sub-regional economic co-operation, for instance the Singapore-Johore-Riau growth triangle could bind individual ASEAN countries.

Ng (2002) argued that countries with highly correlated shocks would indicate an OCA because the entire integrated economy would be able to respond to that shock through one common monetary policy. Ng examined the correlation of economic shocks among 5 ASEAN economies using annual real and nominal GDP data for the sampling period between 1970 – 1995 obtained from the IMF International Financial Statistics, the World Development Indicators published by the World Bank and other domestic sources.

Ng (2002) examined the external shocks, domestic supply shocks and domestic demand shocks experienced by ASEAN, EU and NAFTA. Ng discovered that external shocks are more highly correlated in ASEAN than those of EU and NAFTA. The domestic demand and supply shocks of ASEAN are more correlated than those of EU but lesser than those of NAFTA. Ng also found that the magnitude of shocks on ASEAN is compatible to those of EU but lesser than those of NAFTA.

Ng's findings also dictate that ASEAN experience increasing intra-regional trade in the 1990s and the formation of AFTA is said to likely further stimulate intra-regional trade. Although there seems to be diversity in terms of monetary policy implementation among ASEAN countries, the gap is narrowing in recent years.

South Asian Association for Regional Co-operation (SAARC)

According to DeRosa and Govindan (1996), South Asia will face a major challenge in the next century in meeting the demands for food of their fast growing population. Food security in South Asia has been a major issue in the region because the economic policy regimes have favoured import-substitution and industry over agriculture and highly dependant on imports to meet the demand for food. The reason being industrialisation and trade has shown signs of economic improvement. As such, regionalism in South Asia will likely be a major factor in international trade relations. DeRosa and Govindan (1996) suggested that SAARC to intensify their efforts to integrate the South Asian economies with the world economy or with other fast-growing Asia-Pacific region to achieve much larger gains in trade and economic welfare.

Nonetheless, with preferential trading arrangement among SAARC, tariff and non-tariff concession were granted to the imports of member countries in order to stimulate mutual trade and contribute to the economic development of the countries concerned. Nevertheless, some argued that this would not be the case if there were limited trade complementarities, since SAARC member countries having similar production structures, producing similar products. Besides, production was sometimes in such a small scale that they were not sufficient to meet importing countries' demand. Thus, Rajapakse and Arunatilake (1997) constructed a gravity model to investigate on the bilateral trading prospects of Sri Lanka as a result of the further liberalisation of trade policies.

They also examined if foreign direct investment can promote trade within SAARC. They discovered that there was a large potential for improvements in bilateral trade with the removal of restrictive trade measures but none of the SAARC countries will achieve sustainable economic growth merely by trading among them. It is crucial that all countries of SAARC improve market access to global market as well as regional markets.

Hassan (2001) assessed the feasibility of economic co-operation from the perspective of regional trade in the SAARC. Using the gravity model to measure the pattern of trade of SAARC economies, the trade flow was estimated as a function of variables that directly or indirectly affect the determinants of normal trade flow. For large countries, the gravity variable, volume of trade, should increase with real GDPs, as compared to smaller countries. Trade should diminish with geographical distance because proximity reduces transportation and information costs.

Hassan (2001) found that the SAARC free trade areas will have a significant impact on the Southeast Asia's trade. However, SAARC member countries have yet to achieve trade-creating benefits and the empirical result support that intra-SAARC trade is too low. SAARC countries as a whole trade less with the outside world than would be expected because regional trade is limited by the absence of complementarity in production and resource bases and financing difficulties. Although immediate benefits for SAARC are not likely to be significant, SAARC regional integration could contribute to growth by increasing trade and allowing regional producers to benefit from economies of scale and encouraging foreign direct investment.

Limitations of the analysis include construction of framework that did not take into account of the potential impact of preferential trading arrangements on the coefficients on growth of output in member countries. The model can be extended by differentiating trade into different types of products, such as food or manufacturing goods, expand the geographical coverage to include developing countries and allowing different behavioural coefficients.

Economic Co-operation Organisation (ECO)

According to Bahae and Saremi (2002), the development of ECO co-operation has not been significant due to several reasons. Firstly, is the pressing domestic problem that requires significant immediate attention is a hindrance to economic growth in this region. Afghanistan, for instance, is under the Taliban rule and deemed a terrorist country. Internal political tension has overshadowed integration goals. Secondly, the strong dependency of most member countries on gas and oil has limited the potential intra-regional trade within ECO. Bahae and Saremi (2002) recommended ECO to focus on much narrower objectives of improving or instituting industrialisation, economic and administrative infrastructure. Specific and targeted approach by industry segments or product categories may be more appropriate.

Moreover, the increase of ECO membership is conceived as political positioning, rather than a practical need for a better ECO. Key members must develop fundamental values and principles to guide their decision making and future growth of ECO. The dominance and excessive interference of political views will hinder

competent economic decision. Nevertheless, members of ECO have to be patient and persistence in dealing with overcoming the adversities and challenges for a strong regional economic bloc.

Gulf Co-operation Council (GCC)

As of 1 January 2003, GCC implemented the GCC-wide customs union as well as to formally peg their currencies to the US dollar as a first step towards a monetary union, scheduled on 2010. Since international oil trade is mainly dollar-dominated, the dollar peg has proven stable, without large volatility in oil prices. However, a more flexible exchange rate policy seems more desirable to ensure competitiveness of non-oil exports, considering some GCC countries, Bahrain and Oman, are exhausting their oil reserves. Moreover, the growing populations and labour forces calls for policies to promote non-oil sector growth (Abed *et al.*, 2003).

Since the usage of euro with the 12 EU, Abed *et al.* (2003) questioned if GCC monetary union can achieve the required benefit to peg to a two-currency basket made out of euro and the dollar, instead of dollar alone? Abed *et al.* (2003) found that a peg to a dollar-euro basket does not necessarily dominate the existing peg only to the dollar to improve external stability. The dollar peg may ensure greater stability but may cost the deterioration in competitiveness. They found that pegging to a dollar-euro basket may serve as an interim arrangement toward a more flexible exchange rate policy in future. External stability and competitiveness cannot be achieved with a single instrument, namely the choice of exchange rate regime. Other factors like wage and price policies will play important roles in achieving competitiveness in international markets (Abed *et al.*, 2003).

In addition, by comparing the GCC and EU, Metwally and Tamaschke (2001) discovered that GCC exports to the EU were strongly influenced by oil prices and growth of GDP in the EU. GCC imports from the EU were positively related to GCC exports and the GCC's net income from abroad within a partial adjustment mechanism. The interaction between GCC and the EU trade were tested for feedback effects through simultaneous equation, solved using the two stage least square estimator (2SLS).

There were significant feedback effects in GCC trade with the EU where an increase in GCC exports to the EU increases GCC income. Consecutively, an increase in GCC imports from the EU lead to a rise in EU income and EU imports from GCC. The substantial income GCC obtain from abroad helped GCC sustain their income during declining oil revenue. The GCC trade balance with the EU strongly favours the EU. As such, any changes in commercial policies in GCC were likely to have a significant impact on its trade and with the EU.

In summary, the economic disparity among members of Asian economic blocs is obvious, not to mention cultural, social and political differences. This is further verified by empirical findings with regards to the compliance of optimum currency area criteria conducted on ASEAN, ECO, GCC and SAARC shown in Table 7.

The proposition of economic unification for SAARC is supported by several studies, while in the case of ASEAN, results are mixed. Other studies found that GCC and ECO are not ready for economic integration.

Table 7: Findings on recent studies related to OCA criteria.

Economic Bloc	Studies supporting the formation of economic union.	Studies that oppose the formation of economic union.
ASEAN	<ul style="list-style-type: none"> • Sharma and Chua (2000). • Ling (2001) • Choe (2001) • Ng (2002) 	<ul style="list-style-type: none"> • Bayoumi & Mauro(1999) • Crosby (2003) • Kwack (2004) • Chow and Kim (2003)
GCC	<ul style="list-style-type: none"> • Jadresic (2002) • Abed <i>et al.</i>, (2003) 	Metwally & Tamaschke (2001)
SAARC	<ul style="list-style-type: none"> • Rajapakse & Arunatilake (1997) • Hassan (2001) 	Maskay (2003)
ECO		Bahae & Saremi (2002)

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**A Panel Study on Real Interest Rate Parity in East Asian Countries:
Pre- and Post-liberalization Era**

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Abstract

This study is concerned with the mean reverting behavior of real interest differentials in ten Asian economies using Japan as the base country. Besides the univariate ADF test, the latest panel unit root tests developed by Im, Pesaran and Shin (2003), Harris and Tzavalis (1999) and Breitung (2000) are also applied in our analysis. We obtain a number of interesting results: First, the conventional ADF test fails to support Real Interest Parity (RIP) for at least half of the countries, even for the post-financial liberalization period. Second, the evidence based on panel unit root tests demonstrates that real interest rate differentials exhibit mean reverting behavior and are characterized by long-memory dynamics for the sample period 1985:Q1-1997:Q2. This result holds even when the sample period is extended to include the Asian crisis. Finally, the evidence suggests that deviations from RIP in the Asian countries have a half-life of approximately 6 to 7 months. Together, these findings support the strong form of RIP between selected Asian countries and Japan. Thus, our findings demonstrate the power deficiency of classical unit root tests and to a great extent provide evidence in favour of regional financial convergence, a fundamental requirement for an Optimal Currency Area.

JEL classification: F31, F32, F36

Keywords: real interest differentials, mean-reversion, half-life, panel unit root tests.

Introduction

The last twenty years have witnessed a massive increase in the degree of international financial integration in both industrialized and developing countries prompted by technological breakthroughs, financial liberalization, and growth in the volume of trade (Obstfeld, 1998). The rapid growth in the flows of financial capital worldwide has contributed to nominal interest rate convergence and in some cases has facilitated the movement towards a single currency. A notable example is the increasing financial integration among EU countries during the 1990s that culminated in the launch of the euro, the common currency circulating in 12 European countries that joined the euro zone on 1 January, 2002. In the run up to the single currency, EMU member countries lost a large part of their monetary independence as their monetary policy stance was dictated by Germany's central (anchor) role in the system.

Increasing financial liberalization in East Asia countries since the mid-1980s has fuelled a lively debate regarding the optimum exchange rate regime for the region. Some economists (Mundell, 2003) have advocated the use of a common currency preceded by anchoring to an existing currency or a group of currencies⁴¹. It is anticipated that more financial integration will facilitate nominal interest rate convergence and, depending on the exchange rate regime, may lead to inflation convergence. In these circumstances, real interest rate convergence might also obtain, thus making national monetary policy a less effective stabilization policy tool, as real interest rates will be dictated by a leading country in the region, e.g., Japan. It is therefore important to know to what extent financial integration has led to a long-run equilibrium relationship among real interest rates in the East Asian countries⁴². To this end, we apply unit root tests (both standard ADF and panel tests) on real interest rate differentials vis-à-vis Japan which takes the role of the reference or center country due to its large share in the volume of trade in the region and the leading role of the yen in international transactions involving East Asia countries. We make use of these tests in the pre- and post-liberalization periods. We also examine whether the Asian financial crisis has had any impact on the degree of real interest rate convergence vis-à-vis Japan. The results of our analysis will shed light on the issue of financial interdependence among countries in the region, which has a bearing on the recent discussions on the most appropriate exchange rate regime to be adopted by these countries.

The rest of the paper is organized as follows: section 2 offers an account of the movement towards financial liberalization by the East Asian countries. Section 3 presents the theoretical framework that sets out the hypothesis to be tested and gives a short summary of the existing empirical literature. Section 4 summarizes the econometric methods employed in the paper and section 5 reports our econometric

⁴¹ A recent empirical study by Chow and Kim (2003) finds that East Asian countries differ from Western European countries as they are more likely to be subject to asymmetric shocks, thus making a common currency in Asia a less desirable outcome.

⁴² The terms convergence and long-run equilibrium relationship are used interchangeably. However, strictly speaking, convergence is a prerequisite for a long-run equilibrium, whereas a long-run or cointegrating equilibrium implies that interest rates do not deviate too much from each other.

results. Finally, the last section summarizes our main results and provides some policy implications of these results.

Financial Liberalization in Asian Countries

During the past three decades or so most of the Asian countries have taken steps to promote economic efficiency by liberalizing their domestic financial systems and removing restrictions on capital flows (Habibullah, 1999). Financial liberalization efforts in the East Asian countries followed almost the same pattern and took place primarily in two stages. In the first stage, foreign exchange controls, as well as, the ceilings on deposits and lending rates were progressively removed, though at different times. Hong Kong (1973), Singapore (1975) and Malaysia (1978) were among the first countries to liberalize their interest rate controls. In Indonesia, Philippines and Sri Lanka, interest rates were fully deregulated in the early 1980s. Taiwan, Thailand and South Korea did not abolish their interest rate ceilings until mid to late 1980s. For South Korea, the prospect of becoming an OECD-member country was instrumental in the move towards liberalizing its financial market. In Japan, interest rate deregulation began gradually in 1979 and was only completed in 1994, while its foreign exchange transactions were liberalized in 1980.

The second stage of the liberalization process witnessed the opening up of the capital accounts during the late 1980s. Guarantees were given to non-residents that they would be able to withdraw their investments. Also, restrictions on foreign asset holding by residents were relaxed. Many of these countries allowed the private sector to have access to external finance for the first time. The widespread liberalization of financial markets as well as external factors like a sustained decline in world interest rates and recession in the industrial economies led to a surge in foreign capital into the region⁴³. However, due to the easy-ready external funding, both the banking and corporate sectors became extremely dependent on foreign short-term debt liabilities. The volume of short-term debt was almost twice as much as international reserves before 1997 and countries issuing the debt were vulnerable to possible attacks by international speculators. Some observers could see where this type of short-term speculation was leading, but they were not willing (or unable) to impose regulations on banks and investors. In short, these huge short-term debts along with the pegged exchange rate system, and lax regulation and supervision of the financial markets have been attributed to the destruction of the regional financial system in 1997. The financial crisis was like a snowball affecting most of the countries in the region in a short period.

Figures 1, 2, and 3 plot the real interest rates in ten Asian countries⁴⁴. During the pre-liberalization period, real interest rates were negative in several of the countries

⁴³ For instance, between 1994 and 1996, 210 billion dollars flowed to ASEAN-5, which was about 20% of their GDP (Radelet and Sachs, 1998).

⁴⁴ Please refer to Section 5.1 and Appendix I for a detailed description of data sources and compilation of real interest rates.

considered. However, by the mid-1980s, interest rate liberalization along with economic progress had resulted in positive and stable real interest rates in most of the Asian countries. The authorities in these countries viewed interest rate stability as an important policy variable in promoting a stable financial system and contributing to a more effective monetary policy transmission mechanism. The positive and stable real interest rates contributed to the increase in the volume of resources available to the financial system, as funds previously held outside the formal financial sector found their way to the banking system.

There were only three periods in the past where Association of South East Asian Nations (ASEAN) countries were seriously threatened by negative real rates of interest (see Figure 1, shaded areas). The first period was during the world oil shock in 1978, which caused the boost of world inflation. Second, in the mid 1980s, the Philippines experienced political crisis and economic turmoil. Finally, Indonesia faced negative real interest rates during the Asian crisis period as hyperinflation (60-70%) occurred due to the sharp currency depreciation and market chaos. Like ASEAN countries, the four Newly Industrialized Economies (NIE) in Asia were affected by the world oil shocks in the late 1970s, resulting in negative real interest rates (Figure 2, shaded areas). Relatively speaking, the capital markets in NIE-4 were much better developed than in the other Asian countries while the real rates of interest have stayed more stable and positive most of the time, showing some signs of interest rate targeting. Even South Korea has tried to maintain positive rates during the Asia crisis. Hong Kong SAR, however, was facing greater inflation pressure during the 1990 - 1996 period (7 to 12 percent) due to the booms in asset markets, which in turn, reduced the real rates of interest. On the other hand, Figure 3 demonstrates that the real interest rates in India and Sri Lanka have been more volatile and turned negative on several occasions (shaded areas). According to Figures 1-3, real interest rate movements of the Asian countries share some similarities, in particular during the late 1970s, mid 1980s, and late 1990s. In particular, there seems to have been more real interest rate convergence. For Japan, real interest rates have always been positive, relatively stable, but low. In addition, the data seem to support a comparable real interest rate decline during the same periods, offering some early signs of integration between Japan and Asian countries.

[INSERT Figures 1, 2, and 3]

Theoretical Framework

According to the Fisher equation, real interest rates are nominal interest rates adjusted for expected inflation. Real Interest Parity (RIP) implies equalization of ex ante real interest rates across countries. In the absence of restrictions on the free flow of capital, movement of assets across countries would persist until all arbitrage opportunities are eliminated. RIP requires a number of strong assumptions, such as absence of a country premium, the efficient market hypothesis, and zero expected real exchange rate change. In short, RIP can be obtained by combining the Fisher effect in each country, the ex ante

Purchasing Power Parity (PPP) relationship and the Uncovered Interest Parity (UIP) relationship⁴⁵.

The RIP relationship in its ex ante form states that $E_t(r_{t+k}) = E_t(r_{t+k}^*)$, where E is the expectations operator and r is the real interest rate, with an asterisk denoting the foreign country. It is straightforward to show that, assuming rational expectations, ex post RIP (e.g. realized real interest rate equalization) implies also ex ante RIP (e.g. expected real interest rate equalization). Given the previous work on spurious regressions, it has become common practice to first test for the order of integration for the real interest rate series using unit root tests. If the real rate is found to be a unit root process, the researcher typically employs cointegration analysis using a bivariate test such as the one pioneered by Engle and Granger or a multivariate approach such as the Johansen procedure. As we will show later, all real interest rates are $I(1)$. To test for RIP when real rates are $I(1)$, the following cointegrating regression is estimated:

$$r_t = \alpha_0 + \alpha_1 r_t^* + \varepsilon_t \quad (1)$$

where r_t represents the ex post or observed real rate of interest in selected Asian countries and r_t^* the ex post or observed real rate in the base or reference country, which in the present case is Japan. By imposing the restriction $(\alpha_0, \alpha_1) = (0, 1)$ on the cointegrating regression (1), we have:

$$r_t - r_t^* = \varepsilon_t \quad (2)$$

Given the specification in (2), RIP holds in a long-run equilibrium framework if ε_t is stationary, implying that the real interest differential is mean reverting over time⁴⁶. To test for the stationarity of ε_t , we rely on two types of unit root tests: the classical single-equation based ADF test, and the non-stationary panel-based unit root tests.

Early empirical evidence on RIP used data on industrialized countries and classical regression analysis. Their major finding was that RIP does not hold (e.g., Cumby and Obstfeld, 1984, Mishkin, 1984, Mark, 1985, Cumby and Mishkin, 1986). The results of these studies were subsequently invalidated by developments in the econometrics of nonstationary time series. More favourable evidence on RIP was obtained with the use of unit root tests and cointegration techniques (e.g., Goodwin and Grennes, 1994, Wu and Chen, 1998, Wu and Fountas, 2000). In particular, Chinn and Frankel (1995) and Phylaktis (1997) use data for Asian countries and find some evidence in favour of RIP between some Asian countries and Japan. Baharumshah and Goh (2001) use cointegration analysis and find that the currencies of several Asian countries share a common trend, thus supporting the argument for a yen block.

⁴⁵ See Hallwood and MacDonald (1994, p. 45).

⁴⁶ This is the strong form of RIP. According to the weak form, r_t and r_t^* must be cointegrated but the relationship between the two should not be necessarily one-to-one.

Empirical Methodology

Panel Unit Root Tests

Testing for a unit root in time series studies is by now a common practice in applied time series research. However, it is well known that unit root tests have low power when the root is close to one. In addition, Shiller and Perron (1985) find that the power of the ADF test is low with a short time span. Hence, one possible reason for the failure of existing studies to find evidence in support of RIP may be the low power of the tests used in the empirical analysis. Another more recent approach to examine the stationarity of a series is to apply panel data unit root tests; see, for example, Levin and Lin (1992, LL hereafter), Im, Pesaran and Shin (2003, IPS hereafter), Harris and Tzavalis (1999, HT hereafter) and Breitung (2000), among others. The attraction of panel data unit root tests is that they combine time series with cross-sectional information and thus may enhance the power of a unit root test.

In this study, the non-stationary panel unit root tests advocated by IPS, HT and Breitung (2000) are utilized to test for the RIP hypothesis. The null hypothesis of these three tests is that the panel series has a unit root. Rejection of the null hypothesis would imply that the levels of real interest differentials exhibit mean reversion, i.e., stationarity, and therefore, RIP holds. The LL panel unit root test has been widely applied in the literature partly because it has high statistical power relative to the conventional single equation unit root tests. The major criticism of the LL test is that it requires the coefficient (ρ) of the lagged dependent variables to be homogeneous across all cross-section units of the panel, which suggests that each series reverts to its respective unconditional mean over time at the same rate. Moreover, O'Connell (1998) claimed that the LL test lacks power and suffers from significant size distortion in the presence of correlation among contemporaneous cross-sectional error terms.

By allowing for a greater degree of heterogeneity, IPS (2003) proposed an alternative testing procedure based on the mean group approach: the t-bar statistics and the group mean Lagrange Multiplier test (LM-bar). Based on Monte Carlo experiments, Im, Pesaran and Shin show that the average LM and the t-statistics have better finite sample properties than the LL test by allowing heterogeneity across cross-sectional units. Briefly, the test statistics are given by:

$$\Gamma_i = \frac{\sqrt{N} \{ \bar{t}_{NT} - E(t_{iT} | \beta_i = 0) \}}{\sqrt{\text{Var}(t_{iT} | \beta_i = 0)}} \Rightarrow N(0,1) \text{ where } \bar{t}_{NT} = \frac{1}{N} \sum_{i=1}^N t_{iT} \quad (3)$$

and

$$\Gamma_{LM} = \frac{\sqrt{N} \{ \overline{LM}_{NT} - E(LM_{iT} | \beta_i = 0) \}}{\sqrt{\text{Var}(LM_{iT} | \beta_i = 0)}} \Rightarrow N(0,1) \text{ where } \overline{LM}_{NT} = \frac{1}{N} \sum_{i=1}^N LM_{iT} \quad (4)$$

such that \bar{t}_{NT} is based on averaging individual ADF tests while \overline{LM}_{NT} on averaging across groups. Both means $E(t_{iT} | \beta_i = 0)$, $E(LM_{iT} | \beta_i = 0)$ and both variances $\text{Var}(t_{iT} | \beta_i = 0)$, $\text{Var}(LM_{iT} | \beta_i = 0)$ are obtained from Monte Carlo simulations with $i=1,2,\dots,N$.

In a different dimension, HT (1999) proposed an asymptotic unit root test for first-order autoregressive panel data models with serially uncorrelated errors, under the assumption that $N \rightarrow \infty$, while T is fixed. The HT unit root test is an extension of Levin and Lin (1993) and Quah (1992). The tests are based on the normalized least squares (LS) estimators of the autoregressive coefficient and allow for fixed and individual deterministic trends. We make use of two of the three models suggested by HT. They are the following:

$$y_{it} = \alpha_i + \phi y_{i,t-1} + v_{i,t}, \quad (5a)$$

$$y_{it} = \alpha_i + \beta_i t + \phi y_{i,t-1} + v_{i,t}, \quad (5b)$$

$i = 1, \dots, N; t = 1, \dots, T$, with $\{v_{i,t}\}$ satisfying the following assumptions:

- a. $\{v_{i,t}\}$, $i = 1, \dots, N; t = 1, \dots, T$, is a series of independent identically normally distributed random variables having $E\{v_{i,t}\} = 0$ and $\text{Var}\{v_{i,t}\} < \infty$, for all i and t ;
- b. the initial values, $y_{i,0}$, are fixed;
- c. the individual effects, α_i , are fixed.

The first assumption indicates that each individual is independent from each other. HT mentioned that this statement can be guaranteed by removing the cross-section mean from the data. Assuming the normal distribution is more a convenience than a requirement, given that it simplifies the derivation of the moments that define the asymptotic distribution of the test. This assumption can be relaxed provided that a consistent estimator for $E\{v_{i,t}^4\}$ is available. The second and third assumptions prevent the introduction of additional probability distributions in the model. One of the special features of these models is that they consider a common value for the autoregressive parameter for all the individuals, that is, they are designed to test for the presence of a unit root in the whole set of time series. Regarding the deterministic component, (5a) specifies individual fixed effects whereas (5b) accounts for both fixed individual and trend effects.

More recently, Breitung (2000) investigated the local power of LL and IPS test statistics against a sequence of local alternatives. Breitung (2000) showed that the loss of power in LL is due to bias correction in LL and detrending bias in IPS. Consequently, he proposes a class of t-statistics (λ_{UB}) that do not require bias corrections. Monte Carlo experiments show the test power of the λ_{UB} to be substantially higher than that of LL or the IPS tests. The simulation results indicate that the power of LL and IPS tests is very sensitive to the specification of the deterministic terms. By defining the $T \times 1$ vectors

$Y_i = [\Delta y_{i1}, \dots, \Delta y_{iT}]'$ and $X_i = [y_{i0}, \dots, y_{i,T-1}]'$ and the transformed vectors $Y_i^* = Ay_i = [y_{i1}^*, \dots, y_{iT}^*]'$ and $X_i^* = Bx_i = [x_{i1}^*, \dots, x_{iT}^*]'$, the λ_{UB} statistic is in short given by:

$$\lambda_{UB} = \frac{\sum_{i=1}^N \sigma_i^{-2} y_i^* x_i^*}{\sqrt{\sum_{i=1}^N \sigma_i^{-2} x_i^* A' A x_i^*}} \Rightarrow (N, T \rightarrow \infty)_{seq.} \quad (6)$$

under the assumption of

$$E(y_i^* x_i^*) = 0, \quad \lim_{T \rightarrow \infty} E(T^{-1} y_i^* y_i^*) > 0, \quad \lim_{T \rightarrow \infty} E(T^{-1} x_i^* A' A x_i^*) > 0$$

Half-life Measurement

The half life of deviations from RIP is a useful criterion for assessing the degree of mean reversion of real interest differentials. Suppose the deviation of the logarithm of real rate of interest differential y_t from its long run value y_0 , which is constant under RIP, follows an AR(1) process:

$$y_t - y_0 = \beta(y_{t-1} - y_0) + \varepsilon_t \quad (7)$$

where ε_t is a white noise. Then, at horizon h , the percentage deviation from equilibrium is β^h . The half life of the deviation from RIP is defined as the horizon at which the percentage deviation from equilibrium is one half, that is:

$$\beta^h = \frac{1}{2} \Rightarrow h = \frac{\ln(1/2)}{\ln(\beta)} \quad (8)$$

According to Holmes (2002), the estimates of $\tilde{\beta}_i$ in panel sets can be derived from the following demeaned regressions:

$$\Delta \tilde{y}_{it} = \tilde{\alpha}_i + \phi_i \tilde{y}_{i,t-1} + \sum_{k=1}^{q_i} \rho_{ik} \Delta \tilde{y}_{i,t-k} + \tilde{\varepsilon}_{it} \quad \text{where } \phi_i = (\tilde{\beta}_i - 1) \quad (9)$$

The half-life is calculated as:

$$h = \frac{\ln(1/2)}{\ln(\text{average}\tilde{\beta}_i)} \quad (10)$$

The half-life measurement can be interpreted in two ways: the degree of deviation from its long run mean or, the speed of adjustment back towards long run RIP. Either one will indicate whether RIP holds in its strong or weak form. If, say, the half-lives of deviation from RIP are short, i.e., a few months, RIP will hold strongly. However, if the half-lives are long, say 5 to 6 years, the strong form of RIP is ruled out.

Data and results

Data Description

The various tests outlined in the previous section are applied to a sample of quarterly data for ten Asian economies vis-à-vis Japan, which is taken as the base country. Country classification is based on Asia Pacific Economic Cooperation (APEC) membership. The non-APEC members are India and Sri Lanka while the APEC members are the developed NIE-4 (Hong Kong SAR, Singapore, South Korea and Taiwan Province of China) and the developing ASEAN-4 (Indonesia, Malaysia, Philippines and Thailand). To investigate the effect of liberalization and structural changes in Asian economies, we divide the period under consideration into three sub-periods: the pre-liberalization era (1977:Q1 to 1984:Q4) and the post-liberalization era with the Asian crisis included (1985:Q1 to 2001:Q4) or excluded (1985:Q1 to 1997:Q2). We choose the post-1985 period as the liberalization period because of a lack of synchronization in the timing of financial liberalization in these countries.

Real interest rates of these countries are constructed by subtracting the expected inflation rates from nominal interest rates. For each country, expected inflation was estimated using the autoregressive distributed lag approach (AR(1)), based on the consumer price index (base year 2000=100). The nominal interest rates employed in the study are generally non-control rates, such as money market rates for Hong Kong, South Korea, Taiwan, Philippines and Thailand; call money rates for Japan and Indonesia; Inter-bank money rates for Malaysia, India, Singapore and Sri Lanka. The choice of the nominal interest rate proxy is dictated by data availability considerations, and, only short-term interest rates are utilized due to the fact that long-term interest rates, such as government bond yields are unavailable for most of these Asian countries. To maintain the consistency and reliability of the data, we cross check with various sources such as International Financial Statistics (IMF), ADB Key Indicators, and Central Banks of respective countries. A more detailed description of the data can be found in Appendix I.

Empirical Results and Discussion

As mentioned earlier, according to equation (2), if real interest rate differentials are stationary and therefore reverting to the long run mean, RIP holds strongly between Japan and the selected Asian country. Otherwise, there will be no cointegration between the two real interest rates.

Table 1 reports the univariate ADF tests on the bilateral real interest differentials with respect to Japan during the first subperiod 1977Q1 to 1984Q4. Obviously, the unit root null hypothesis cannot be rejected for all cases, suggesting the random walk nature of real interest rate differentials. In other words, the mean reverting behavior is ruled out and RIP does not hold. For the post-liberalization period 1985Q1 to 1997Q2 ending prior to the Asia crisis of 1997/98, most of the unit root null hypotheses cannot be rejected according to the ADF test at conventional significance levels (see Table 2). When the sample period is extended to 2001Q4 (Table 3), further evidence of mean reversion of bilateral real interest rate differentials applies. Evidence now applies for the interest rate differentials of Malaysia, Philippines, South Korea, Taiwan and India. Nevertheless, this evidence on RIP remains partial.

INSERT [Tables 1, 2, 3]

Table 4 presents the panel unit root tests. For the first sub-period, the results support the findings of the ADF tests reported earlier. The absence of cointegration between the real interest rates of Japan and other Asian countries during the pre-liberalization period shows evidence against RIP. These findings are not surprising due to the existing restrictions on capital movements in several countries, including Japan. These results differ drastically when the post-liberalization period is considered. When taken as a group, the panel unit root tests reject the unit root hypothesis for the post-liberalization period, before and after the crisis (Table 4). The test statistics are consistent and highly significant at one-percent level, suggesting that the real interest differentials are undeniably mean reverting over time in the long run. Indeed, the RIP is as well being supported when only the ASEAN-5 group is being considered, as illustrated by the results of Table 5.

[INSERT Tables 4 and 5]

The evidence in favor of RIP during the post-liberalization era, even when crisis period is included in the analysis, highlights the substantial financial interdependence among the Asian economies and Japan. This finding is attributed not only to the financial liberalization process in these Asian countries, but also to the Japanese international trade policy. In addition, the results also indicate the benefits of using panel data in exploiting the cross cross-country variations of the data, thus, yielding higher test power in the estimation. More important, the present study choosing Japan as the base country has to a great extent, confirmed the Japanese leading role in the Asian financial markets. Future fluctuations of real interest rates of an Asian country can be determined or forecasted, using the Japanese real rates as part of the information set. The finding of the Japanese leading role through time is in line with the anecdotal evidence of Japanese influence in the region in the form of trade, direct investment, and financial capital flows.

Half-life Analysis

To obtain an insight into the extent of deviations from RIP, Table 6 reports the half-life of deviations from RIP. As shown, the half-lives are about 2.18 to 2.43 quarters (or 6 to 7 months), showing a high degree of mean reversion of real interest rate differentials. For all Asia-10 taken as a group, the post-liberalization period prior to Asia crisis records

a half-life of around 6.75 months. When the post-crisis period is taken into account, the half-life is approximately 7.3 months. As for the ASEAN-5 group, the half-lives are recorded at 6.6 and 6.5 months for the periods with and without the post-crisis period, respectively. Although there are signs of increasing deviations when the crisis period is included, the differences are insignificant and relatively small. To summarize, the deviations from RIP are small while the degree of mean reversion is high, suggesting that the adjustments of real interest rate differentials to their long-run mean are fast. Hence, the half-life analysis has provided solid evidence in support of the strong form of RIP in Asian countries.

INSERT [Table 6]

Concluding Remarks and Policy Implications

The major findings of this study are four-fold: First, RIP holds strongly between Japan and Asian emerging markets. This finding is partly supported by studies that showed a possible 'Japan-centered' regional trading bloc (see e.g. Bowles and MacLean, 1996; Baharumshah and Goh, 2001). In one way, the evidence for RIP between Japan and Asian countries reflects the substitutability of financial assets and the growth of capital flows that are conducive to regional financial integration and economic convergence. In another way, it indicates the smaller scope for monetary autonomy meaning that the domestic interest rate and aggregate price level of an Asian country would be influenced by external factors, most likely originating in Japan. Consequently, this could have narrowed domestic policy options and constrained national choices over monetary and fiscal policies, which may facilitate excessive borrowing. An open capital market could immediately confront national authorities with a dilemma over controlling either interest rates or exchange rates (Obstfeld, 1998). Integration into the global capital market also implies more difficulty to tax internationally footloose capital relative to less mobile factors of production, notably labor.

Second, deviations from RIP have a half-life of approximately 6-7 months. This is considerably less than the half life reported in the PPP studies. However, Holmes' (2002) work on European RIP with Germany taken as the base country has reported a much lower half-life, around 2.2 to 2.6 months. This may suggest that there has been less financial integration in Asia than in Europe. A possible explanation is that, whilst regional initiatives have produced a substantial increase in intra-regional trade and foreign direct investment in Asia, progress towards regional financial integration is still at its infancy stage (Park, 2002). Cross-border bank credit flows within Asia remain at a low level and government or corporate bond markets are not integrated. On the contrary, cross-border transactions of European government bonds have risen sharply with the emergence of the German mark as a benchmark asset in the 1990s. In addition, efforts to abide by the Maastricht Treaty of 1991 have been instrumental in the convergence of interest rates and inflation rates within the European Union. More important, regional integration in Europe is motivated in part by a desire for political integration that has no counterpart in Asia, as highlighted by Panagariya (1994) and Eichengreen and Pempel (2002).

Third, the Asia crisis does not seem to jeopardize the support for the strong form of RIP. This could be due to the resolute actions by policymakers to deepen adjustment and reform effects in response to the sharp curtailment of capital inflows in 1997/98. Indeed, the rapid return of confidence and recovery of investment activities demonstrates the efficiency of the stabilization and deregulation strategies that have been pursued in Asia.

Fourth, the empirical support for RIP is quite weak when the single-equation based ADF test is employed, thus confirming the well-documented power deficiency of ADF tests in finite samples. The results of various panel-based unit root tests used in this study are consistent. By exploiting the cross-sectional information and increasing the data span, these non-stationary panel tests achieve a higher power relative to the classical unit root tests. The failure of previous empirical studies to confirm the mean reversion of real interest rate differentials may therefore reflect the choice of the estimation method used rather than any inherent deficiency in the Real Interest Parity relationship.

In summary, our findings are supportive of financial integration among Asian countries with Japan and carry important policy implications regarding the future exchange rate regime in the area. It is well known that countries highly integrated with each other in the sphere of international trade in goods and services are likely to constitute an Optimum Currency Area (Frankel and Rose, 1998). Although Asian countries may lack the political will evident in the European Union, they appear to be financially integrated, thus providing support to the formation of a single currency area with the Japanese Yen taken as benchmark. For most Asian countries, the settlements of the net balance of trade are in US dollars. During the Asian crisis of 1997/98, the affected countries were in financial trouble and did not have enough foreign exchange reserves to finance their imports. A move to a single currency (say, Yen) would help countries to improve their balance of payment and the Yen could be used to hedge against exchange rate risk. Likewise, strong linkages within the currency area can be a force for stability and convergence, with expanding economies providing additional demand and export markets members experiencing a downturn. In short, the formation of an optimum currency area could provide a collective defense mechanism against systemic failures and monetary instability.

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Figure 1: Real Interest Rates of ASEAN-4

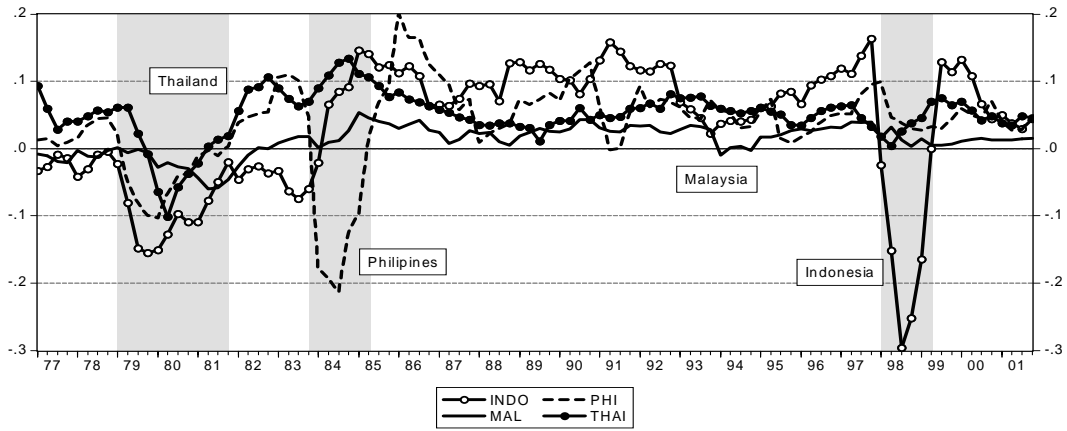


Figure 2: Real Interest Rates of NIE-4

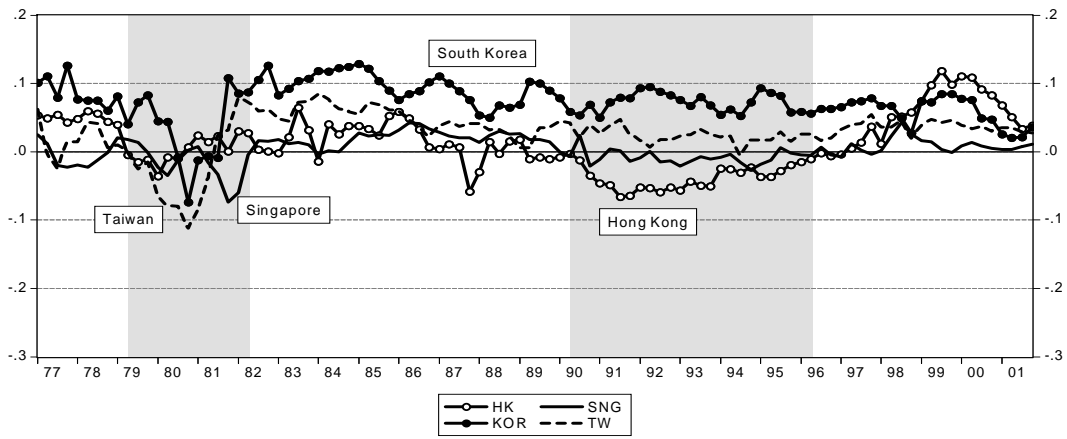


Figure 3: Real Interest Rates of Japan, Sri Lanka and India

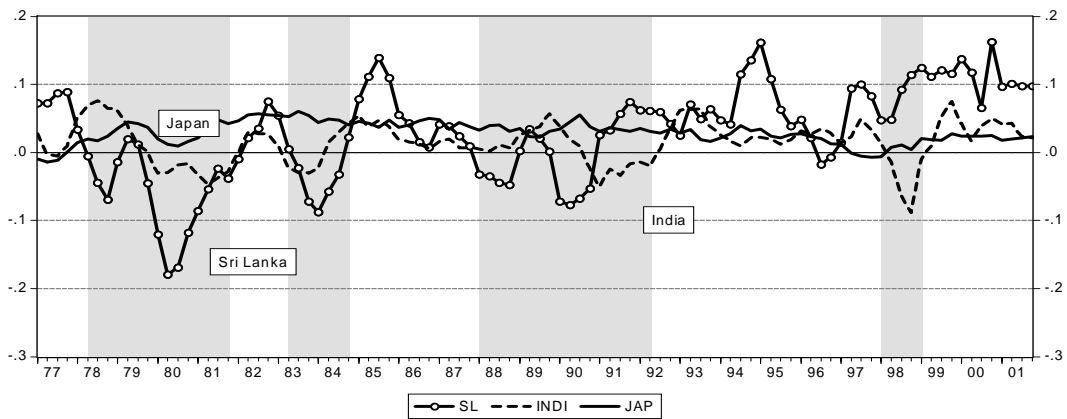


Table 1: ADF Unit Root Test of Real Interest Rate Differentials, 1977Q1-1984Q4

	lag	Model with trend	lag	Model with constant
INDO	1	-2.08	1	-2.06
MAL	1	-1.40	0	-0.99
PHI	0	-1.56	0	-1.44
THAI	0	-1.45	1	-1.56
HK	0	-2.69	0	-2.77
SIN	0	-2.54	0	-2.60
SK	0	-2.20	0	-2.22
TW	0	-2.34	0	-2.28
INDI	0	-1.21	0	-1.44
SRI	0	-1.51	4	-1.44
Critical values				
1%		-4.27		-3.65
5%		-3.56		-2.96

Notes: All real interest differentials are constructed with respect to Japan. The ADF critical values for estimated residuals are computed according to MacKinnon (1991) and optimal lag lengths are selected according to the modified AIC. The following notation applies in all forthcoming tables: INDO=Indonesia, MAL=Malaysia, PHI=Philippines, THAI=Thailand, HK=Hong Kong, SIN=Singapore, SK=South Korea, TW=Taiwan, INDI=India, SRI=Sri Lanka.

Table 2: ADF Unit Root Test of Real Interest Rate Differentials, 1985Q1-1997Q2

	lag	Model with trend	lag	Model with constant
INDO	0	-2.09	0	-2.31
MAL	1	-2.86	1	-3.06 *
PHI	0	-5.13 **	0	-4.78 **
THAI	1	-2.74	1	-2.74
HK	2	-0.42	2	-1.27
SIN	2	-1.13	0	-2.26
SK	0	-3.37	0	-3.58 **
TW	0	-3.32	0	-3.31 *
INDI	0	-2.50	0	-2.57
SRI	0	-3.24	3	-2.89
Critical values				
1%		-4.11		-3.57
5%		-3.50		-2.92

Notes: * and ** denote statistical significance at 5% and 1% levels, respectively. All real interest differentials are constructed with respect to Japan. The ADF critical values for estimated residuals are computed according to MacKinnon (1991) and optimal lag lengths are selected according to the modified AIC.

Table 3: ADF Unit Root Test of Real Interest Rate Differentials, 1985Q1-2001Q4

	lag	Model with Trend	lag	Model with constant
INDO	0	-2.80	0	-2.79
MAL	0	-3.58 *	0	-3.58 **
PHI	0	-5.49 **	0	-5.01 **
THAI	0	-3.33	5	-2.88
HK	0	-1.98	0	-1.72
SIN	2	-1.83	2	-1.93
SK	0	-3.48 *	0	-3.33 *
TW	5	-2.85	5	-2.90 *
INDI	0	-3.08	0	-3.07 *
SRI	0	-3.00	0	-2.75
Critical values				
1%		-4.10		-3.53
5%		-3.48		-2.90

Notes: * and ** denote statistical significance at 5% and 1% levels, respectively. All real interest differentials are constructed with respect to Japan. The ADF critical values for estimated residuals are computed according to MacKinnon (1991) and optimal lag lengths are selected according to the modified AIC.

Table 4: Panel Unit Root Tests of Real Interest Rate Differentials for ASIA-10

	HT		IPS		IPS		UB
	constant	trend	constant (LM)	trend (LM)	constant (T)	trend (T)	
1977Q1-1984Q4	-0.53	0.52	0.33	1.94	-1.12	-0.90	0.85
1985Q1-1997Q2	-50.62**	-30.20**	28.68**	21.20**	-10.99**	-9.47**	-13.20**
1985Q1-2001Q4	-69.08**	-41.78**	40.48**	30.67**	-14.33**	-13.15**	-16.44**

Notes: ** denotes statistical significance at 1% level. HT refers to Harris and Tzavalis (1999); IPS refers to Im, Pesaran and Shin (2003); UB refers to Breitung (2000).

Table 5: Panel Unit Root Tests of Real Interest Rate Differentials for ASEAN-5

	HT		IPS		IPS		UB
	Constant	trend	constant (LM)	trend (LM)	constant (T)	trend (T)	
1977Q1-1984Q4	-1.03	0.63	1.02	0.54	-0.84	-0.46	0.65
1985Q1-1997Q2	-10.69**	-6.06**	4.73**	2.31*	-2.86**	-1.08	-0.89
1985Q1-2001Q4	-10.26**	-5.51**	7.08**	4.20**	-5.49**	-4.45**	-2.76**

Notes: * and ** denote statistical significance at 5% and 1% levels, respectively. HT refers to Harris and Tzavalis (1999); IPS refers to Im, Pesaran and Shin (2003); UB refers to Breitung (2000). ASEAN-5 represents the five original members from ASEAN including Indonesia, Malaysia, Philippines, Singapore and Thailand.

Table 6: Half-life Analysis

Model	Average of $\tilde{\beta}_i$	Half-life (Quarters)
<u>ASIA-10</u>		
1985Q1-1997Q2	0.7355	2.2566
1985Q1-2001Q4	0.7518	2.4301
<u>ASEAN-5</u>		
1985Q1-1997Q2	0.7275	2.1784
1985Q1-2001Q4	0.7296	2.1989

Note: The half-lives are computed for the post-liberalization periods, where RIP is confirmed (see equations (9) and (10) in the text). The measurement units are in quarters. A simple calculation would suggest that, for instance, 2.43 quarters correspond to 7.29 months or 0.6 year.

Appendix I

Conventional measurement of ex ante real interest rates follows the Fisher equation and is based on the differential between nominal interest rates and expected inflation. Nevertheless, there are many ways to proceed in generating a measure of expected inflation (see Baxter, 1994; Larsen et al., 2003). The common procedures are:

- i. to use survey-based measures of inflation expectations;
- ii. to use econometric models to provide estimates of expected inflation
- iii. to obtain an inflation forecast from an estimated time-series model, such as ARMA model;
- iv. to compute the exponential smoothing or moving average of the actual inflation series.

Our study deploys the third procedure of an autoregressive distributed lag (e.g. AR(1) model) to generate the expected inflation as show below.

Data Description, 1977Q1-2001Q4

	Nominal Interest Rates	Price	Source	Expected Inflation, AR(1)
APEC				
Japan	Call Money Rate	CPI	IFS Database	$EF = 0.0243 + 0.9944F_{-1}$
NIE-4				
Hong Kong	Money Market Rate	CPI	IFS Database	$EF = 0.0622 + 0.9910F_{-1}$
Singapore	3-Month Interbank Rate	CPI	IFS Database	$EF = 0.0499 + 0.9816F_{-1}$
South Korea	Money Market Rate	CPI	IFS Database	$EF = 0.1846 + 0.9866F_{-1}$
Taiwan	Money Market Rate	CPI	Taiwanese Monthly Bulletin of Statistics	$EF = 0.0171 + 0.9904F_{-1}$
ASEAN-4				
Indonesia	Call Money Rate	CPI	IFS Database	$EF = 0.2518 + 0.9779F_{-1}$
Malaysia	Interbak Overnight Rate	CPI	IFS Database	$EF = 0.0665 + 0.9820F_{-1}$
Philippines	Money Market Rate	CPI	IFS Database	$EF = 0.2119 + 0.9827F_{-1}$
Thailand	Money Market Rate	CPI	IFS Database	$EF = 0.0707 + 0.9855F_{-1}$
NON-APEC				
India	Interbank Rate	CPI	IFS Database	$EF = 4.2944 + 0.6248F_{-1}$
Sri Lanka	Interbank Call Loan Rate	CPI	IFS Database	$EF = 1.1749 + 0.9442F_{-1}$

Notes:

EF denotes expected inflation while F_{-1} denotes actual inflation (based on CPI, year 2000=100) lagged one period.

ON EAST ASIAN ECONOMIC INTEGRATION: DO ASEAN+3 MEET THE MAASTRICHT CONVERGENCE CRITERIA?

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Introduction

An economic integration represents a unification of countries that has successfully coordinated their economic policies in serving the interest of the region. The foundation of a lucrative union is a common market in which member countries enjoy unimpeded access to resources and technology, in a collaborating endeavour to encourage economic growth through monetary liberalisation and trade cooperation. At present, the developing economies of East Asia have yet to be economically integrated as such. Questions have been raised on whether the East Asian countries should come together as an economic bloc with a single currency similar to the European Union (EU).

Previous establishment of the Association of South East Asian Nations (ASEAN) in 1967 and its proposed tie to China, Japan and Korea (ASEAN+3) thirty years later show that efforts have been initiated to build a stronger economic bond between East Asian countries. Since its establishment, ASEAN has taken various measures to encourage economic growth, observe social progress and enrich cultural development amongst its members, in promoting regional peace and stability. Rewarding economic corporation that has transpired since proves that ASEAN economies are thus willing to join forces and pool resources with fellow neighbours in gaining economic advantage to compete against larger world economies such as the United States of America (USA) and the EU.

In its early years, ASEAN recognized intra-regional trade as a tool in which economic cooperation can be encouraged between member countries. Share of intra-ASEAN trade initially constitutes of merely 12 to 15 percent of total trade between members. ASEAN has since introduced several schemes such as the initial Preferential Trading Arrangement (PTA) in 1977, which was promoted to the Enhanced PTA Programme ten years later. Subsequently, a scheme was launched for the ASEAN Free Trade Area (AFTA)⁴⁷ during the Fourth ASEAN Summit 1992 in Singapore. Besides trade liberalisation, ASEAN also endorses schemes to develop the Trans-ASEAN transportation network for the benefit of regional communications. Above all, schemes and programmes adopted by ASEAN have proven to be prolific through the double increase of intra-ASEAN volume of

⁴⁷ The main objective of AFTA incorporates the increasing of competitive advantage of Asian economies by promoting the region as a single production unit. A proposed acceleration of the AFTA implementation in The Agenda for Greater Economic Integration was accepted in the Fifth ASEAN Summit in Bangkok in 2000.

exports and intra-regional shares of trade for each member country after three years since the notion of AFTA was introduced.⁴⁸ In 1997, the ASEAN Vision 2020 was presented and accepted by ASEAN members, verifying the need to promote regional productivity, economic efficiency and international competitiveness through economic integration. The Vision emphasizes the role of ASEAN in international community and proposes cooperative ties with other East Asian economies. Three identified allies that were proposed were China, Japan and Korea. That year, the framework of cooperation for these economies in the 21st century was agreed and signed upon in a joint statement by the respective national leaders. An outline of the East Asian Cooperation was further refined, made finalized and issued in 1999.

ASEAN+3: Towards East Asian Cooperation

Recently, the ASEAN leaders have expressed their interest in expanding the existing economic cooperation between ASEAN 10 member countries to include China, Japan and Korea.⁴⁹ ASEAN acknowledges the benefits they have gained from sustaining close relations with these three countries and foresees more advantages from the proposed cooperation of ASEAN+3.

China's accession to the World Trade Organisation (WTO) in December 2001 is an advantage in creating better opportunities for China and ASEAN markets, which sums up to over 1.7 billion people with income of an estimated USD2 trillion in Gross Domestic Product (GDP).⁵⁰ China has also agreed to grant several types of aid ranging from special tariffs for the less developed countries to development funds as ASEAN recovers from the recent economic crisis.⁵¹ Meanwhile, Japan, who has been the most important trade partner for ASEAN for the past ten years, has shown strong support to the idea of ASEAN+3. Its share of exports and imports with ASEAN countries has reached over 30 percent of the total volume of trade. As the Japanese government strives to reform its economy back on a sustainable growth path, it is hoped that the reversed economic downturn will encourage new investment flow into the region. In addition to financial and trade agreements, Japan has also assured the ASEAN community of its willingness to participate and assist them in developing infrastructure, healthcare, education and technology. Likewise, President Kim of Korea also expressed his willingness and commitment to strengthen existing relations between his country and ASEAN. Korea has offered a USD2 million fund and to organize joint training programmes that will help

⁴⁸ Exports among ASEAN countries increased from USD43.26 billion in 1993 to approximately USD80 billion in 1996, at an average annual growth rate of 28 percent.

⁴⁹ The 7th ASEAN Summit and the three ASEAN+1 Summits that followed were held in November 2001 at Bandar Seri Begawan, Brunei during which the ASEAN leaders held separate meetings with leaders of China, Japan and Korea. To date, ASEAN constitutes of 10 member countries; Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam.

⁵⁰ Figures are as reported in the press release following the meeting between ASEAN leaders and Premier Zhu of China.

⁵¹ The Asian Financial Crisis was triggered by the collapse of Thai Baht in January 1997, and the impact began to spread from one country to another as massive capital flight and speculative attacks set off regional financial and economic meltdown.

improve labour skill in member countries. Korea has also promised to lend consultation support in the development of human resources, information technology, health and environment in ASEAN. In general, all parties seem to have accepted the proposed idea of ASEAN+3 and welcome having an extended economic bloc in the region.

To examine the potential benefit from such extension of regional integration will require a detailed analysis of financial and economic data from all countries involved. Unfortunately, complete data sets are hardly accessible for some ASEAN countries such as Brunei, Cambodia, Laos, Myanmar and Vietnam. Due to this predicament, only five countries (Indonesia, Malaysia, Philippines, Singapore, and Thailand) are selected to represent ASEAN in the study of its potential integration with the three proposed partners; China, Japan and Korea.

Table 1.1: Selected Indicators (2001)

Country	Area (km ²)	'000 Population (million)	Population Growth Rate (%)	GDP per capita (USD)	Unemployment (%)
China	9543280	1271.9	0.7	912.1	3.6
Indonesia	1904.6	214.8	1.5	577.66	8.1
Japan	377.8	127.3	0.6	29988.18	5.0
Korea	99.3	47.3	0.7	8764.93	3.7
Malaysia	329.8	22.6	2.2	3890.84	3.9
Philippines	300	77.1	2.2	918.79	9.8
Singapore	0.6	4.1	2.7	20084.42	3.4
Thailand	513.1	62.9	0.8	1833.54	2.6

Source: EIU Country Report, IMF Statistical Yearbook, Asian Development Bank.

In 2001, the total population represented by these selected Asian countries reached 1.8 billion, in a total land area of 9.5 billion km². The potential market in these countries alone accounted for one third of total number of consumers in the world. The population growth rate in each averaged at 1.4 percent with the highest rate of 2.7 percent in Singapore and the lowest of 0.7 percent in China. Meanwhile, unemployment rates were sustained at an average of a little over 3 percent for most countries with exceptional cases in Indonesia and Philippines where the rate almost doubled compared to the rest of the group. National income per capita was impressively high in Japan and Singapore with at least USD20,000 each, while a comfortable range of GDP per capita from USD1,000 to USD9,000 was observed in Korea, Malaysia and Thailand. On the other hand, people in China and the Philippines only managed to earn approximately USD900 per person while Indonesians only manage to pull together two thirds of the amount.

The unification of these eight countries alone has a lot to offer to international businesses worldwide. A single economic bloc as such assures greater benefits for international

trade. Export and import data in Table 1.2 reveals that enormous quantities of goods and services of approximately 2.3 trillion worth in total were transported in 2001, and its respective volume amounting to almost 20 percent of overall GDP. Standardized regulations and a single currency serving the union will further ensure efficiency and encourage economic activities. With massive numbers of available work force and scores of abundant resources shared amongst its members, ASEAN+3 stands a greater chance to compete with existing economic giants such as the USA and the EU.

Table 1.2: Gross Domestic Product and Trade Data (2001)

Country	GDP (billion USD)	Export (billion USD)	Import (billion USD)
China	1159.9	266.2	243.6
Indonesia	143.4	44.7	23.3
Japan	3818.7	398.8	374.8
Korea	414.9	178.0	168.3
Malaysia	88.1	102.4	86.3
Philippines	70.8	34.9	33.6
Singapore	82.9	100.9	103.1
Thailand	115.3	76.4	69.4
TOTAL	5894.0	1202.3	1102.4

Source: EIU Country Report, IMF Statistical Yearbook, Asian Development Bank.

ASEAN+3: Based On The Maastricht Convergence Criteria

In the process of forming the EU, a set of convergence criteria was identified to serve as a benchmark for membership qualification into the monetary union. The set of five criteria was finalised and endorsed at the signing of The Maastricht Treaty in Rome, 1991. By measuring the economic performance of the candidate, the treaty decides whether a country that fulfils all five criteria is thus eligible for EU citizenship as the criteria set justifies the quality of a country's prospect in supporting the union in maintaining the economic stability of the region. The five selected criteria are:

Table 1.3: THE MAASTRICHT CONVERGENCE CRITERIA

1. Inflation rate should not be 1.5% higher than the average of the 3 lowest inflation rate in the community;
 2. Long-term interest rate should not be 2% higher than the average observed in the 3 low-inflation countries;
 3. Country should not experience a devaluation during the 2 years prior to entry
 4. Government budget deficit should not be higher than 3% of its GDP.
 5. Government debt should not exceed 60% of its GDP
-

The first criterion requires a candidate country to provide evidence of stable movement of prices. A low inflation rate at no more than 1.5 percent higher than the average of three lowest inflation rates among member countries is thus compulsory. This will ensure that upon joining the union, the new member will be able to integrate without posing threats of sudden price hike for the whole region. Aside from price stability, this criteria set also requires a future candidate to keep the interest rates low and levelled with other members of the union, in order to boost investors' confidence to enter the market. Hence the second criterion calls for a low long-term interest rate that does not exceed by more than 2 percent of the average interest rates in the three members with the lowest inflation rates. Next, there is the exchange rate criterion, in which candidates should attest to the strength of its local currency. A country that has a 'strong' currency should not experience devaluation for at least two years prior to joining the union. Finally, budget deficit and government debt are the two final criteria to conclude the measurement for membership eligibility. Both criteria are aimed to measure the effectiveness of local fiscal policies and as an inference to the political stability under the ruling party of the country. The accomplishment of sustaining a low budget deficit and a minimal debt to GDP ratio serves as evidence to strong and sturdy economic support from its local government. Therefore, a country that fulfils all of these criteria is said to possess the quality qualification to enter a union, as its robust economy with steadfast support from local government shall benefit the regional economy upon its joining as a member.

Applying this set of criteria to the selected eight countries in this study, their current status as candidates for union membership is summarized in Table 1.4. As of the year 2001, data suggest that none of these countries were qualified to join a monetary union. Not a single country from this group was able to satisfy all five criteria denoted by the Maastricht Treaty

Table 1.4: ASEAN+3: Maastricht Convergence Criteria (2001)

Country	Inflation Rate	Interest Rate	Devaluation (% change)	Deficit/Surplus (% of GDP)	Debt (% of GDP)
China	2.3	2.3*	4.4*	-4.4	14.8*
Indonesia	11.5	15.5	-16.9	-1.2*	3.2*
Japan	-0.7*	0.1*	-11.9	7.2	130.0
Korea	4.3	4.9	-6.6	1.7*	31.2*
Malaysia	1.4*	3.4*	0.0*	-5.5	43.6
Philippines	6.1	8.8	-13.0	-4.0	73.9
Singapore	1.0*	1.5*	-5.1	-0.3*	97.0
Thailand	1.6*	2.5*	-7.9	-2.4*	24.7*

Source: Asian Development Bank, Bank Negara Malaysia, World Bank.

Note: Currency devaluation is as measured by averaged annual percentage change from 1999 to 2001. Asterisk “*” indicated criteria fulfilled by individual countries.

Japan, Malaysia, Singapore and Thailand are the only four countries that have successfully sustained low inflation rates while China, Indonesia, Korea and Philippines have failed to satisfy these requirements. Similarly, China joins the previous four countries as qualified candidates according to the interest rate criterion, whereas Indonesia, Korea and Philippines remain to be under qualified. All but two countries (China and Malaysia) have experienced currency devaluation for two consecutive years, undoubtedly still struggling to recover from the financial crisis in 1997. In fact, Malaysia managed to escape the currency devaluation in the aforesaid period due to the radical move of pegging the Malaysian Ringgit to the U.S. Dollar following the financial crisis. The final two criteria which measures government financing show that only half of the group fulfilled the requirements set regarding budget deficit and government debt. In 2001, Korea was the sole country enjoying a surplus while others submit to deficits and debt was notable high in Philippines and Singapore. However, for Japan, despite of having the highest debt to GDP ratio, its low interest rate environment (the lowest among the countries) has helped to prevent panic in its market thus providing support for the local economy. By and large, judging via the five criteria set as the benchmark for EU membership, ASEAN+3 has yet to prove their compatibility and congruence ability in order to actually start a monetary union of their own.

Motivation

The vague implication provided by the results in Table 1.4 calls for further examination on the significance of the Maastricht convergence criteria to serve as a benchmark for

measuring potential membership qualities of Asian economies. However, determining the degree of existing convergence between the selected countries is beyond the scope of this study. Even so, trends of economic data provide evidence of strong relationship between them for the past three decades. All of the economies seem to have grown in a parallel direction; absorbing similar shocks and correspondingly affected by world crisis. This modest sign of convergence among these Asian economies gives support to having a regional economic integration in the region. The prospect of a successful Economic and Monetary Union (EMU) in the future is displayed through the achievement of promising economic growth and the higher level of cooperation embraced between the neighbouring countries over the years. Of course, with the implementation of common macroeconomic policies in the region, good coordination among member countries will help to secure economic stability in the union.

Forming a monetary union in Asia now is more than timely. With the mounting expectation of seeing AFTA in full-course action by 2005, economists debate over the need for Asia to imitate Europe to establish an EMU in the region. Of particular interest, this study wishes to find evidence to support the implication of the readiness of ASEAN+3 members to form an EMU. Since the preliminary observation based on the Maastricht Convergence Criteria shows that these countries are not yet ready for a monetary union, an application of selected statistical tests on the criteria is hoped to shed some light on their significance as a benchmark for membership qualification. Should the findings show that these criteria are statistically insignificant, this study hopes to support that under current economic circumstances, the selected ASEAN+3 economies are not the best candidates to form a monetary union.

Objectives of the Study

The overall objective of this study is to observe the readiness of ASEAN+3 countries to form a monetary union by using the Maastricht Convergence Criteria as a benchmark and to examine the significance of the proposed criteria as a qualifying standard for these economies. This study hopes to find sufficient empirical support to the significance of these criteria to serve as a tool to measure the economic performance and the qualifying property of ASEAN+3 economies towards forming or joining a monetary union.

This study hopes to contribute to the literature of Asian economic integration in which analysis and result of examining the economic performance using the Maastricht Treaty Convergence Criteria may (1) provide preliminary indication of the readiness of ASEAN+3 countries to form a monetary union and (2) support the significance of the adopted criteria set for standard measurement of economic performance granting union membership for the ASEAN+3. Both the examination of present compliance towards economic integration and the application of qualifying criteria set for ASEAN+3 are important with respect to the process of actual forming of a monetary union to ensure feasible coordination of regional economic policies. In addition, a central bank and a common currency may further help to strengthen the union and increase its competitive ability in the world market. Also, a transparent sharing of technology, labour and capital

are inclusive as part of the commitment expected from participating member countries in order to guarantee success in forming a monetary union.

Review of Related Literature

The review of literature presented in this chapter is divided into two parts. The first section presents theoretical support and arguments of forming a monetary union or a single currency area, of its general requirement and benefits for members of the union. The theoretical overview of the concept behind the formation of a monetary union is important to help understand the positive impact it may have to our Asian economy and how it will help encourage economic growth for the region. The second section presents a review of selected studies previously done to examine various issues pertaining to forming a monetary union in Asia and other parts of the world. Many of these studies have found proof to the economic benefit of forming a monetary union while some others offer issues imperative in developing policies for an integrated region.

Monetary Union and Optimum Currency Area

According to De Brouwer (1999) and De Grauwe (1997), characteristics of a monetary union include minimum trade barriers between member countries, minimum restriction to movements of labour and capital across national borders, a single market in which goods and services can be traded with participants from member countries under the same regulations of the integrated economic policies, the opportunity for labor force to move freely within the region to seek better employment and pay, and the opportunity to share knowledge and resources with members of the union.

As to prepare for a monetary union, a selected group of neighbouring countries should first exhibit some level of economic convergence prior to forming a more intensive economic cooperation. And to ensure the successful merging of monetary policies and the interlocking of exchange rates, individual countries' commitment to conform to a centralized body of authority (i.e. a union central bank) is vital. A fixed exchange rate can greatly benefit a union by protecting the region from negative effects of flexible exchange rate. By reducing risk and uncertainty hence boosting foreign investors' confidence in the local market, a fixed exchange rate is argued to be most appropriate for a monetary union. Of course, a single currency is a bonus for a monetary union as it facilitates transaction among members and with the rest of the world. Having a common currency also means huge savings from operational costs since market participants do not have to deal with multiple currencies anymore in trading with members of the union. In addition, a monetary union should have its own central bank to act on behalf and decide for individual national central banks and to monitor the observance of member countries in implementing the centralized economic policies designed to serve the interest of the whole region. Policy issues such as money credit, interest rates, fiscal budget and income policies can be sorted out through the assistance of a union central bank and assured

compliance of union policies will help to achieve designated goals of boosting economic growth and safeguarding the regional economy.

Benefits of a monetary union include a regionally low inflation rate, huge savings of maintaining separate currencies and multiple currency transactions, a protection from speculative attacks on national currency and from external economic shocks, and a stronger competitive ability in international market.

In the case of Asia, a monetary union also encourages political stability in the region by drawing attention to achieving overall economic growth as the main goal. Cooperative relationship between leaders of country members can help promote constructive economic collaborations, through which the benefit of borderless technology and knowledge sharing between members of a union can be fully utilised. Finally, there is the benefit of a common currency may serve as an important icon of political unity for Asia as a monetary union. The common currency for Asia may possibly have a better chance to compete against the majestic US Dollar and the most celebrated Euro with the strong support of member economies. Local securities denominated in the new currency will attract more investors if our Asian currency proves to be stable and strong enough to be compatible in the world market, earning more capital for Asian businesses.

Then again, the trade-offs of forming a monetary union with a common currency include numerous adjustments that can be rather costly. Namely, there will be costs of replacing national currencies with the common money, as there will be the production and distribution costs of the new currency. There will be costs of modifying current banking and financial system to accommodate the dual currency for the early phase of the implementation of the common currency and a whole new system to serve the single currency for members and non-members alike. Information and accounting systems of local and foreign banking institutions will need to be revised since these are companies that hold extensive documentations and records. Aside from financial costs, a monetary union requires total submission of monetary authorities of member countries to centralized economic policy that will be decided by a union central bank. Implying giving up the advantage of individual policy making authority, a member country cannot use exchange rate policy anymore to attract labour from neighbouring countries, nor can it use exchange rate targeting to finance its government spending. Of course, the most dearly sacrifice of all; a member country will lose the seigniorage of its own currency.

However, economists like De Brouwer (1999) believes that these trade-offs are modest compared to all the benefits in store. He argues that these financial costs of adopting a common currency for a union is only a one-time expense and will eventually be offset by savings gained from having a more efficient and attractive market with one single currency as a medium of transaction. The loss of a country's central bank authority and monetary independence will also be compensated through the benefits of trade, improvement in social welfare and overall economic growth.

On the other hand, Robert Mundell introduced the Optimum Currency Area Theory in 1961 to explain the idea of forming a single currency area⁵². This theory was among the first to discuss the monetary integration of several nations within a region to the extent of establishing a common currency to replace individual currencies. Mundell deliberately examine the idea of having a regional monetary union rather than focusing from the national point of view. He argues that by having a single currency that replaces two or three others will benefit in reducing various transaction costs and in increasing the liquidity of the common currency as the area of transaction now expands throughout region. Financial markets are sure to gain from the simplification of operations between one member country to another as well as those involving the region and the rest of the world. Payments can be made by using the common currency and less procedure will definitely increase the market efficiency and investors' confidence, both domestically and internationally. Other advantages of having an optimum currency area include smoother inter-regional adjustment, effective barrier against inflation, and, enhanced factor mobility across the region. Also, having a common currency for the whole group beats having flexible exchange rates in each and every individual member country. Among other flaws, flexible rates may cause destabilizing speculation as uncertainty peaks in international trading and investment, face an offsetting effect of wages and currency devaluation, and they are normally inflationary, as depreciation tends to cause further depreciation. Thus, by forming a single currency area, member countries hope to gain a regionally low inflation rate, a lower transaction cost, a protection against internal and external exchange rate shocks, an automatic mechanism that will enforce uniformed monetary and fiscal discipline and an even stronger competition against other international currencies such as Dollar and Euro.

Previous Studies

Of late, issues pertaining to forming a monetary union have been popular in recent studies by economists worldwide. Some like Wane, Burkett and Guell (1996) and Maudos, Pastor and Seranno (1999), and Rose (1999) support the positive contribution of a union towards economic growth and productivity for a region, whereas others like Pattichis (2002) offer assurance that countries with high growth will be able to maintain their current rates upon joining the other less developed colleagues in a union without the risk of jeopardizing their balance of payments. Meanwhile, many other studies like D'Amato and Pistoiesi (1997), Fountas and Wu (1998), Camarero, Ordonez and Tamarit (2002) and Holmes (2002) examine the level of convergence of selected indicators such as income and interest rates and argued that a high level of convergence between a group of countries improve the opportunity to benefit from an economic and monetary union. Specifically for Asia, several studies such as Trivasvavet (2001), Goglio and Thornton (2002) and Ng (2002) have found evidence supporting the forming of a monetary union in Asia based upon the degree of trade bias in the region, arguing that a further increase in economic size of the market will promote intra-regional trade between Asian countries.

⁵² Robert Mundell, Professor of International Economics at Columbia University, New York received the Nobel Prize for Economics Award in Stockholm, 10 December 1999.

However, there are also studies that opposes the idea of having a monetary union in Asia, such as Sharma and Chua (2000) which argues that trade in the region has naturally grow with the economy and having an economic integration or a free trade area will have little impact on the Asian trade. On top of that, another study by Choudhry, Abu Bakar and Wylie (2000) argues that the determinant of East Asian integration falls mainly upon the proximity and the size of regional economy and has found no evidence to support a Yen bloc for the region.

Support for Forming a Monetary Union

Pattichis (2002) utilized Thirwall's law and vector auto regression (VAR) methods in examining the growth costs for the United Kingdom (UK) should it join the European Monetary Union. This study argued that UK should be able to maintain current growth rate with minimum danger to its balance of payment equilibrium. Maudos, Pastor, and Seranno (1999) used nonparametric frontier technique and utilized the Malmquist index to examine economic growth of the EU members during the period of 1965-1990. They concluded that successive phases of European Economic Integration had been beneficial to promote growth especially in countries that had registered at an earlier date to be a member of the union. The increase in productivity and market efficiency as a country joins a union provided support for the forming of the European Union and also similar integration in Asia and Latin America.

Another study by D'Amato and Pistoiesi (1997) tested the co-movements of Organisation for Economic Co-Operation and Development (OECD) growth cycles, in particular; the short-run and long run convergence of economic growth in selected 21 OECD countries. By using dynamic principal component and coherence analysis, the findings rejected the hypothesis of growth convergence. However, the results presented evidence of co-movement in the growth cycles and particularly supported long run economic integration for the G5 group. Haan and Sturm (2000) provided support for fiscal policy ruling of the Maastricht Treaty to have a reduction effect on budget deficits for 10 OECD countries. Data from 1978-1996 showed that financial markets had disciplining effects on government financial policies following the Maastricht Treaty. The authors argued that through higher interest rate, primary deficits were reduced and a deficit in member country posed threat to an even higher interest rate for the whole union.

The relationship between a union membership and economic growth was examined in Wane, Burkett and Guell (1996). In this study, they found new evidence of positive impact of Communaute Financiere Africaine (CFA) membership upon economic growth in Sub-Saharan Africa countries. Based on the growth model, the authors argued that CFA membership have had positive effect on the economic growth of these countries via productivity of investment. Mkenda (2000) investigated East African Integration between Kenya, Tanzania and Uganda. He used generalized purchasing power parity (PPP) to estimate cointegration between real exchange rates from 1981-1998 in hope to find

support for an OCA. The cointegration results showed that the three countries were affected by similar shocks during the period of study.

Thornton and Goglio (2002) used the gravity model to examine the degree of regional bias in intra-SEA trade. Their findings confirmed the importance of economic size, geographical distance and common language as re-exporting generally promotes ASEAN trade. They also found that the degree of trade bias in South East Asia was higher than it was in North America Free Trade Area (NAFTA) but lower compared to the degree of trade bias in the EU. Rose (1999) found that a common currency had large positive effect on international trade and small negative impact on exchange rate volatility. The gravity model was used to examine effects of exchange rate volatility and customs union on trade for 186 countries from 1970 to 1990 and this study supported that two countries that shared the same currency traded three times as much as they did with other trading partners. Trivasvavet (2001) examined the correlation matrix for supply and demand shocks for eight East Asian countries and tested for the stability of the correlation. High correlation of shocks could suggest OCA and vector auto regression method was applied. His findings support the forming of monetary union for East Asia to start with the South East Asian (SEA) countries followed by South Korea, Japan and Hong Kong.

Support against Forming a Monetary Union

In examining economic integration in Asia, Sharma and Chua (2000) used the gravity model to study the intra-regional trade in the area. Their study found that trade among ASEAN members has increased from 1980 to 1995 but they believed that trade was expected to naturally grow with the size of the economy. They also believed that the proposal of ASEAN integration or ASEAN FTA had little impact in promoting intra-regional trade in the region. Choudhry, Abu Bakar and Wylie (2000) believed that East Asian integration is determined by size and proximity of regional economies. Using the gravity model, this study found evidence of East Asian integration in merchandise trade flow data from 1975-1995. However, the authors argued that their result does not support the Yen bloc for the East Asian region, due to little support from high-powered Asian economies, because of the possibilities that Japanese firms might increase barriers to market access to non-Japanese producers.

In addition, Frankel and Rose (1996) offered an interesting insight to Swedish decision to adopt a common currency and join the EU. Their findings support that Swedish trade has strengthened in correlation with the formation of the EU and Swedish economy was more likely to converge with other EU members after joining the OCA. This has sparked debates between economists who begin to argue whether convergence is a necessary condition that has to be met prior to joining an OCA. Whereas Melitz (1995) discussed issues pertinent to handling the monetary policy integration for a monetary union. He argued that the OCA theory has neglected the distinction between exchange rate adjustment and trade adjustment in quest of standardizing of monetary policies across the region. Meanwhile, Bayoumi and Eichengreen (1997) constructed an OCA index and applied it to EU countries. Results support symbiotic relationship between economic

integration and monetary integration for a region. They argued that a single market promotes bilateral trade that supports economic integration, which encourages monetary integration. They thus conclude that the concepts of EMU and single market showed a self-enforcing and circling nature.

Support For Selected Criteria As Measurement Of Convergence

These studies have applied at least one of the five Maastricht Convergence Criteria in examining the issue of economic and monetary integration. Many of them believed that these criteria pose a method of measurement to study convergence among selected economies. For example, Rao and Thangavelu (2000), and Webber (2001) used the income convergence criteria whereas Fountas and Wu (1998), Camarero, Ordonez and Tamarit (2002) focused on interest rate convergence. Others like Holmes (2002) and Ng (2002) studied inflation rate criteria and correlation of shocks between selected economies. Holmes and Luitel (1999) also tested for exchange rate convergence in their study.

Rao and Thangavelu (2000) tested the hypothesis that poor countries tend to grow faster than rich countries for 59 selected countries. Their study found a statistically significant but weak inverse relationship between trend growth rate and initial per capita GDP among all countries. However, the study also found strong relationship between trend growth rate and initial per capita GDP for 17 countries with per capita GDP of less than USD1000. Webber (2001) investigated a slowing of national income convergence following the 1973 depression. By using the Markov chain method, he examined data from 104 countries for 30 years prior to and following the oil shock. His finding showed that national income convergence was continuously evident at a faster rate before the crisis and the rate has since slowed down after the 1970s.

Ng (2002) attempted to examine the correlation of shocks for the SEA region by using structural VAR and long-run coefficient matrix methods. He found that SEA countries possessed stronger correlated shocks compared to the EU countries. Among the selected countries examined in this study, he found strongest correlation between Indonesia, Malaysia and Singapore. Meanwhile, he also found that large tradable sectors had helped improve intra-regional trade in the region and some evidence suggested that the inflation rate gap in the region had narrowed.

Holmes (2002) applied unit root and cointegration tests on panel data from selected European countries to investigate the long-run inflation convergence in the European Union. His study found evidence of such convergence during the period of 1972-1999, providing support to the relevance of inflation rate as a convergence criterion for a successful monetary union. Holmes and Luintel (1999) offered support to the importance of fixed exchange rate regime for a monetary union. They examined fiscal policies convergence during the Exchange Rate Mechanism (ERM) period of the EU and found

that fixed exchange rate regime tend to improve the degree of fiscal cointegration between EU members.

Fountas and Wu (1998) tested for bilateral interest rate convergence and structural breaks in the European Monetary System (EMS). Using a new test for cointegration that accounts for structural breaks, data for selected EMS countries were examined for the period of 1979-1995. Strong evidence of convergence between German interest rate and four EMS countries were found giving support for interest rate convergence in the EMS. Camarero, Ordonez and Tamarit (2002) also tested for interest rate convergence and structural breaks in the EMS. They examined the link between interest rate within the EU to see if the ERM has led a converging process by using unit roots, uncovered interest rate parity and the Kalman filter methods. They found convergence for some of the EU members whereas others were showing that convergence was still in progress.

Methodology

This section describes data and methods used in the course of the study. The estimation models are derived based on Afxentiou and Serletis (2000), which was partly designed to examine the contribution of the Maastricht Convergence Criteria in promoting overall economic benefits of EU member countries.

Data Source

Data for eight ASEAN+3 countries are primarily obtained from The International Financial Statistics published by the International Monetary Fund (IMF). However, data from publications by Bank Negara Malaysia and the Asian Development Bank are also used to provide supporting figures. For the purpose of this study, six variables are examined for each country. The growth rate of a country's GDP per capita is chosen to represent overall economic growth of each individual country and the five Maastricht Treaty Convergence Criteria are examined for their significance as a contributing factor of economic growth. The five criteria are represented by the inflation rates, the interest rates, the exchange rates, the budget deficit or surplus ratio and the government debt ratio. The inflation rates are measured by the percentage change in the Consumer Price Index (CPI), the interest rates are based on bank deposit rates, the exchange rates are measured in terms of national currency against US Dollar (except China, which available data are based on the value of national currency against Special Drawing Rights or SDR), and the deficit as well as debt ratio are measured by their percentage of GDP.

Due to the number of countries and variables involved, annual data are used to ensure uniformity and consistency based on the data sources. This study attempts to cover the last three decades of Asian economies, specifically the period between 1971 and 2001. The thirty-year period covers the early 1970s and 1990s oil price shocks, the mid 1980s recession and the 1997 Asian Financial Crisis. However, some data are confined to shorter time periods as per reported in the statistics. For example, most data for China

are only available beginning from the 1980s whereas the fifth convergence criterion that calls for data of government debt are only obtainable up to early 1990s for certain countries such as Japan and the Philippines. A summary of data time period by countries is as follows:

Table 3.1: Time Period Of Data For ASEAN+3

Country	Inflation Rate	Interest Rate	Exchange Rate	Deficit/Surplus	Debt
China	1986-2001	1980-2001	1970-2001	1979-2001	1990-2001
Indonesia	1971-2001	1970-2001	1970-2001	1970-2001	1972-1999
Japan	1971-2001	1970-2001	1970-2001	1970-1999	1970-1992
Korea	1971-2001	1970-2001	1970-2001	1970-2001	1970-1998
Malaysia	1971-2001	1976-2001	1970-2001	1970-2001	1970-2001
Philippines	1971-2001	1976-2001	1970-2001	1970-2001	1970-1994
Singapore	1971-2001	1977-2001	1971-2001	1970-2001	1970-2001
Thailand	1971-2001	1977-2001	1970-2001	1970-2001	1970-2001

Source: International Financial Statistics, Asian Development Bank, Bank Negara Malaysia.

Statistical Testing: Unit Root Test

Due to the nonstationary nature of time series data, unit root testing is employed to determine the existence of a unit root among the regressors. Previous studies such as Holmes (2002) had incorporated this test in their examination of convergence criteria. Unit root tests are crucial as nonstationary regressors may affect the validity of standard regression results. Hence, the Phillips-Perron (PP) test is used to examine the stationarity of data in this study. The PP test was developed by Phillips and Perron (1988) and is suitable for use in small sample size data. This test examines the hypothesis $\rho = 1$ in the equation:

$$\Delta y_t = \mu + \rho y_{t-1} + \varepsilon_t$$

The equation is estimated by ordinary least squares, with the options to include constant and/or time trend, and the t-statistic of the coefficient is corrected for serial correlation in t. Theoretically, if Y has a unit root, then a transformation of $\Delta Y = Y_t - Y_{t-1}$ will normally provide stationarity. Thus, the difference series of data are used in regression analysis for data with the evidence of unit root, where appropriate.

The Estimating Models

The estimating models employed in this study are based on the Ordinary Least Squares (OLS) estimates used in Afxentiou and Serletis (2000) in which the Maastricht Convergence Criteria were examined of their significance in contributing to overall economic growth in the EU member countries. In that study, the authors have examined the hypothesis that the Maastricht convergence criteria are conducive to real per capita income growth (g_t) using the following equation:

$$g_t = \alpha_t + \beta_1 \text{INFL}_t + \beta_2 (\text{DEFICIT}_t / \text{GDP}_t) + \beta_3 (\text{DEBT}_t / \text{GDP}_t) + \varepsilon_t$$

where,

g = GDP growth rate per capita
 INFL = Inflation rate
 $\text{DEFICIT}/\text{GDP}$ = Deficit/GDP Ratio
 DEBT/GDP = Debt/GDP Ratio

and β_1 , β_2 and β_3 coefficients are expected to be negative. High rates of inflation, deficit and debt ratio are argued to hold back economic growth, affecting the confidence level of market participants and making local economy unattractive to foreign investors. In this model, the authors had excluded the interest rate factor due to the Fisher effect, which argues that interest rate move one-for-one with inflation by the classical long-run neutrality theory. However, the reason for dropping the currency devaluation factor from the exchange rate criterion was not clarified by the authors.

For the purpose of this study, an OLS regression model is used to examine the statistical significance of each individual criterion against the growth rate per capita of each country.

- (1) $g_t = \alpha + \beta_1 \text{INF}_t + \varepsilon_t$
- (2) $g_t = \alpha + \beta_2 \text{DEFG}_t + \varepsilon_t$
- (3) $g_t = \alpha + \beta_3 \text{DEBG}_t + \varepsilon_t$
- (4) $g_t = \alpha + \beta_4 \text{EXC}_t + \varepsilon_t$
- (5) $g_t = \alpha + \beta_5 \text{INT}_t + \varepsilon_t$

where,

g_t = GDP growth rate per capita
 INF = Inflation rate
 DEFG = Deficit/GDP Ratio
 DEBG = Debt/GDP Ratio
 EXC = Exchange rate
 INT = Interest rate

β_i is the coefficient for each criterion from the Maastricht Convergence Criteria, tested individually one at a time. These simple regressions examine the existence of linear relationship that each individual criterion may have with each individual country's growth rate of GDP per capita. Hence, individual test results may support the β signs and its significance in implying its contributing property towards overall economic growth for any particular East Asian country.

Next, a similar model is used to examine the combination of the MCC criteria set by adopting the model used in Afxentiou and Serletis (2000). Also, two additional models are added in, hoping to examine the coefficient signs and the significance of the interest rate and the exchange rate variables in this sample data. Since all β s are expected to be negative, a multivariate regression analysis is used to examine the signs of the β s and the t-value gives the level of significance for the selected criteria.

$$(6) \quad g_t = \alpha + \beta_1 INF_t + \beta_2 DEFG_t + \beta_3 DEBG_t + \varepsilon_t$$

$$(7) \quad g_t = \alpha + \beta_1 INF_t + \beta_2 DEFG_t + \beta_3 DEBG_t + \beta_4 EXC_t + \varepsilon_t$$

$$(8) \quad g_t = \alpha + \beta_1 INF_t + \beta_2 DEFG_t + \beta_3 DEBG_t + \beta_4 EXC_t + \beta_5 INT_t + \varepsilon_t$$

Chapter Four proceeds to present the test results and discuss the empirical findings of this study. Results may show evidence to support the significant attribute of certain criteria to maintain as a benchmark towards designing a new criteria set for East Asia.

Results and Discussions

This section presents the empirical results and analysis derived in this study. The first test result is of the unit root test for stationarity, using the Phillips-Perron test to determine the stationary level of data prior to OLS estimation. The second set of results shows OLS estimates for models Models (1) through (5), which study the signs and statistical significance of each MCC criterion for every selected country individually. And the third set of results is of Models (6), (7) and (8) which examine the combination of criteria as the benchmark for measuring economic growth in the ASEAN+3 economy. Finally, an overall analysis covering all eight countries is offered at the end of the chapter.

Results of Unit Root Test

The empirical analysis for this study begins with a standard Phillips-Perron Unit Root Test to ensure data used in OLS regression are stationary. The unit root tests are employed using time trend and without time trend for individual sets of data. Data with a PP test statistic absolute value that is larger than the MacKinnon critical values at 5 percent level of significance are assumed to have rejected the hypothesis of a unit root. Since nonstationary regressors may affect the validity of standard regression results, only data that are stationary and does not exhibit unit root are used in the regression analysis. Table 4.1 summarizes the PP test results for GDP per capita growth rate (g_t), inflation

rate (INF_t), deficit/GDP ratio ($DEFG_t$), debt/GDP ratio ($DEBG_t$), exchange rate (EXC_t), and interest rate (INT_t):

Table 4.1: Phillips-Perron Test Results For Stationarity

		Level		1st difference	
		No trend	Trend	No trend	Trend
China	g	-2.059138	-1.880318	-3.679483*	-3.660310*
	INF	-1.226904	-1.867006	-2.810573*	-2.776380**
	DEFG	-2.507202	-2.825259*	-3.618730*	-3.944610*
	DEBG	-1.152681	-1.518175	-2.098039	-2.161031**
	EXC	-0.298802	-1.971445	-4.780099*	-4.670586*
	INT	-1.789621	-1.276068	-3.676238*	-4.005593*
Indonesia	g	-4.191246*	-4.556262*	-17.00745*	-13.89439*
	INF	-4.098762*	-4.095558*	-12.76210*	-10.46767*
	DEFG	-2.981512*	-3.842279*	-8.308007*	-8.002495*
	DEBG	-2.842737*	-3.887729*	-8.402552*	-8.309150*
	EXC	2.880762*	0.320373	-5.262273*	-5.976120*
	INT	-2.610752	-3.231700*	-6.389474*	-6.233961*
Japan	g	-0.297206	-3.798289*	-7.932023*	-7.409934*
	INF	-1.776951	-3.224279*	-6.304400*	-6.004494*
	DEFG	-2.748339*	-2.740607*	-8.302584*	-8.384087*
	DEBG	-1.892577	0.239983	-3.066487*	-4.247632*
	EXC	-1.748999	-1.705810	-5.196218*	-5.821195*
	INT	-0.473977	-2.353884	-4.701277*	-4.724905*
Korea	g	-1.461874	-3.699455*	-8.220618*	-8.159450*
	INF	-1.944156	-2.577492	-5.926912*	-5.782202*
	DEFG	-4.515806*	-4.517419*	-12.13416*	-15.26215*
	DEBG	-1.913880	-2.101300	-3.198739*	-3.056679*
	EXC	-1.462141	-3.735041*	-10.51625*	-10.30065*
	INT	-1.668999	-2.599620	-4.818217*	-4.704831*
Malaysia	g	-4.629173*	-4.905208*	-15.24340*	-15.20152*
	INF	-3.166267*	-3.785010*	-9.885414*	-8.329479*
	DEFG	-1.517675	-1.648918	-4.935987*	-4.867289*
	DEBG	-1.606578	-1.505406	-3.144746*	-3.038103*
	EXC	-0.656097	-2.049749	-5.941459*	-11.02872*
	INT	-1.813004	-1.746197	-4.110936*	-4.430318*
Philippines	g	-4.507553*	-7.071898*	-7.603717*	-7.458865*
	INF	-5.392240*	-7.291803*	-7.223160*	-7.079284*
	DEFG	-2.322556	-2.384933	-7.645621*	-7.456197*
	DEBG	-2.203715	-5.082937*	-16.07437*	-15.62977*
	EXC	1.570000	-1.639429	-5.884904*	-6.579991*
	INT	-1.693988	-2.147116	-3.780739*	-3.788977*
Singapore	g	-2.393309	-3.362783*	-6.141366*	-5.956795*
	INF	-2.716462*	-3.689156*	-11.10848*	-11.14799*
	DEFG	-1.857566	-2.115120	-6.868963*	-6.766883*
	DEBG	-0.935227	-1.954699	-4.166203*	-4.041800*
	EXC	-2.687153	-1.480774	-4.310891*	-5.201897*
	INT	-1.431317	-2.710386*	-4.128283*	-3.888919*
Thailand	g	-2.891930*	-3.598528*	-7.007494*	-6.438009*
	INF	-3.175991*	-3.893543*	-8.381901*	-7.695807*
	DEFG	-2.365986	-2.364982	-6.927654*	-7.078375*
	DEBG	-1.976502	-1.971629	-2.408676	-2.462629**
	EXC	-0.626310	-3.027232*	-8.572234*	-11.00320*
	INT	-1.383258	-1.488072	-4.325290*	-4.865059*

Note: Asterisk “*” and “**” denotes significance at 5 and 1 percent levels, respectively.

Based on the test results of the unit root, the following data for these countries are found to be stationary and treated as I(0) at level:

- i) GDP per capita growth rate for Indonesia, Japan, Korea, Malaysia, Philippines, Singapore and Thailand,
- ii) Inflation rate for Indonesia, Japan, Malaysia, Philippines, Singapore and Thailand,
- iii) Deficit/GDP ratio for China, Indonesia, Japan and Korea,
- iv) Debt/GDP ratio for Indonesia and Philippines,
- v) Exchange rate for Indonesia, Korea and Thailand; and,
- vi) Interest rate for Indonesia and Singapore

whereas the rest of the data tested only exhibit stationarity at first difference. Hence, the application of first difference for these data is employed prior to estimation and this is to eliminate the problem of nonstationarity commonly found in times series data. The validity of result implications derived thereafter is thus supported.

Results of Bivariate Analysis

To help support the β signs and the statistical significance of the variables, this section offers bivariate analysis in which each criterion are tested individually against the GDP per capita growth rate for every country using Models (1) through (5). The results are as follows, with asterisk “*” denoting statistical significance at 5 percent level:

China

Criteria	β	t-statistics	R ²	F-statistics
Inflation Rate (INF)	0.629284	2.988397*	0.407219	8.930514
Deficit/GDP Ratio (DEFG)	-0.856244	-0.734136	0.027584	0.538955
Debt/GDP Ratio (DEBG)	5.697253	1.418891	0.182803	2.013253
Exchange Rate (EXC)	-0.113137	-0.080977	0.000345	0.006557
Interest Rate (INT)	1.280997	1.247546	0.075712	1.55637

Indonesia

Criteria	β	t-statistics	R ²	F-statistics
Inflation Rate (INF)	0.885553	8.022013*	0.68935	64.35269
Deficit/GDP Ratio (DEFG)	-2.031437	-1.593538	0.080514	2.539365
Debt/GDP Ratio (DEBG)	-0.109207	-0.574920	0.012553	0.330533
Exchange Rate (EXC)	-0.000212	-0.257902	0.002288	0.066514
Interest Rate (INT)	-0.003557	-0.011014	0.000004	0.000121

Japan

Criteria	β	t-statistics	R ²	F-statistics
Inflation Rate (INF)	0.876217	8.245902*	0.701015	67.99489
Deficit/GDP Ratio (DEFG)	0.360483	1.192831	0.050060	1.422847
Debt/GDP Ratio (DEBG)	0.206469	0.954407	0.045748	0.910892
Exchange Rate (EXC)	-0.025571	-0.630573	0.013526	0.397622
Interest Rate (INT)	2.019920	1.692118	0.092773	2.863265

Korea

Criteria	β	t-statistics	R ²	F-statistics
Inflation Rate (INF)	0.290157	1.017618	0.035665	1.035546
Deficit/GDP Ratio (DEFG)	0.066105	0.061141	0.000129	0.003738
Debt/GDP Ratio (DEBG)	-1.502571	-1.519442	0.084541	2.308703
Exchange Rate (EXC)	-0.023437	-6.500130*	0.592992	42.25169
Interest Rate (INT)	0.974932	1.046256	0.037624	1.094652

Malaysia

Criteria	β	t-statistics	R ²	F-statistics
Inflation Rate (INF)	1.042915	2.684533*	0.199044	7.206717
Deficit/GDP Ratio (DEFG)	1.241286	2.955732*	0.237812	8.736353
Debt/GDP Ratio (DEBG)	-0.737545	-5.401745*	0.510308	29.17885
Exchange Rate (EXC)	-7.397818	-1.476206	0.072208	2.179183
Interest Rate (INT)	0.576611	0.778181	0.025654	0.605566

Philippines

Criteria	β	t-statistics	R ²	F-statistics
Inflation Rate (INF)	0.622899	7.231873*	0.643296	52.29999
Deficit/GDP Ratio (DEFG)	0.809305	0.807242	0.022744	0.65164
Debt/GDP Ratio (DEBG)	0.022355	0.280308	0.003559	0.078573
Exchange Rate (EXC)	0.173037	0.415577	0.00613	0.172704
Interest Rate (INT)	1.325219	4.35693*	0.452157	18.98284

Singapore

Criteria	β	t-statistics	R ²	F-statistics
Inflation Rate (INF)	0.913615	4.839008*	0.446734	23.41600
Deficit/GDP Ratio (DEFG)	0.261574	0.828583	0.023933	0.686549
Debt/GDP Ratio (DEBG)	-0.819352	-4.274085*	0.394828	18.26780
Exchange Rate (EXC)	-26.23684	-2.984264*	0.241312	8.905830
Interest Rate (INT)	1.441763	2.910723*	0.269199	8.472311

Thailand

Criteria	β	t-statistics	R ²	F-statistics
Inflation Rate (INF)	0.784253	4.336719*	0.393396	18.80713
Deficit/GDP Ratio (DEFG)	1.188442	2.536946*	0.186900	6.436092
Debt/GDP Ratio (DEBG)	-1.477072	-6.790993	0.622222	46.11759
Exchange Rate (EXC)	-0.112137	-0.722004	0.018277	0.521289
Interest Rate (INT)	1.446510	2.542715*	0.227132	6.465401

Bivariate analysis on each criteria for every country has shown that very few of the five selected criteria are statistically significant in explaining the movement of GDP per capita growth rate in East Asian countries for the last thirty years. For example, results for China, Indonesia, and Japan only provide support of significance for a single criterion which is the inflation rate variable. Meanwhile in Korea, the only criterion found to be significant is the exchange rate. The rest of the countries examined in this study manage to give concurrent support to two or more criteria for each country, namely the inflation rate and interest rate for the Philippines; inflation rate, deficit/GDP ratio and debt/GDP ratio for Malaysia; inflation rate, deficit/GDP ratio and interest rate for Thailand; and finally, inflation rate, debt/GDP ratio, exchange rate and interest rate for Singapore.

The β signs of these statistically significant variables are of positive values, which contradict with the negative signs initially expected in the beginning of the study and this is evident for all criteria except debt/GDP ratio and exchange rate. Nonetheless, corresponding to the European results of Afxentiou and Serletis (2000), debt/GDP ratio is found to have significant negative relationship with GDP per capita growth rate in Malaysia and Singapore whereas exchange rate shows similar negative effect in Korea and Singapore.

Results of Multivariate Analysis

The regression analysis using models (6), (7) and (8) are specifically designed to examine the coefficient signs of Maastricht Convergence Criteria as explanatory variables for explaining economic growth in East Asia. According to Afxentiou and Serletis (2000), of which these models are derived from, the coefficient signs for all criteria should be negative. A negative coefficient implies that a variable has an adverse effect in promoting economic growth.

For example, a price hike that may have been caused by escalating demand in an economy may force the government to increase the interest rate hoping to curb the rising inflation. An increase in interest rate will discourage public spending, as savings will be most favourable. Also, high interest rates generate higher price of capital for businesses and loans become more costly. Hence, a rise in both inflation rate and interest rate will reduce spending power and demand, also the ability to produce in the economy thus resulting in a much lower growth rate over time. Similarly, a nation's productivity and economic growth faces higher risk if its national currency is experiencing prolonged

devaluation, especially if trade is a major contribution to its GDP. For a country that depends on foreign investment, a weak currency may deter foreign interest. The nation's productivity in the long run will be affected if their national market continues to lose foreign investment. Finally, high deficit and debt ratio tend to raise alarm and shatter investors' confidence in local government. Also, the government now has an obligation to pay off huge debts and interests resulting from all its borrowing thus this may lower government expenditure that may have been imperative in helping to boost productivity and growth in the local economy.

Consequently, the coefficients (β_1 to β_5) of all variables representing the five Maastricht Convergence Criteria are expected to have negative signs in relation to GDP per capita growth rate. It is also necessary for the criteria to show statistical significance to be considered conducive in measuring ASEAN+3 economy. Having defined the expected outcome from these models, the actual regression results for each ASEAN+3 country, with asterisk "*" denoting statistical significance at 5 percent level are as follows:

China

Model (6):

$$\Delta g_t = -4.648376 + 0.806489\Delta INF_t - 1.806664DEFG_t + 3.359896\Delta DEBG_t$$

$$(-1.707591) \quad (4.292663)^* \quad (-1.684465) \quad (1.651993)$$

$$R^2 = 0.844175, \quad F\text{-Stat} = 12.64075$$

Model (7):

$$\Delta g_t = -0.892425 + 1.259724\Delta INF_t - 0.757104DEFG_t + 0.098483\Delta DEBG_t$$

$$(-0.323933) \quad (4.975915)^* \quad (-0.773430) \quad (0.044974)$$

$$-2.330292\Delta EXC_t$$

$$(-2.224253)$$

$$R^2 = 0.914595, \quad F\text{-Stat} = 16.06347$$

Model (8):

$$\Delta g_t = -0.600828 + 1.321878\Delta INF_t - 0.653359DEFG_t - 0.086406\Delta DEBG_t$$

$$(-0.173875) \quad (2.901292)^* \quad (-0.531965) \quad (-0.032940)$$

$$-2.503913\Delta EXC_t - 0.185186\Delta INT_t$$

$$(-1.639443) \quad (-0.171642)$$

$$R^2 = 0.915096, \quad F\text{-Stat} = 10.77797$$

For China, the regression models seem to fit quite well and R^2 slightly increases as exchange rate and interest rate variables were introduced. The F-statistic indicates that at least one of the coefficients is probably a non-zero for all three models. However, individual t-statistics (in parentheses) show that only the inflation rate variable is statistically significant at 95 percent confidence level (indicated by “*”). As for the signs of the coefficients, statistics reveal that deficit/GDP ratio, exchange rate and interest rate are consistent in retaining negative relationship with GDP per capita growth rate whereas debt/GDP ratio only show a negative sign for β in the third model. Inflation rate, which is the only statistically significant variable, shows a positive relationship with respect to GDP per capita growth rate under all circumstances.

Indonesia

Model (6):

$$g_t = 12.04843 + 0.864069INF_t - 0.287598DEFG_t - 0.104976DEBG_t$$

(2.638044) (6.83804)* (-0.331531) (-0.954343)

$$R^2 = 0.695427, \quad F\text{-Stat} = 18.26629$$

Model (7):

$$g_t = 5.172411 + 1.131238INF_t + 0.851069DEFG_t + 0.200163DEBG_t$$

(1.893494) (8.630919)* (1.070296) (1.564709)

$$- 0.003423EXC_t$$

(-3.414560)*

$$R^2 = 0.797884, \quad F\text{-Stat} = 22.69904$$

Model (8):

$$g_t = 7.705830 + 1.201487INF_t + 1.257213DEFG_t + 0.287999DEBG_t$$

(1.779845) (9.188716)* (1.591200) (2.196211)

$$-0.002279EXC_t - 0.547323\Delta INT_t$$

(-1.992542) (-1.820508)

$$R^2 = 0.824346, \quad F\text{-Stat} = 20.64925$$

Although the explanatory power of Models (6), (7) and (8) increases as more criteria are introduced to the set and F-statistics rejects the hypothesis of all coefficients are equal to zero, only the inflation rate variable has shown sufficiently large t-statistics to be significant for all models whereas the exchange rate shows significance in the second model alone. Other variables remain insignificant regardless of various combinations of the criteria. Similar to China, the inflation rate in Indonesia also has a positive effect on its GDP per capita growth rate. But the exchange rate has a negative impact on the

economic growth in Indonesia, especially since the currency has been the most volatile for the last few decades. Although some of the coefficients for other criteria show the expected negative signs, the t-statistics are not sufficient to reject the null hypothesis of $\beta_i=0$.

Japan

Model (6):

$$g_t = 4.396467 + 0.766670INF_t + 0.132007DEFG_t - 0.150339\Delta DEBG_t$$

(5.438562) (6.332758)* (0.608275) (-0.950856)

$$R^2 = 0.716500, \quad F\text{-Stat} = 14.32159$$

Model (7):

$$g_t = 4.238222 + 0.774216INF_t + 0.077693DEFG_t - 0.173564\Delta DEBG_t$$

(4.972230) (6.271533)* (0.332015) (-1.057884)

$$- 0.015881\Delta EXC_t$$

(-0.691527)

$$R^2 = 0.724728, \quad F\text{-Stat} = 10.53106$$

Model (8):

$$g_t = 4.086786 + 0.820714INF_t + 0.062559DEFG_t - 0.231061\Delta DEBG_t$$

(4.510663) (5.544745)* (0.260474) (-1.196926)

$$- 0.014598\Delta EXC_t - 0.499816\Delta INT_t$$

(-0.620190) (-0.598668)

$$R^2 = 0.731151, \quad F\text{-Stat} = 8.158691$$

R^2 values in these regressions indicate that they are able to explain more than 70 percent of the variance of GDP per capita growth rate in Japan. The F-statistics are also sufficient to reject the null hypothesis of all $\beta_s = 0$. None of the criteria has shown statistical significance at 95 percent confidence level except inflation rate in all three models whereas other criteria remain insignificant throughout the analysis. And as in the cases of China and Indonesia, the Japanese inflation rate also has a positive sign for its coefficient. Consistent positive signs are also evident for deficit/GDP ratio in all models while the remaining variables: debt/GDP ratio, exchange rate and the interest rate are showing the corresponding negative signs albeit being statistically insignificant.

Korea

Model (6):

$$g_t = 11.35424 + 0.442472\Delta INF_t - 6.996933DEFG_t - 5.758892\Delta DEBG_t$$

(5.251531) (2.09382)* (-4.402816)* (-4.765189)*

$$R^2 = 0.526978, \quad F\text{-Stat} = 8.541167$$

Model (7):

$$g_t = 27.00813 + 0.355998\Delta INF_t - 3.986745DEFG_t - 3.45102\Delta DEBG_t$$

(5.477545) (2.015206)* (-2.516836)* (-2.516206)*

$$- 0.016762 EXC_t$$

(-3.406841)*

$$R^2 = 0.690344, \quad F\text{-Stat} = 12.26162$$

Model (8):

$$g_t = 26.74668 + 0.223828\Delta INF_t - 4.442048DEFG_t - 3.221987\Delta DEBG_t$$

(5.486671) (1.09575) (-2.764474)* (-2.669416)*

$$- 0.016582EXC_t + 0.942602\Delta INT_t$$

(-3.410525)* (1.244546)

$$R^2 = 0.711614, \quad F\text{-Stat} = 10.36381$$

The explanatory power of these estimation models examining the Korean data improves relatively well with each expansion of criteria set, compared to other countries. These encouraging values of R^2 suggest that the models are getting better at explaining the variance of GDP per capita in Korea. Even the F-statistics are sufficiently large to reject the hypothesis of all β values are equal to zero. Moreover, deficit/GDP ratio, debt/GDP ratio and exchange rate variables consistently show statistical significance at 95 percent confidence level in all three models, as does inflation rate in the first two. It is also noted that throughout the analysis, inflation rate and interest rate maintain positive relationships to GDP per capita growth rate, similar to other ASEAN+3 countries examined in this study, while other variables indicate negative relationships, true to our initial expectation.

Malaysia

Model (6):

$$g_t = 4.584126 + 0.999252INF_t + 0.81697\Delta DEFG_t - 0.534754\Delta DEBG_t$$

(3.359492)* (3.908912)* (2.632788)* (-4.276606)*

$$R^2 = 0.712376, \quad F\text{-Stat} = 21.46526$$

Model (7):

$$g_t = 4.944798 + 0.935826INF_t + 0.819788\Delta DEFG_t - 0.524632\Delta DEBG_t - 2.978287\Delta EXC_t$$

(3.499218)* (3.549036)* (2.640551)* (-4.179747)*
(-0.988046)

$$R^2 = 0.723185, \quad F\text{-Stat} = 16.32829$$

Model (8):

$$g_t = 2.913634 + 1.379481INF_t + 0.698878\Delta DEFG_t - 0.482636\Delta DEBG_t - 0.524103\Delta EXC_t - 0.215485\Delta INT_t$$

(1.454879) (2.774663)* (2.275736)* (-4.187204)*
(-0.188094) (-0.374648)

$$R^2 = 0.701381, \quad F\text{-Stat} = 8.925249$$

The models are able to explain approximately 70 percent of the variance of Malaysian GDP per capita growth rate and the F statistics are sufficiently large to support that at least one of the coefficients is not equal to zero. Three of the variables: inflation rate, deficit/GDP ratio and debt/GDP ratio variables are significant at 95 percent confidence level in all three models. On the other hand, exchange rate and interest rate variables have not shown any statistical significance in explaining the dependent variable. The β signs are consistently positive for inflation rate and deficit/GDP ratio variables; and negative for debt/GDP ratio, exchange rate and interest rate variables.

Philippines

Model (6):

$$g_t = 6.465428 + 0.671042INF_t + 0.28797\Delta DEFG_t - 0.046141DEBG_t$$

(3.115033) (6.141103)* (0.382117) (-0.87471)

$$R^2 = 0.669474, \quad F\text{-Stat} = 12.82806$$

Model (7):

$$g_t = 7.150122 + 0.634981INF_t + 0.617877\Delta DEFG_t - 0.072518DEBG_t + 0.866481\Delta EXC_t$$

(3.115033) (5.896072)* (0.81797) (-1.355777)
(1.576172)

$$R^2 = 0.70956, \quad F\text{-Stat} = 10.99374$$

Model (8):

$$g_t = 5.691145 + 0.37078INF_t + 0.504362\Delta DEFG_t + 0.027275DEBG_t$$

(2.338257) (2.597627)* (0.7176) (0.483045)

$$+ 0.709081\Delta EXC_t + 0.63688\Delta INT_t$$

(1.417) (1.615031)

$R^2 = 0.780344,$ $F\text{-Stat} = 8.526177$

Debt/GDP ratio for the Philippines shows a negative relationship with GDP per capita growth rate in the first two models while other variables tested have positive coefficients. However, inflation rate is the only criterion of statistical significance at 95 percent confidence level. The explanatory power, R^2 has improved substantially from 67 percent to 78 percent when exchange rate and interest rate variables were introduced to the initial combination of criteria in Model (1). But since both variables are found statistically insignificant, along with deficit/GDP ratio and debt/GDP ratio, this analysis offers a weak support to their role in influencing the local economy. Nonetheless, the F-statistics for all the three models suggest that at least one of the coefficients is significant, and does not equal to zero.

Singapore

Model (6):

$$g_t = 7.223944 + 0.710661INF_t - 0.021926\Delta DEFG_t - 0.570817\Delta DEBG_t$$

(6.252351) (4.086387)* (-0.100811) (-3.160336)*

$R^2 = 0.635603,$ $F\text{-Stat} = 15.11695$

Model (7):

$$g_t = 7.289145 + 0.602544INF_t - 0.046817\Delta DEFG_t - 0.562087\Delta DEBG_t$$

(6.369702) (3.128207)* (-0.216632) (-3.142923)*

$$- 9.02871\Delta EXC_t$$

(-1.24893)

$R^2 = 0.657004,$ $F\text{-Stat} = 11.97179$

Model (8):

$$g_t = 2.143320 + 0.627683INF_t - 0.299780\Delta DEFG_t - 0.765824\Delta DEBG_t$$

(1.514011) (1.208531) (-1.766997) (-4.861787)*

$$- 9.717553\Delta EXC_t + 1.112822INT_t$$

(-1.730940) (2.286100)

$$R^2 = 0.818682, \quad F\text{-Stat} = 17.15768$$

Singapore is the only other East Asian country selected in this study that shows the most consistent signs in its coefficients. The inflation rate is found to be statistically significant in the first two models with a positive sign whereas among the correctly observed negative signs in other criteria, only the debt/GDP ratio variable is significant at 95 percent confidence level and this is true in all three models. The R^2 values for all estimation models suggest that these combinations of criteria may have a relatively good explanatory power to explain the variance of GDP per capita growth rate in Singapore. An equally high F-statistics is sufficient to reject the hypothesis of all β 's = 0, giving support to the significance of some of these criteria in measuring the Singaporean economy.

Thailand

Model (6):

$$g_t = 7.45691 + 0.525219INF_t + 0.216813\Delta DEFG_t - 1.199358\Delta DEBG_t$$

(8.085281) (4.66891)* (0.802602) (-6.36707)*

$$R^2 = 0.799035, \quad F\text{-Stat} = 34.45849$$

Model (7):

$$g_t = 7.668792 + 0.401256INF_t + 0.290857\Delta DEFG_t - 1.012421\Delta DEBG_t$$

(8.229098) (4.059308)* (1.300008) (-6.186490)*

$$- 0.271631EXC_t$$

(-3.635925)*

$$R^2 = 0.868547, \quad F\text{-Stat} = 41.29543$$

Model (8):

$$g_t = 6.862861 + 0.552310\text{INF}_t + 0.194453\Delta\text{DEFG}_t - 1.248161\Delta\text{DEBG}_t$$

(3.430624) (3.958429)* (0.750302) (-7.365418)*

$$- 0.136314\text{EXC}_t + 0.044098\Delta\text{INT}_t$$

(-1.242826) (0.215180)

$$R^2 = 0.836033, \quad \text{F-Stat} = 19.37540$$

Three of the criteria, inflation rate, debt/GDP ratio and the exchange rate show evidence of being statistically significance with consistent positive signs of coefficient for inflation rate and negative for debt/GDP ratio and exchange rate. Although there is not enough support of statistical significance in these models, deficit/GDP ratio and interest rate seem to exhibit positive relationship towards the dependent variable. A fairly large F-statistics further suggest that at least one of the coefficients for these variables has a value of greater than zero. The expansion of estimating models increases the R^2 values to exceed 80 percent. However, a decrease in R^2 and F-statistics values in Model 3 and also the insignificance of exchange rate criterion support the Fischer effect of adding interest rate to the variables.

Discussions

From the regression results of both bivariate and multivariate analysis, this study has found little evidence to support that the criteria set used as the benchmark for candidate countries joining the EU, which is known as the Maastricht Convergence Criteria, is thus significant as contributing factors to the economic growth in the ASEAN+3 economies. Some of these criteria have failed to show statistical significance when tested individually or as part of a criteria set, which reduces support on its ability to explain and measure the overall economic growth rate in this region.

Single one-to-one bivariate analysis between each criterion and the GDP per capita growth rate mostly fails to provide statistical support of significance for individual criterion in each country. Results reveal that inflation rate is the only criterion found to be statistically significant in almost all countries except Korea. In all cases, the inflation rate seems to have a positive relationship with the GDP per capita growth rate. This is much likely a portrait of the developing nature of East Asian economies in which as the economies grow and production increases, encouraging demand of locally cost-saving produced goods are pushing up the relative prices. Korea, on the other hand, has emerged as one of the manufacturers of good, quality electronic and telecommunication products since the last three decades and made famous with brand names such as Samsung and LG. In fact, economies worldwide regard Korea as the next giant producer of trusted brands after Japan and this helps to secure strong demand that leads to robust

economic growth regardless of price movement, hence explaining the less significant nature of inflation rate towards its economy.

Meanwhile, the deficit/GDP ratio, which represents excessive government spending, is found to be positively significant to economic growth in two of the countries, Malaysia and Thailand. As with other small East Asian countries, the economies in these two countries have been heavily supported by their respective government especially through capital injection and funding of infrastructure during the 1980s and most recently, in the late 1990s. Thus, in the most trying times, running budget deficit is seen as a continuous effort of the local government to help promote economic recovery through huge capital spending on government projects. Yet, the examination of the debt/GDP ratio, which is proclaimed to be another measurement tool of the role of local government in an economy, shows that this criterion is negatively significant in Malaysia and Singapore. Both countries have reported huge debt over the last thirty years and have probably been viewed as a threat to the stability offered by their respective ruling government at that time. As both Malaysian and Singapore's Prime Ministers have been globally regarded as the lead man running the show in their respective economies, the high government debt may have affected the level of confidence and trust investors have on their countries.

Nonetheless, exchange rate does not seem to make a lot of impact on economic growth in any of these East Asian countries, only in Korea and Singapore where there has been a huge increase in volume of international trading. Strangely, Japanese exchange rate does not seem to play significant role in explaining its economic growth. A probable reason for its insignificant role is that the global confidence and trust in Japanese well-established economy has always been superior to the exchange rate volatility hence the little dependence on this criterion. As for the rest of other small yet developing economies, the value of their currency is far too small to make an impact on the international demand for their exports. Trade and foreign investment continue to prosper supported by other qualities such as cheap labour costs and low prices, thus exceeding the pressure of any exchange rate movement. Finally, the last criterion of interest rate has shown statistically significant positive relationship with regards to the GDP per capita growth rate in Philippines, Singapore and Thailand. No doubt that Singapore's interest rate plays a vital role in sustaining its huge internationally recognized financial market. But although foreign direct investment only makes up a small proportion of national output in the Philippines and Thailand, interest rate may still have some positive effect on local economic growth. A favourable interest rate may provide the much-needed motivation for investors to invest more into local businesses in addition to external support received via foreign aids from abroad.

Results from the multivariate analysis show that only the first two sets of criteria, namely Models (6) and (7), achieves comprehensive statistical support in explaining the GDP per capita growth and this is only true in Korean case. In Model (6), the selected criteria selected are inflation rate, deficit/GDP ratio and debt/GDP ratio. In Model (7), the exchange rate criterion is added to the previous combination. This also carries some evidence that adding the interest rate criterion in Model (8) may be subjected to the Fischer effect as in cases like Thailand. Whereas in other countries, none of the three

proposed combination based on the EU convergence criteria are found to be significant in representing the overall performance of these economies.

In general, the findings of this analysis is summarized in Table 4.2:

Table 4.2: Supporting Evidence For Maastricht Convergence Criteria In Selected East Asian Countries

Country	Model	Inflation Rate	Deficit/GDP Ratio	Debt/GDP Ratio	Exchange Rate	Interest Rate
China	(1)-(5)	+*	-	+	-	+
	(6)	+*	-	+	n/a	n/a
	(7)	+*	-	+	-	n/a
	(8)	+*	+	-	-	-
Indonesia	(1)-(5)	+*	-	-	-	-
	(6)	+*	-	-	n/a	n/a
	(7)	+*	+	+	_*	n/a
	(8)	+*	+	+	-	-
Japan	(1)-(5)	+*	+	+	-	+
	(6)	+*	+	-	n/a	n/a
	(7)	+*	+	-	-	n/a
	(8)	+	+	-	-	-
Korea	(1)-(5)	+	+	-	_*	+
	(6)	+*	_*	_*	n/a	n/a
	(7)	+*	_*	_*	_*	n/a
	(8)	+	_*	_*	_*	+
Malaysia	(1)-(5)	+*	+*	_*	-	+
	(6)	+*	+*	_*	n/a	n/a
	(7)	+*	+*	_*	-	n/a
	(8)	+*	+*	_*	-	-
Philippines	(1)-(5)					
	(6)	+*	+	-	n/a	n/a
	(7)	+*	+	-	+	n/a
	(8)	+*	+	+	+	+
Singapore	(1)-(5)	+*	+	_*	_*	+*
	(6)	+*	-	_*	n/a	n/a
	(7)	+*	-	_*	-	n/a
	(8)	+	-	_*	-	+
Thailand	(1)-(5)	+*	+*	-	-	+*
	(6)	+*	+	_*	n/a	n/a
	(7)	+*	+	_*	_*	n/a
	(8)	+*	+	_*	-	+

Note: Signs “+” or “-” represents the signs of the coefficients and asterisk “*” denotes statistical significance at 5 percent level.

Conclusions

This section presents the empirical findings resulting from this study, its implications and recommendations for future research.

An overview

East Asian economic integration offers huge forthcoming benefits to the region. Firstly, with an integrated market that serves local businesses in a liberalised environment with less trade restrictions, easier access to local resources plus an increase in factor mobility; regional production is bound to expand at a greater scale. Producing countries will definitely benefit from the much lower costs of attaining resources also from the sharing of technology between more and the less developed economies. Secondly, with the strong back up by a regional economic system and well-coordinated macroeconomic policies that protect and serve the interest of all country members, market efficiency and investors' confidence will be increased. These and many other factors will ensure that East Asia will emerge as a new highly competitive economic bloc in the world market. Aside from monetary gains, social welfare for the whole region stands a better chance to become at par with the more well to do countries in the other parts of the world as the economy grows as a union.

Hence, spurred from the need to push forward the proposal of establishing an economic bloc in East Asia, economic studies seek supports from all directions that include examining the actual process of forming a monetary union. Taking cue from the similar process undertaken by the EU prior to its establishment, serious considerations should also be given to the criteria used to monitor the enrolment of candidate countries into the union. In the European case, five criteria are selected as a benchmark for economic competency of a candidate country before it is considered for admittance into the economic bloc. These five criteria are measured by the inflation rate, exchange rate, interest rate, deficit/GDP ratio and debt/GDP ratio. Only countries that manage to fulfil the requirements for each criterion is deemed fit to enter the union.

However, to apply these criteria as a benchmark for the East Asian economies requires further assessment. Are these criteria significant enough as a measurement tool for our economies and does the combination truly reflect the competency of East Asian economies in forming a monetary union? Hence, it is the intention of this thesis to provide some empirical support in finding out the answers to the above issues. Unfortunately, this study is partially affected by the limitations of data especially for China. Most of its data are only available beginning from the late 1980s, whereas data concerning the deficit/GDP ratio for Japan and Philippines are limited to the early 1990s even though the sample period of this study should cover until year 2001. These data limitations have posed a problem that suppresses the number of observations available for empirical analysis.

Summary of Empirical Findings

The empirical analysis of this study begins with the Phillips-Perron Stationarity Test in order to determine at which level do the data exhibit stationarity for the purpose of regression analysis application. All data representing the five Maastricht Convergence Criteria including the growth rate of GDP per capita are examined prior to estimation. Results show that most data are stationary at first difference whereas some exhibits stationarity at level. Hence, the estimation process incorporates these qualities to ensure the validity of the regression results.

The first part of regression analysis involved bivariate analysis in which each criterion are tested individually against GDP per capita growth rate for every country, in hope to find support to its weight as a measurement for the local economic growth. Results, as summarized in Table 4.2, again show that inflation rate is found to be significant in most cases with a positive sign implying a direct relationship between inflation and economic growth. And although the deficit/GDP ratio and interest rate are also found to have positive relationship on GDP per capita growth rate, this criterion shows no statistical significance at 5 percent level except for two or three countries in particular. Other criteria mainly show negative signs and statistical significance is only evident in two countries for each debt/GDP ratio and exchange rate criterion, respectively.

The second part of the empirical study incorporates a multivariate analysis in which GDP per capita growth rate for each individual country is estimated against three sets of criteria. Model (6) includes inflation rate, deficit/GDP ratio and debt/GDP ratio based on Afxentiou & Serletis (2000); Model (7) adds exchange rate criterion to the combination; and Model (8) incorporates all five Maastricht Convergence Criteria into the regression model.

Regression results show that these combinations can explain the trend of economic growth considerably well in almost all selected countries except Japan and the coefficient signs for the inflation rate, deficit/GDP ratio and interest rate are mostly found to be positive whereas the coefficients for debt/GDP ratio and exchange are mainly negative. Although the results portray relatively good explanatory power, very few of these criteria show statistical significance in the proposed models. Only inflation rate scores highest in frequency of being statistically significant while others are found to be significant in very few rare occasions.

Implications of Study

In general, the results from the regression analysis indicate the followings:

- Currently, the Maastricht Convergence Criteria set serves as a poor measurement or representation of the economic performance for the East Asian region. Inflation rate is the only criterion that is found to be statistically significant and have a positive relationship towards GDP per capita growth rate.

- Statistical significance for the criteria may be able to be improved if better coordination of economic policies in East Asian economies is developed and strengthened in years to come.

In conclusion, the empirical analysis suggests that a direct application of the Maastricht Convergence Criteria on the East Asian economies does not support the formation of a monetary union under current circumstances with respect to its low explanatory and representation power. Also, coefficient signs indicate that the nature of relationship between certain criteria and economic growth in this region may be contradictory to their counterparts in Europe due to different political environment as well as the economic status of these mostly underdeveloped or developing countries, as compared to the more developed nations in other regions.

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CANDIDATES FOR THE EAST ASIAN COMMUNITY: AN INCOME CONVERGENCE APPROACH

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Introduction

The geographical expression of East Asia, consists of Japan, China (includes Hong Kong), South Korea and the ten members of ASEAN (Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam), has generated much talk not only among academicians but also in the political circle, especially in regards to the emergence of new regionalism in East Asia that represents a clear break from the region's strong history of multilateralism. For instance, in response to the 1997 Asian financial crisis, academicians have urged for closer regional economic co-operation and integration in East Asia (see, for example, [Dutta, 2002](#); [Harvie and Lee, 2002](#); [Yu, 2003](#)). However, opinions provided by scholars are only helpful in the formation of ideas, while it is the policymakers who make these ideas become reality. In this regard, the political commitment for the pursuit of closer East Asian cooperation is evidenced from the ASEAN +3 (China, Japan and South Korea) process, Japan's Initiative for Development in East Asia (IDEA), the establishment of East Asia Vision Group (EAVG) and East Asia Study Group (EASG). The recent idea of regionalism in East Asia is in fact not something new. Back in year 1990, Mahathir Mohamad, the former Prime Minister of Malaysia, has proposed the formation of the East Asian Economic Group (EAEG), with an initial idea that countries in East Asia should do more in consultation and cooperation to help lesser developed economies in the region. However, due to strong objection of the United States and the lukewarm response from Japan and South Korea, the EAEG proposal was quietly laid to rest.

The important question is why these East Asian countries have changed their course of direction towards pursuing such institutionalized cooperation. This is partly due to the success of European Union (EU) and North American Free Trade Area (NAFTA) where efforts of cooperation and integration have been progressing at a rapid pace. Furthermore, the enlargement of the EU and growing pan-American moves to increase free trade arrangements have been seen as a threat by these East Asian countries to multilateral trading system. For instance, efforts have been undertaken to expand NAFTA into the proposed Free Trade Areas of the Americas (FTAA) that includes the entire American continent except Cuba. On the other hand, the EU opens its door to 10 new members (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia) on 1 May 2004, increasing the number of the EU member nations from 15 to 25. Alarmed by the growing competition from EU, NAFTA and other mushrooming

free trade areas in the world, a nascent sense of an East Asian community is emerging as these countries realize that they must cooperate to tackle common challenges in this increasingly borderless interdependent world. In fact, Dutta (2003) highlighted that globalization with regionalization may be the map of the world economy. The World Bank, at its first annual conference on the Global Development Network (GDN)⁵³, has added substantive input to the concept of economic regionalization based on a map-of-the-world view of a region, by grouping the developing economies into seven regions of East Asia, South Asia, Central and South America, Africa, Middle East, Southern Europe, and Russia (Dutta: 2000: 68). It seems that there is no alternative to regionalism in this new millennium of globalization.

The second factor is the economic potential of growth for these East Asian countries, with a combined population of about 2 billion. This is approximate one third of the world's population, and about 150% larger than the combined population of NAFTA and EU. In terms of economic size, the combined GDP of East Asia is about two-third of the U.S., and nearly nine-tenth of the EU. However, with a huge market size to be tapped, the economic size of East Asia could soon surpass that of NAFTA or EU. Furthermore, Yu (2003:725) argued that these East Asian economies possess abundant natural resources and rich sources of manpower with hard-working spirit. If these natural resources can be effectively deployed, and the manpower well educated, these two factors can provide greater comparative advantages and greater levels of competitiveness with other regions of the world.

The third factor is the increasing interdependence among these East Asian economies through trade and investment. In recent years, East Asia has been coming together in almost imperceptible ways, slowly but steadily. In this regard, the East Asian economies have often been likened to flying geese, with Japan leading the flock and the newly industrialized countries and then the less developed ones following in that order (Kojima, 2000). As noted by Yu (2003: 725): "*Japan, as the second richest country in the world, was the leader of the flying geese paradigm in East Asia, not only because Japan was the first Asian country to complete its industrialization, but also because it has provided machinery, equipment and semi-manufactured products to the rest of the East Asian economies, and has undertaken major investment throughout the region*". The success of the East Asian flying geese model of development is evidenced from the region's high rates of economic growth, which is considered as an economic miracle that has attracted wide academic and policy interests. World Bank (1993) documented this as the "*East Asian Miracle*". In particular, the prosperous economies of Hong Kong, South Korea, Singapore and Taiwan has earned them the tag of Asian '*four little dragons*' economies and have been hailed as the models of achievement for other emerging economies to emulate. While the East Asian '*little dragons*' grew the fastest with more than 8% per year, the performance of the other four Southeast Asian economies (the four '*little tigers*'), namely Indonesia, Malaysia, the Philippines and Thailand, are equally impressive. Even the poorest economy of China and Vietnam too have had an average annual growth rate in excess of 5 percent in the last two or more decades.

⁵³ The first annual Global Development conference was held in Bonn, Germany on 5-8 December, 1999. Information on the conference can be accessed at http://www.gdnet.org/activities/annual_conferences/.

There is a pragmatic judgment in waiting for things to evolve in their due course. In this regard, the 1997 Asian Financial Crisis may have operated as a trigger or an occasion to prompt a sense of immediacy, which explains the timing of the recent movement towards regionalism in East Asia. The announcement of the Bank of Thailand on 2 July 1997 to abandon its defense of the Baht has caused the collapse of its currency. In what appeared to be a local financial crisis in Thailand quickly escalated into an Asian financial crisis, spreading to other Asian countries like Indonesia, Korea, Malaysia and the Philippines. This crisis has brought severe turmoil to most of the East Asian countries, with massive depreciations of local currencies, collapse of the stock markets, and decline in real GDP growth rates. Some of these countries had to go the International Monetary Fund (IMF) for large bailout loan programs (Korea, Thailand and Indonesia). All in a sudden, the Asian geese were no longer flying but lying sick on the ground. Hence, the crisis serves like a wake-up call for the rethinking of East Asia, not only as a geographic concept, but more strongly as a regional institutional arrangement.

During the ASEAN+3 Summit in 1998, South Korea's President Kim Dae Jung proposed the establishment of an expert panel, the East Asian Vision Group (EAVG), as the first step in exploring the possibility of forging a regional co-operation mechanism. This group discussed ways to develop the ASEAN+3 grouping into a regional co-operation forum. The EAVG submitted their reports entitled "*Towards an East Asian Community: Region of Peace, Prosperity and Progress*" in October 2001, with 57 recommendations covering cooperation in the areas of economic, financial, political and security, environmental, social and cultural, and institutional. At the fourth ASEAN +3 Summit in Singapore in November 2000, which is one year before EAVG submit their report, President Kim Dae Jung's proposal to establish an official East Asia Study Group (EASG) was adopted. The EASG is an official group at the Senior Officials level, aiming to explore practical ways and means to deepen East Asian cooperation, and to assess the recommendations to be suggested by the EAVG. The EASG have submitted their reports in November 2002, with 26 concrete short-term and medium-to-long-term measures (17 of them are short-term measures, while the rest are medium-term and long-term measures) selected from the EAVG recommendations, to move East Asian cooperation significantly forward and eventually realize the vision of building a *bona fide* regional community of peace, prosperity and progress, known as the 'East Asian community'. The short-term measures that are relatively easier to implement include the formation of an East Asia Forum, an East Asia Business Council, a network of East Asia eminent intellectuals, and the promotion of East Asian studies. The long-term measures include the formation of an East Asia Free Trade Area and the evolution of the ASEAN +3 Summit into an East Asian Summit.

There are certainly many challenges in store for the realization of the vision of 'East Asian community', in view of the region's immense diversity- historical, cultural, ethnic, political, etc. However, the main objective of this paper is to address one critical issue that deserves urgent attention from these East Asian countries, as they aspire to achieve greater integration in the region. It is important to note that the disparities of income levels among candidates' economies have to be addressed when formulating policies of such regional integration, since the benefits from economic integration are greater for

countries that have similar levels of income and economic development (see, for example, [Robson, 1998](#); [Park, 2000a](#)). Even in the context of European Union, the issue of income equality across members is not only an academic concern (see, for example, [Neven and Gouyette, 1995](#); [Cuadrado-Roura, 2001](#); [Happich and Geppert, 2003](#); [Maza and Villaverde, 2004](#)), but has been one of the central goals since the early days, with various policy measures being introduced to narrow the income gap among members' economies. One of the key policy measures is the setting up of Structural Funds. The main purpose is to improve the long-term growth prospects of the Union's less prosperous members, in an apparent fear that, should integration proceed on its own, increasing returns and agglomeration effects would naturally prevail, causing poorer member countries to fall further behind. Reflecting this concern, most of the grants provided under this policy have been directed towards enhancing the region's human capital endowments and infrastructures, and the four less developed EU members (Spain, Portugal, Ireland and Greece) have been the main beneficiaries of this policy. In addition to that, prior to the admission of the ten new Central and Eastern European countries in May 2004, the EU-15 have implemented various programmes to assist these countries in the reconstruction of their economies so that they can adjust to the standards and competitive nature of the EU economy, and hence reap the benefits from such regional integration.

With the background, motivation and objective in place, this paper proceeds as follows: Section II provides a brief discussion on the issue of income convergence, with a focus on methodology to ensure robust results for drawing reliable policy prescriptions. This is followed by a description of the data and methodology employed in Section III and IV respectively. Subsequent section presents the empirical results as well as the analysis of the findings. Finally, concluding remarks are given at the end of the paper.

Empirical Investigation of Income Convergence

The topic of income convergence has attracted substantial attention from researchers over the past few decades. The theoretical underpinnings of the convergence hypothesis are derived from [Solow's \(1956\)](#) neoclassical growth model, which postulated that differences in initial income do not have long term effects on growth with initially poorer economies are able to catch up with the richer economies. Most empirical tests of the convergence hypothesis utilized cross-sectional data to investigate the correlation between income differences and initial per capita income in cross-country and cross-regional studies, in which a negative correlation is taken as evidence of convergence (see, for example, [Baumol, 1986](#); [Barro, 1991](#); [Barro and Sala-i-Martin, 1991, 1992](#); [Mankiw *et al.*, 1992](#); [Engelbrecht and Kelsen, 1999](#); [Zhang, 2003](#)). However, this approach has recently come under heavy criticism and many researchers resorted to time series tests in their empirical investigation (see, for example, [Carlino and Mills, 1993](#); [Bernard and Durlauf, 1995](#); [Oxley and Greasley, 1995](#); [Evans and Karras, 1996](#); [Loewy and Papell, 1996](#); [Li and Papell, 1999](#); [St Aubyn, 1999](#); [Tsonas, 2000](#); [Zhang *et al.*, 2001](#); [Lee *et al.*, 2004](#)). In particular, the Augmented Dickey-Fuller (ADF) unit root test is widely employed to look at the stationarity of cross-country per capita income differences.

Unlike those cross-sectional studies, the time series evidence has not been very supportive of the convergence hypothesis. In this regard, [Lee *et al.* \(2004\)](#) reviewed the related literature in this body of growth studies, highlighting the limitations of cross-sectional approach, and the reasons behind the inconsistent results from both approaches.

The failure of the ADF unit root test to detect stationarity of income differences might be due to the low power of the test itself, especially when dealing with long time spans of data. Some authors suggested that the statistical power of ADF unit root test might be decreased by structural discontinuities problems such as the World Wars, technology and policy shocks, oil supply shocks and economic crisis. Specifically, [Perron \(1989\)](#) highlighted the possibility that a break in the deterministic trend could be interpreted as the existence of a unit root and could lead to failure to reject the null hypothesis of a unit root. Motivated by this concern, a number of previous studies have given attention to the possibility of structural discontinuities in the convergence process, utilizing structural break tests such as those proposed by [Perron \(1989\)](#), [Perron and Vogelsang \(1992\)](#) and [Zivot and Andrews \(1992\)](#), in order to ensure a more robust results (see, for example, [Carlino and Mills, 1993](#); [Oxley and Greasley, 1995](#); [Loewy and Papell, 1996](#); [Li and Papell, 1999](#); [Zhang *et al.*, 2001](#); [Lee *et al.*, 2004](#)).

However, this study offers an alternative explanation to the failure of ADF unit root test to support income convergence between countries. In particular, this study conjectures that the failure is due to the low power of the test against non-linearity in the data generating process of the real income series. In fact, the non-linear process can be considered as a general form that encompasses structural discontinuities in the convergence process addressed by those earlier studies cited above. With regards to the conventional ADF test, it is noteworthy to highlight that the test is build on the linear autoregressive $AR(p)$ model that has become the fundamental of higher econometric analysis⁵⁴. This assumption of linearity, which has been made as an approximation of the real world, is now found to be inappropriate, especially with the advancement of research methodology and computer technology. [Liew *et al.* \(2003\)](#) argued that estimating the linear $AR(p)$ model, implicitly disregarding any possible non-linearity in the series under consideration, will yield a mis-specified model and thereby provide incorrect inferences and policy conclusions. Specifically, the authors (see also, [Lim and Liew, 2004](#)) suggested employing formal linearity test as a diagnostic tool to determine the nature of the data generating process before any further empirical analysis. Linear model is valid only when formal linearity test result fails to provide evidence on the existence of non-linearity. In this regard, though the literature on financial data is far most voluminous, testing for non-linearity in macroeconomic time series such as the GDP is no lesser, for instance [Scheinkman and LeBaron \(1989\)](#), [Potter \(1995\)](#), [Teräsvirta \(1995\)](#), [Gatti *et al.* \(1998\)](#), [Skalin and Teräsvirta \(1999\)](#) and [Öcal and Osborn \(2000\)](#). More importantly, there has been increasing empirical evidence suggesting that the failure of ADF test might be due to the invalid maintained hypothesis of linearity. Specifically, [Sarno \(2001\)](#), [Kapetanios *et al.* \(2003\)](#) and [Liew *et al.* \(2004\)](#), among others, demonstrated the lack of power of the ADF test to reject a false null hypothesis of unit root when the true data

⁵⁴ For instance, the nowadays most widely applied unit root (or stationary) test, the order of integration test, the Granger causality test and the cointegration test are all built on the basis of $AR(p)$ model.

generating process is non-linear⁵⁵. In a recent related paper, [Datta \(2003\)](#) highlighted the possibility that the convergence process is non-linear and the assumption of ‘structural stability’ in standard time series tests would lead one to reject convergence under such situations. This is in line with earlier assertion by [Durlauf \(2001: 67\)](#) that the constant coefficient linear model assumptions made in standard growth analyses are not supported by the data.

Motivated by the above concern, this study attempts to address the issue of income convergence among candidates’ economies-China, Hong Kong, Indonesia, Japan, Malaysia, the Philippines, Singapore, South Korea, Taiwan and Thailand, using a more robust procedure to ensure reliable inferences and policy prescriptions. Following the suggestions of [Liew *et al.* \(2003\)](#) and [Lim and Liew \(2004\)](#), this study employs formal linearity test as a diagnostic tool to determine the adequacy of the linear AR(p) model in characterizing the variable before any further application of this model in empirical analysis. In particular, the linearity nature of the income differences between Japan (target leader) and each of the East Asian countries is first investigated, using the standard linearity test (henceforth denoted as *LST* linearity test) first proposed by [Luukkonen *et al.* \(1988\)](#). If the linear AR(p) framework is found to be inadequate, this study proceeds with the newly developed non-linear unit root test (henceforth denoted as *KSS* non-linear unit root test) proposed by [Kapetanios *et al.* \(2003\)](#) to test the income convergence hypothesis. This is important, as pointed out by [Liew *et al.* \(2004\)](#), that the evidence of non-linearity does not necessarily imply non-linear stationary. It is worth highlighting that though there were previous empirical growth studies involving some of these East Asian countries (see for example, [Park, 2000a, 2000b, 2003](#); [Zhang, 2003](#); [Lee *et al.*, 2004](#)), the contribution of this paper is methodological. For instance, [Park \(2000a, 2000b, 2003\)](#) utilized Theil inequality indices, [Zhang \(2003\)](#) addressed the weaker notion of catching up using cross-sectional approach, while [Lee *et al.* \(2004\)](#) employed the ADF and structural break test constructed in the linear framework. In addition to that, unlike previous studies, the present one contributes direct policy input to the formation of ‘East Asian community’.

The Data Source

The source of our data, real Gross Domestic Product (GDP) per capita for ten East Asian countries (China, Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Taiwan and Thailand) is the Penn World Table (PWT). Similar data set has been employed by [Lee *et al.* \(2004\)](#). Taiwan is included in the sample as mainland China has never recognized the independence of the island, coupled with strong political support from the world that Taiwan is part of her territory. On the other hand, only the five core economies of ASEAN are included as [Park \(2000a\)](#) found that there exists wide income disparities between the core and the remaining five periphery economies-Brunei Darussalam, Cambodia, Laos, Myanmar and Vietnam. The author argued that a more likely scenario is that of integration among the five core economies first, and

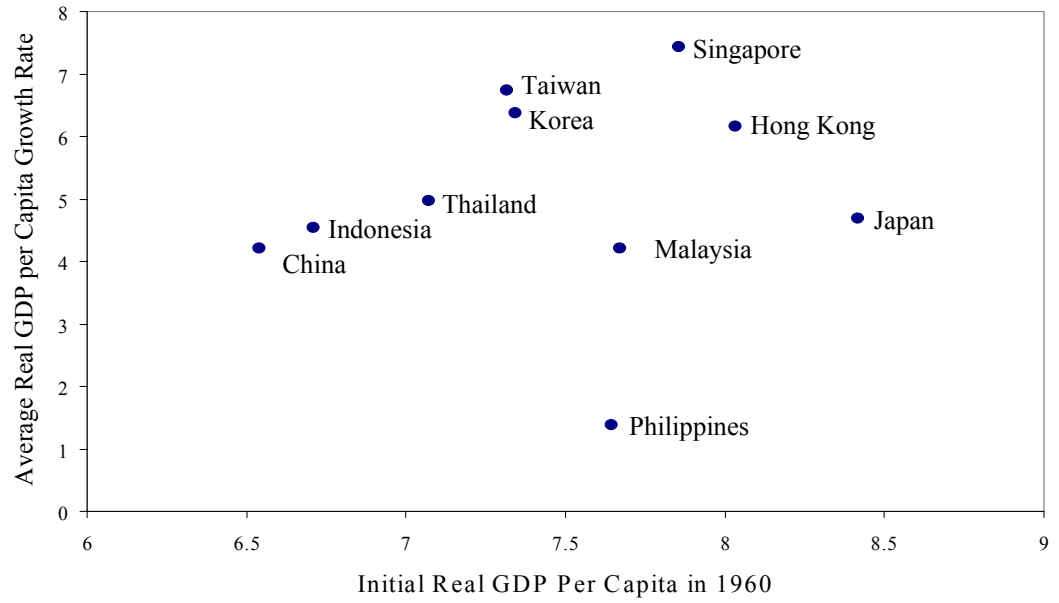
⁵⁵ Nevertheless, the Monte Carlo results of [Sarno \(2001\)](#) and [Kapetanios *et al.* \(2003\)](#) showed that the ADF test is robust when the true generating process is linear.

subsequently bringing in the periphery economies as well into the integration process. In the context of East Asian, [Dutta \(2002\)](#) proposed the model of 3 plus 5, three economies of Northeast Asia (China, Japan and South Korea) and five in Southeast Asia (Indonesia, Malaysia, the Philippines, Singapore and Thailand), as a first step towards regionalization in East Asia.

The unique feature of PWT is that all economic variables are denominated in a common set of prices in a common currency so that real quantity comparisons can be made, both between countries and over time. This study is able to use the newly release PWT version 6 prepared by [Heston *et al.* \(2001\)](#), in which the base year has been moved from 1985 in the earlier version of 5.6 to year 1996, providing us with a longer data span from 1960 to 1998. However, data in 1998 are not utilized because it appears likely that the Asian financial crisis will disrupt the growth patterns of these East Asian countries. However, it would be interesting for future study to assess the impact of the crisis on the convergence amongst these countries, when more data after the crisis is made available. As usual, prior to analysis, all the series are transformed into logarithm form.

Figure 1 provides a sketch of the important income indicators for the selected East Asian countries. The average growth rate of real GDP per capita in 1960-1997 is plotted on the vertical axis, while the logarithm of initial real GDP per capita in 1960 lies on the horizontal axis. As observed, the initial incomes in 1960 differ substantially across East Asia. The role of Japan as the lead country in the region is undisputable since it has higher initial real GDP per capita of US\$4512 in PPP terms. With the spectacular growth rate achieved by other East Asian economies, it is interesting to investigate whether these countries are able to attain income convergence with the lead goose in the region.

Figure 1
Average Real GDP Per Capita Growth Rate and Initial Real GDP Per Capita



Source: Penn World Table version 6.0

Methodology

This study first employs the *LST* linearity test proposed by [Luukkonen et al. \(1988\)](#) to determine the linearity nature of the income differences between Japan (target leader) and each of the East Asian countries. If the linear $AR(p)$ framework is found to be inadequate, this study proceeds with the newly developed *KSS* ([Kapetanios et al., 2003](#)) non-linear unit root test to empirically investigate the income convergence hypothesis. This is important, as pointed out by [Liew et al. \(2004\)](#), that the evidence of non-linearity does not necessarily imply non-linear stationary. However, if the null of linearity cannot be rejected by the *LST* linearity test, then there is no need to proceed with the *KSS* non-linear unit root test. In fact, the Monte Carlo results of [Sarno \(2001\)](#) and [Kapetanios et al. \(2003\)](#) showed that the ADF test is robust when the true generating process is linear. In this regard, the ADF test results reported in [Lee et al. \(2004\)](#) will be consulted for making inferences and policy prescriptions.

LST Linearity Test

This study adopts the [Luukkonen et al. \(1988\)](#) linearity test in the present context to determine whether the logarithm differences of real GDP per capita between two sample countries, $(\ln Y_{it} - \ln Y_{At})$ exhibits linear or non-linear behaviour:

$$\begin{aligned} (\ln Y_{it} - \ln Y_{At}) = & \alpha_0 + \sum_{j=0}^2 \sum_{k=1}^p \alpha_{jk} (\ln Y_{it-k} - \ln Y_{At-k}) (\ln Y_{it-k} - \ln Y_{At-k})^j + \\ & \alpha_3 (\ln Y_{it-d} - \ln Y_{At-d})^3 + \omega_t \end{aligned} \quad (1)$$

where α_0 , α_{jk} ($j = 0, 1, 2; k = 1, \dots, p$) and α_3 are parameters to be estimated and under the null hypothesis, ω_t is the stochastic error term with zero mean and constant variance assumption, p stands for the autoregressive lag length whereas d is called the delay parameter. Note that p and d have to be determined empirically based on sample data, see [Liew et al. \(2003\)](#) in this regard.

Under linearity, the null hypothesis of $\alpha_{2k} = \alpha_3 = 0$ for all k , implying the absence of non-linearity, against the alternative hypothesis of the existence of a type of non-linearity known as Smooth Transition Autoregressive (STAR) process, see [Luukkonen et al. \(1988\)](#) and [Teräsvirta \(1994\)](#) for other details. The *F*-type test statistic is employed to accomplish this test.

KSS Non-linear Unit Root Test

Applying to the context of this study, the [Kapetanois et al. \(2003\)](#) non-linear unit root test enables us to detect the presence of non-stationarity against non-linear but globally stationary STAR process, which can be represented by:

$$(2) \quad \Delta(\ln Y_{it} - \ln Y_{At}) = \delta(\ln Y_{it-1} - \ln Y_{At-1})^3 + \mu_t$$

or

$$\Delta(\ln Y_{it} - \ln Y_{At}) = \sum_{k=1}^p \beta_k \Delta(\ln Y_{it-k} - \ln Y_{At-k}) + \delta(\ln Y_{it-1} - \ln Y_{At-1})^3 + \nu_t$$

(3)

where μ_t and ν_t are stochastic error terms each with zero mean and constant variance assumption.

Specifications (2) and (3) correspond to the conventional Dickey-Fuller (DF) and augmented Dickey-Fuller (ADF) unit root tests with no intercept and trend terms in the non-linear framework. Results of simulation study show that these non-linear unit root tests produce robust results if the data generating process of the series under study is in fact non-linear in nature ([Kapetanois et al. 2003](#)).

The null hypothesis of non-stationary series, $H_0 : \delta = 0$ (implies divergence) against the alternative of $H_1 : \delta > 0$ (implies income convergence) can be tested using the t statistics. For the brevity of reporting, the t statistics estimated from Equations (2) and (3) are reported as t_{KSS1} and t_{KSS2} respectively in Table 2 for $p = 8$, as was practised in [Liew et al. \(2004\)](#). However, as suggested in [Kapetanois et al. \(2003\)](#), the present study also conducts test of Equation (3) for $1 \leq p \leq 12$ and reports the maximum test statistics as t_{KSS3} . This measure is taken to ensure that the non-rejection of the null hypothesis of KSS test is not due to the restrictive assumption of fixing $p = 8$ *in priori*. All these KSS test statistics are to be compared with the same set of critical values simulated by [Kapetanois et al. \(2003\)](#) as conventional t critical values are no more applicable in this non-linear framework due to the asymptotically distribution of δ , which has been proven to be non-normal.

The Empirical Results

From Table 1, it is observed that the null hypothesis of linearity has been rejected by the F statistics at less than 1% significance level in all cases. This finding suggests that the data generating process of income differentials between Japan and all other East Asian economies under study cannot be taken as linear in nature. Hence, the conventional ADF test, which does not account for non-linearity, is no doubt inappropriate to be employed in our empirical investigation of the income convergence among candidates' economies for the formation of new regionalism in East Asia. As such, we turn to the results of the relevant KSS non-linear unit root test.

By the t_{KSS1} test statistics as reported in Table 2, the null hypothesis of non-stationary cannot be rejected in all cases even at 10% level. Nonetheless, the portmanteau Q statistics suggest that these test statistics should be interpreted with caution as the model's residuals are contaminated with serial autocorrelation in most cases. In such situation of serial correlation, the t_{KSS2} results should be consulted, as proven by [Kapetanios *et al.* \(2003\)](#) to be robust. Turning to the t_{KSS2} test results provide evidence of income convergence for Japan-Korea only. However, the results of t_{KSS3} test, which allows the computer programme to detect the optimal autoregressive lag p rather than fixing it *in priori*, reveal that Korea is not the only country in the region that has achieved the income convergence criterion. Instead, favourable evidence of income convergence is reported for three more countries-Hong Kong, Singapore and Taiwan. Overall, it can be concluded from this KSS test that China, Indonesia, Malaysia, the Philippines and Thailand exhibit divergence behaviour with respect to Japan's income, whereas Hong Kong, Korea, Singapore and Taiwan show otherwise.

Table 1
LST Linearity Test Results

<i>Country</i>	<i>p</i>	<i>d</i>	<i>F</i>	<i>msv</i>	<i>Q</i>
China	1	12	21.138	0.001	0.137
Hong Kong	1	6	10.422	0.003	0.392
Indonesia	1	8	23.021	0.000	0.583
Korea	1	12	21.586	0.000	0.786
Malaysia	1	12	15.061	0.000	0.210
Philippines	1	6	6.018	0.028	0.751
Singapore	1	11	28.388	0.000	0.927
Taiwan	1	12	22.736	0.000	0.859
Thailand	1	9	19.474	0.000	0.802

Notes: The marginal significance value of the *F* statistic is denoted as *msv*. Ljung-Box portmanteau statistic is applied to test for the presence of serial correlation up to 20 lags and its marginal significance value is denoted as *Q*. The optimal autoregressive lag length *p* is determined by inspecting the PACF of the series. The optimal delay parameter *d* is chosen from the one that minimizes the marginal significance value of the *F* test statistic.

Table 2
KSS Non-linear Test Results for Income Convergence Hypothesis

Country	t_{KSS1}	<i>Q</i>	t_{KSS2}	<i>Q</i>	t_{KSS3}	<i>Q</i>	Optimum lag <i>p</i>
China	0.015	0.005	-1.513	0.509	-1.942	0.509	12
Hong Kong	-1.142	0.433	-1.835	0.435	-3.094 ^b	0.435	10
Indonesia	-0.139	0.000	-1.249	0.556	-2.212	0.556	12
Korea	-0.940	0.001	-2.703 ^a	0.731	-2.879 ^a	0.731	12
Malaysia	-0.194	0.008	-0.805	0.905	-0.839	0.983	6
Philippines	2.036	0.014	0.255	0.927	1.454	0.927	10
Singapore	-1.553	0.857	-1.378	0.558	-2.992 ^b	0.558	5
Taiwan	-1.329	0.000	-2.488	0.996	-2.853 ^a	0.997	10
Thailand	-0.400	0.012	-0.557	0.997	-2.208	0.997	12

Notes: The 10%, 5% and 1% critical values for KSS test statistics are, respectively, -2.66, -2.93 and -3.48. Superscripts ^a and ^b denote significant at 10 and 5 percent levels respectively. Portmanteau statistic is applied to test for the presence of serial correlation up to 20 lags and its marginal significance value is denoted as *Q*.

Since this study employs similar dataset as Lee *et al.* (2004) but with different methodology, a comparison of the results can be made. First, the ADF unit root test results in Lee *et al.* (2004) reveal that there is a divergence of income between Japan and each of these East Asian countries. The authors demonstrated that the failure of ADF test to identify convergence stems from the presence of structural discontinuities in the convergence process. However, the present study found that the failure is due to the

presence of non-linearity in the data generating process of income differences. In particular, given the strong evidence of non-linearity but a linear method (ADF test) is used to test for income convergence, the inferences and policy prescriptions drawn from this linear method are indeed questionable. In fact, many studies (Sarno, 2001; Kapetanios *et al.*, 2003; Liew *et al.*, 2004) have demonstrated the lack of power of the ADF test to reject a false null hypothesis of unit root when the true data generating process is non-linear. Second, using the structural-break unit root test proposed by Zivot and Andrews (1992), Lee *et al.* (2004) are able to obtain evidence of income convergence for Japan-Hong Kong and Japan-Singapore, while Taiwan is catching up with the lead goose of the region. In contrast, from the more robust t_{KSS3} test results, this study found that Korea should be included in the same convergence club as Hong Kong, Singapore and Taiwan. The present finding is not surprising as these Asian ‘*four little dragons*’ economies have been expanding at an average real GDP growth rate of more than 8% per year for the past decades. On the other hand, though Japan has been able to establish herself as the second largest world economy and leader in the East Asian region, the economy of the country has gone weak after the burst of her ‘bubble economy’ in the 1990s (see, for example, Sato, 2002). These two developments have contributed to the convergence of income levels between Japan and these four economies. Third, as compared to the structural-break test, the KSS non-linear unit root test is proven to be more powerful in detecting convergence, especially when the data generating process is found to be non-linear in nature. As mentioned earlier, structural discontinuities in the convergence process is just a special type of non-linear process. Hence, the procedure employed in this study ensures a more robust results and the policy prescriptions given are reliable.

Conclusion

Given the commitment of these East Asian governments, the push and pull factors behind the ‘East Asian community’, we share the optimism of other scholars that the ‘East Asian community’ is a realistic possibility and not an ephemeral dream. In this regard, these East Asian countries could always draw valuable lessons from their EU counterparts in their effort to establish a framework that would contribute to a sense of ‘community values’ and ‘community’. In fact, many scholars have argued that the European Union and the Euro-regime must be a learning model for an agenda of ‘East Asian community’ (Dutta, 2000, 2002; Letiche, 2000). Despite this optimism, the findings from our empirical investigation reveal that the income disparities between Japan and five of the candidates’ economies- China, Indonesia, Malaysia, the Philippines and Thailand, should be on top of the agenda when formulating policies of such regional integration. In particular, using a robust procedure, the KSS non-linear unit root test found that there are at least two groups in the East Asian region. The first group consists of the Asian ‘*four little dragons*’ economies- Hong Kong, Korea, Taiwan and Singapore, which are able to converge with the richer Japanese economies over the years, due to liberal trade policies adopted by these countries as noted by Zhang (2003). The remaining countries in the region- China, Indonesia, Malaysia, the Philippines and Thailand, made up the other group, in which their respective income disparities with Japan has widened. As discussed

earlier, though the EU's financial commitment to its new or even candidates' economies is indeed worth emulating, financial support such as the Structural Funds is not a realistic possibility in the context of East Asian given the limited financial resources that these countries possess. Hence, this issue of income disparities is indeed a daunting task for the policymakers.

As a practical step, the flying geese model of economic development should be upheld in the East Asian economies, with Japan continue to be the lead goose. As recommended by [Kojima \(2000: 397\)](#), the member countries of the proposed 'East Asian community' should take more positive initiatives in promoting regional economic development. According to the author, by propelling regional economic development, these East Asian economies should be able to raise their per capita incomes to the advanced economies' level, with more equal income levels among themselves, say within 20 or 30 years. Then, a new horizon for further integration and development will be open. To conclude, while there is no roadmap for the formation of 'East Asian community', the journey has actually begun, even though there is still a long way to go, just as the progression of EU took about half a century to reach its present state.

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INTERNATIONAL CAPITAL MOBILITY AND FINANCIAL INTEGRATION

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Introduction

The general move towards international financial liberalisation by countries has been motivated by the fact that integration of financial markets allows for more efficient use and allocation of investment funds over time. Financial integration and capital mobility are closely related and often used interchangeably as the integration of financial markets involves the deregulation of national markets and the liberalisation of international flows. Therefore, financial market integration is conducive to capital mobility or increases the potential of capital flows and it can be implied that capital mobility is a sufficient condition for financial integration or that a high level of capital mobility indicates a high level of market integration (Moosa, 1996).

While the gains from financial integration and the associated capital mobility are quite clear, the measurement criteria for financial integration have proven to be more difficult. This paper focuses on the saving-investment criterion highlighted by Feldstein and Horioka (1980) as a way of measuring international capital mobility. Feldstein and Horioka ran a cross-sectional regression on 16 industrial countries and found a high correlation between saving and investment. This was interpreted indicating low capital mobility because if there is high capital mobility, there is no a priori reason for savings and investment to be correlated across countries as saving in each country would respond to the worldwide opportunities for investment, while the worldwide pool of capital would finance investments in each country. However, if capital mobility were restricted, then there would be a wedge between the cost of domestic and foreign savings and the incremental saving would tend to be invested domestically. Therefore a positive close-to-one correlation between the saving rate and investment would be suggestive of imperfect capital mobility and in the extreme case of zero capital mobility; saving and investment would be perfectly correlated.

The finding of a high correlation between saving and investment by Feldstein and Horioka (1980) implying imperfect capital mobility has jolted the widespread analytical approach by researcher that international capital mobility is nearly perfect. If international capital mobility does not require a close correlation between savings and investment, it is difficult to rationalise the Feldstein-Horioka finding – corroborated in many similar studies – that savings and investment are in fact highly correlated. Referred to as the Feldstein-Horioka puzzle, this raised considerable doubt on whether national markets for physical capital are highly integrated. Despite this, the savings-investment

correlation proposed by Feldstein and Horioka (1980) has been widely accepted as a measure of financial integration and capital mobility.

However, the Feldstein-Horioka finding has been subject to both econometrics and theoretical criticisms. The cross-sectional regression not only ignores the time-series and non-stationary properties of investment and saving in each country that could lead to spurious regressions but also could be subject to simultaneity bias (e.g. Dooley et al., 1987; Miller, 1988; Sinn, 1992). There have also been difficulties in interpreting the results of tests based on the Feldstein and Horioka method, as the regression equations are not explicitly derived from theory. There is therefore no information on the size of the regression coefficient under the null hypothesis of perfect capital mobility. Indeed there are many cases in which saving and investment are correlated even under perfect capital markets (Obstfeld, 1993).

Due to these criticisms, alternative approaches have been employed to study the saving-investment relationship. Cointegration techniques of analysis pioneered by Miller (1988) have been considered as they take into account the time-series and non-stationarity properties of saving and investment in each country. The cointegration analysis essentially extends the Feldstein-Horioka interpretation by arguing that cointegration between saving and investment implied that capital is highly immobile internationally. Absence of cointegration between saving and investment meant that capital mobility is high. Results from various cointegration tests (Miller, 1988; Barkoulas, 1996; Bajo-Rubio, 1998) show either no cointegration between saving and investment or decreasing regression coefficients over time. However recently it has been argued that saving and investment tend to be cointegrated variables (Coakley et al., 1996; Coakley and Kulasi, 1997; Coiteux and Olivier, 2000). The cointegration between saving and investment has been taken to imply inter-temporal budget constraints rather than evidence of low capital mobility.

However, although cointegration analysis was able to address the issue of non-stationarity of investment and savings, the conventional unit root and cointegration tests have been found to have low testing power and which could therefore result in erroneous results (Coakley et al., 1996; Coakley and Kulasi, 1997; Oh et al., 1999).

To take into account the econometric problems of the Feldstein-Horioka approach, this paper employs the panel data approach to analyse international capital mobility. Panel data analysis has been found to improve the statistical power of the conventional unit root and cointegration tests by pooling data and increasing the number of observations (Coakley et al., 1996; Coakley and Kulasi, 1997; Nagayasu, 1998; Oh et al., 1999).

Literature Review

The Feldstein-Horioka finding of a high correlation between investment rates and their national saving rates has been confirmed by many subsequent studies using a variety of techniques encompassing both cross-section and time-series regressions over different

time periods for both industrialised and developing countries (e.g. Feldstein, 1983; Penati and Dooley, 1984; Dooley et al., 1987; Vos, 1988; Tesar, 1991). In fact Feldstein (1983) finds no evidence that this correlation has weakened over time.

However there is little agreement on explanations of this apparent empirical regularity of a high correlation between saving and investment. Economists are not willing to accept the inference that financial markets are not highly integrated and argue that the results do not necessarily imply low capital mobility in the international economy (e.g. Westphal, 1983; Finn, 1990; Baxter and Crucini, 1993; Coakley et al., 1996; Coakley and Kulasi, 1997).

A number of hypotheses have been used to rationalise the Feldstein-Horioka regression result without concluding that capital is immobile. For example, a number of studies suggest that the saving-investment correlation increases with country size due to its effects on the world interest rate (Murphy, 1984; Dooley et al., 1987; Baxter and Crucini, 1993; Krol, 1996). Another alternative proposition is that saving and investment can be correlated even in the presence of capital mobility if exogenous variables like productivity shocks or non-traded consumption goods affect both saving and investment (Wong, 1990; Tesar, 1991).

The inter-temporal approach to the current account or the solvency constraint arguments have also been used to explain the relationship between saving and investment as both a short run and long run phenomenon (Sachs, 1982; Finn, 1990; Sinn, 1992; Baxter and Crucini, 1993; Coakley et al., 1996; Coakley and Kulasi, 1997; Jansen, 2000). According to the inter-temporal approach to the current account, domestic savings and investment should be perfectly correlated in the long run, since current account balances (i.e. differences between savings and investment) should add up to zero. Due to the inter-temporal budget constraints in an open economy, current account deficits/surpluses cannot be sustained indefinitely. In the long run therefore investments cannot deviate too much from saving. This implies that savings and investment should keep a one-to-one relation in the steady state; in other words, savings and investment are cointegrated variables. On the other hand, in the short run the size and sign of the correlation between savings and investment would depend on the structure of the economy, as well as on the nature of the shocks. So while small positive, zero or negative correlations would indicate a significant degree of capital mobility, high positive correlations would not necessarily mean capital mobility being small.

One main criticism of the Feldstein-Horioka finding is that the national saving and investment both endogenous variables that respond to common factors. For example, one version of the endogeneity critique that results in investment and saving being correlated has been attributed to government policy whereby governments react systematically to current account imbalances so as to offset these imbalances (Tobin, 1983; Bayoumi, 1990). Although endogeneity of savings arises especially in time-series analysis it may also arise in cross-section analysis. One way to deal with the cyclical endogeneity to remove the effects of the business cycle is to use averaged rates of saving and investment over a period of time as in a cross-sectional regression (Feldstein and Horioka, 1980; Bayoumi, 1990; Hussein, 1998)

There are essentially two ways that the relationship between saving-investment have been analysed. The first is to use time-averaged or cross-sectional data (Feldstein and Horioka, 1980; Feldstein, 1983; Bayoumi, 1990, Wong, 1990;) and the second is to use time-series data (Sinn, 1992). However, the use of cross-sectional data to primarily remove the business cycle effects has been a subject of contention. For example, Sinn (1992) and Krol (1996) argue that cross-sectional data biases the results against capital mobility. Firstly, the averaging of data over five or ten years may not be sufficient to establish a long-run relationship between saving and investment. Furthermore, capital mobility is not just a long run issue. Secondly, averaging data can introduce an empirical problem of offsetting changes in investment and saving over time suggesting a relationship between investment and saving when none may exist. For instance, the inter-temporal budget constraints imply that there is a high correlation between saving and investment in the long run (Sachs, 1982; Sinn, 1992). Therefore the saving and investment ratios averaged over sufficiently long periods must be close despite capital mobility. This implies that the correlation between saving and investment should be higher in the long run, compared to the short-run although this may not always be the case as shown by Sarno and Taylor (1998).

To overcome the shortcomings of the cross-sectional method, time-series estimation has been advocated. One important aspect of the time series estimation is that the same correlation coefficient is not imposed across different countries (Sinn, 1992). Therefore the time series estimates have the advantage as the countries that are more open and integrated with the world capital markets are not merged together with economies that are more closed in a single regression. Modern theory of inter-temporal economics also shows that even with financial integration, a country may experience net capital inflows and outflows at different points in time (Genberg and Swoboda, 1992). This variability would not be captured by a cross-sectional analysis that is based on time-averaged data and would therefore result in a bias against the capital mobility hypothesis. A re-estimation of the Feldstein-Horioka model using annual data shows not only lower correlation coefficients but also considerable variability between saving and investment (Sinn, 1992).

Despite its apparent advantages, there have been concerns that the time series estimates may be subject to greater bias than cross-section regressions because of the problems of identification and estimation induced by simultaneity bias or the endogeneity of both savings and investment. For instance, the time-series estimates do not take into account business cycle effects on both saving and investment (Krol, 1996; Oh et al., 1999).

As a result there is now growing interest in panel data methodology that utilises information from both the time-series and cross-sectional variation in the data. It does not require the averaging of data and there is no loss of information associated with it while at the same time allowing for specific country effects such as country size to be taken into account.

Krol (1996) employs the panel data approach to re-estimate the saving-investment regression as he attributes the high saving-investment coefficient obtained in the Feldstein-Horioka study (1980) to the problem of the estimation technique. It is argued that although the cross-sectional data employed by Feldstein-Horioka takes into account the time-effects like the business cycle, it does not take into account the unobserved or unmeasured country effects like country size. On the other hand, time-series data does not take into account the business cycle effects. A panel data approach would allow for both these effects to be taken into account as it controls for business cycle effects without averaging the data or any loss of information associated with it and it also takes into account the country effects. Using the panel approach, a considerably smaller correlation between saving and investment than previous estimates is found. Country effects are found to have more significant effects than international business cycle effects in the saving-investment analysis. The findings of Krol are corroborated by a number of studies adopting a panel data approach (Vamvakidis and Wacziarg; 1998; Corbin, 2001; Oh et al.; 1999; Coakley et al., 1996).

One common criticism raise in the literature is that the low testing power of the conventional cointegration tests. Coakley and Kulasi (1997) employ a variety of cointegration tests to analyse the relationship between saving and investment. Besides the conventional ADF cointegration tests, a panel unit root test using the t-bar statistic based on the average ADF proposed by Im et al. (1995) is also employed as it has higher power than the conventional time-series tests. The results of the panel cointegration show that there is cointegration between saving and investment in all the 11 countries studies as compared to only 8 countries by the conventional tests. Oh et al. (1999) use conventional and panel unit root and cointegration tests and confirm the low testing power of conventional cointegration tests as they fail to detect cointegration between saving and investment in contrast to the finding of the panel cointegration tests.

Methodology

The empirical model to test the capital mobility hypothesis applied here employs the panel data approach to the basic regression model used by Feldstein and Horioka (1980) to analyse the relationship between savings and investment. This approach utilises information from both time series and cross-sectional variation in the data and allows for the use of advances made in estimating models of individual behaviour over time without having to aggregate time-series data. It does not require the averaging of data and there is no loss of information associated with it.

The regression model that is employed in this study is as follows:

$$(I/Y)_{it} = \alpha_i + \beta(S/Y)_{it} + \varepsilon_{it} \quad (1)$$

where I is the gross domestic investment, S is the gross national savings, Y is the gross domestic product, i is the country index, α is the constant term and β is the saving-investment coefficient, ε is the error term and t is the observation year.

In this regression, β is subjected to the equality restriction and is constrained to have the same value for all countries and does not vary across countries. However, to capture the country specific effects, the equality condition is not imposed on α and it is allowed to differ across countries. These constraints define the fixed-effects model (Krol, 1996; Coiteux and Olivier, 2000).

Under the assumption of high capital mobility, β should be closer to zero than to one. The null hypothesis that is tested is $\beta = 0$ against the alternative hypothesis of $\beta = 1$. If β is not found to be significantly different from zero, then the null hypothesis cannot be rejected and it can be inferred that capital is mobile internationally. However, if the null hypothesis is rejected, it can be inferred that capital is not perfectly mobile.

The conventional unit root and cointegration tests used in time-series data have been found to be limited due to their low testing power especially for panels of moderate size where the existing test procedures may not be computationally feasible or sufficiently powerful. This may therefore lead to erroneous results. The panel data approach employs the panel unit root tests and panel cointegration tests that have been found to improve the power of these tests. In this respect, the panel unit root tests developed by Im et al. (1997: IPS hereafter) and the cointegration tests by Pedroni (1995) and Kao and Chiang (1998) are used.

To determine the stationarity of the individual variables, the conventional unit root tests of Augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1981) and Phillips-Peron (PP) (Phillips and Peron, 1988) are conducted. However, as these tests have low testing power; this study employs a panel unit root test proposed by IPS to test the null hypothesis of unit root (that is, non stationarity). This test is substantially more powerful than the individual time-series ADF or PP tests.

The IPS test is based on the average of the statistics obtained from individual tests. In other words, in the IPS procedure an ADF equation is estimated separately for each individual country and this allows for differing parameter values, variance and even different lag lengths. The null hypothesis for the presence of unit root is $H_0 : \beta_i = 0$ for all i against the alternative $H_1 : \beta_i < 0$ for $i = 1, 2, \dots, N_1$; $\beta_i = 0$ for $i = N_1 + 1, N_1 + 2, \dots, N$. The alternative hypothesis allows for β_i to differ across groups.

The IPS procedure looks at the stochastic process generated by the first-order autoregressive process:

$$Y_{it} = (1 - \phi_i)\mu_i + \phi_i Y_{i,t-1} + \varepsilon_{it} \quad (2)$$

where $i = 1, 2, \dots, N$; $t = 1, 2, \dots, T$ and the initial values $Y_{t,0}$ are given. The following equation is estimated:

$$\Delta Y_{it} = \alpha_i + \beta_i Y_{i,t-1} + \varepsilon_{it} \quad (3)$$

where $\alpha_i = (1 - \phi_i)\mu_i$, $\beta_i = (1 - \phi_i)$ and $\Delta Y_{it} = Y_{i,t} - Y_{i,t-1}$. The errors ε_{it} are assumed to be serially uncorrelated.

IPS proposed two test statistics to test the null hypothesis of the unit root test. These are the Lagrange multiplier or the LM-bar statistic and the t-bar statistic. In this study only the t-bar test statistic is used as in the absence of autocorrelation, the t-bar test tends to perform better than the LM-bar test with finite samples. The t-bar test statistic can be calculated as follows:

$$\Gamma_i = \frac{\sqrt{N} \{ \bar{t}_{NT} - E(t_T | \beta_i = 0) \}}{\sqrt{\text{Var}(t_T | \beta_i = 0)}} \Gamma_i \quad (4)$$

where \bar{t}_{NT} is the cross-sectional average of the standard individual ADF unit root t-statistics, such that $\bar{t}_{NT} = \frac{1}{N} \sum_{i=1}^N t_{iT}$. The terms $E(t_T | \beta = 0)$ and $\text{Var}(t_T | \beta = 0)$ are the respective finite common mean and variance of t_{iT} for $i = 1, 2, \dots, N$, obtained under the null hypothesis of $\beta_i = 0$. The test statistic t_{iT} is the individual t-statistic for testing the null hypothesis of the unit root ($\beta_i = 0$) in the standard individual ADF and its critical values are reported by Im et al. (1997).

Cointegration on the individual time-series data is conducted using the Engle-Granger (1987) cointegration test. However, the conventional cointegration tests tend to suffer from unacceptably low power especially when applied to series of moderate length. Hence, the panel cointegration tests will be employed. Panel cointegration tests generally allow for selective pooling of information regarding common long-run relationships from across the panel while allowing the associated short run dynamics and fixed effects to be heterogenous across different members of the panel.

Two cointegration tests proposed by Kao (1999) and Pedroni (1995) are employed to test whether a cointegration relationship exists between savings and investment. For this study, these tests apply to homogenous panels whereby β is assumed to be the same across all individuals. In these tests the null hypothesis of no cointegration in the variables in each member of the panel is tested.

Kao (1999) proposes two types of panel cointegration tests, namely the Dickey-Fuller (DF) and augmented Dickey-Fuller (ADF). The DF-type tests are calculated from the estimated residuals as follows:

$$\hat{e}_{i,t} = \gamma \hat{e}_{i,t-1} + v \quad (5)$$

where $\hat{e}_{i,t}$ is the estimated residual from the estimated equation. To test the null of no cointegration, ($H_0: \gamma = 1$), four DF-type tests are constructed as follows:

$$1. DF_\gamma = \frac{\sqrt{NT}(\hat{\lambda} - 1) + 3\sqrt{N}}{\sqrt{10.2}} \quad (6)$$

$$2. DF_t = \sqrt{1.25} t_\gamma + \sqrt{1.875} N \quad (7)$$

$$3. DF_\gamma^* = \frac{\sqrt{NT}(\hat{\gamma} - 1) + (3\sqrt{N}\hat{\sigma}_v^2 / \hat{\sigma}_v^2)}{\sqrt{3 + (7.2\hat{\sigma}_v^4 / \hat{\sigma}_{0v}^4)}} \quad (8)$$

$$4. DF_t^* = \frac{t_\gamma + (\sqrt{6N}\hat{\sigma}_v / 2\hat{\sigma}_{0v})}{\sqrt{(\hat{\sigma}_{0v}^2 / 2\hat{\sigma}_v^2) + (3\hat{\sigma}_v^2 / 10\hat{\sigma}_{0v}^2)}} \quad (9)$$

where $\hat{\sigma}_v^2 = \sum_p - \sum_{\mu\epsilon} \sum_{\epsilon}^{-1}$ and $\hat{\sigma}_{0v}^2 = \Omega_\mu - \Omega_{\mu\epsilon} \Omega_\epsilon^{-1}$. DF_γ and DF_t are based on strict exogeneity of the regressors with respect to the errors in the equation while DF_γ^* and DF_t^* are based on endogenous regressors. The ADF test is calculated from the following regression:

$$\hat{e}_{i,t} = \gamma \hat{e}_{i,t-1} + \sum_{j=1}^p \mathcal{G}_i \Delta \hat{e}_{i,t-j} + v_{i,t} \quad (10)$$

The ADF test statistic is constructed as follows:

$$ADF = \frac{t_{ADF} + (\sqrt{6N} \hat{\sigma}_v / 2 \hat{\sigma}_{0v})}{\sqrt{(\hat{\sigma}_{0v}^2 / 2 \hat{\sigma}_v^2) + (3 \hat{\sigma}_v^2 / 10 \hat{\sigma}_{0v}^2)}} \quad (11)$$

where t_{ADF} is the t-statistic of γ in equation (6). The distributions of all these statistics are normal $N(0, 1)$.

Pedroni (1995) constructs a panel autoregressive coefficient estimator $\hat{\gamma}_{N,T}$ based on a pooled Phillips and Perron-type test as follows:

$$\hat{\gamma}_{N,T} - 1 = \frac{\sum_{i=1}^N \sum_{t=2}^T (\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i)}{\left(\sum_{i=1}^N \sum_{t=2}^T \hat{e}_{i,t-1}^2 \right)} \quad (12)$$

where $\hat{\lambda}_i$ is the scalar equivalent to the correlation matrix and corrects for any correlation effect. The two test statistics proposed by Pedroni (1995) are:

$$1. PC_1 = \frac{T\sqrt{N}(\hat{\gamma}_{N,T} - 1)}{\sqrt{2}} \Rightarrow N(0, 1) \quad (13)$$

$$2. \text{ PC}_2 = \frac{\sqrt{NT(T-1)}(\hat{\gamma}_{N,T} - 1)}{\sqrt{2}} \Rightarrow N(0, 1) \quad (14)$$

The cointegration relationship in the panel data is estimated using Kao and Chiang's (2001) dynamic OLS (DOLS) and fully modified (FMOLS) estimators. The FMOLS estimator does not in general improve on the OLS estimator while the DOLS estimator is better than both the bias-corrected OLS and FMOLS estimators. The OLS estimator of β is

$$\hat{\beta}_{OLS} = \left[\sum_{i=1}^N \sum_{t=1}^T (X_{i,t} - \bar{X}_i)(X_{i,t} - \bar{X})' \right]^{-1} \left[\sum_{i=1}^N \left(\sum_{t=1}^T (X_{i,t} - \bar{X}_i) \hat{y}_{i,t}^+ - T \hat{\Delta}_{\varepsilon\mu}^+ \right) \right] \quad (15)$$

where $\bar{X}_i = (1/T) \sum_{t=1}^T X_{i,t}$ and $\bar{Y}_i = \left(\sum_{t=1}^T Y_{i,t} \right)$. The FM estimator is obtained by correcting for endogeneity and serial correlation to the OLS estimator in (15) above and is given as follows:

$$\hat{\beta}_{FM} = \left[\sum_{i=1}^N \sum_{t=1}^T (X_{i,t} - \bar{X}_i)(X_{i,t} - \bar{X}_i)' \right]^{-1} \left[\sum_{i=1}^N \left(\sum_{t=1}^T (X_{i,t} - \bar{X}_{i,t}) \hat{Y}_{i,t}^+ - T \hat{\Delta}_{\varepsilon\mu}^+ \right) \right] \quad (16)$$

where $\hat{\Delta}_{\varepsilon\mu}$ is the kernel estimates of $\Delta_{\varepsilon\mu}$. The DOLS estimator can be obtained from the following regression:

$$Y_{i,t} = \alpha_i + X_{i,t}' \beta + \sum_{j=-q}^p c_{ij} \Delta X_{i,t+j} + v_{i,t} \quad (17)$$

The DOLS (p,q) where p and q denote the number of leads and lags respectively are estimated. To test for panel cointegration, the residual based ADF statistic proposed by Kao (1999) to test the null of no cointegration is employed. If there is a unit root then there is no cointegration in the model.

This study uses saving and investment data of the ASEAN5+3 economies namely; Indonesia, Malaysia, Philippines, Singapore and Thailand, China, Japan and Korea, The sample period extends from 1970 to 1999.

Results and Discussions

In general, the results of the panel unit tests based on the IPS procedure presented in Table 1 suggest that the individual unit root tests fail to reject the null hypothesis of non-stationarity of the investment rate and saving rate.

The cointegration analysis is carried out for both Kao (1999) and Pedroni (1995) approaches and the results are presented in Table 2. Both cointegration test reject the null hypothesis of no cointegration, These findings corroborate other studies in the literature and confirm that saving and investment are cointegrated in the long run for all the countries under consideration (Jansen, 1997; Anoruo, 2001).

The presence of cointegration is consistent and complies with the arguments that the inter-temporal budget constraints are always operative in an open-economy as current account deficits cannot be sustained indefinitely (Jansen, 1997, 2000). As such regardless of the degree of capital mobility the inter-temporal budget constraints are powerful enough to drive the results indicating the presence of a cointegration relationship.

Our point of interest is to evaluate the magnitude of β , the saving retention coefficient for the sample of ASEAN5 and ASEAN+3. As shown in Table 3, the DOLS estimate of β for ASEAN5 registered a value of 0.89, and when China, Korea and Japan is included in the sample, the estimated β has reduced to 0.58. Both β 's are significantly different from zero at the 5 percent level.

A comparison of capital mobility between the two sub-regional samples is not easy. The magnitude of β cannot be used to measure degree of capital mobility. The β estimate of 0.26 for the ASEAN 5 region does not necessarily indicate a lower degree of capital mobility than the estimate of zero. This is because the estimate may reflect different types of shocks that the countries may experience under capital mobility. By the same token, it is impossible to associate a zero coefficient with the theoretical benchmark of perfect capital mobility. In fact even under perfect capital mobility the β is not expected to be zero (Feldstein and Horioka, 1980).

However the results can be used to make qualitative comparisons pertaining capital mobility in the region. A comparison of β estimates on a regional basis shows that the ASEAN5 reject the null hypothesis of perfect mobility indicating that capital mobility in these regions is low. However the results for the ASEAN+3 show otherwise. Based on these results it can be concluded that while capital mobility is low in the ASEAN5 region as a whole, the capital mobility is relatively higher in the ASEAN+3 region.

Conclusion

The findings of this study corroborates other studies that savings and investment are cointegrated and this can be interpreted as a manifestation of the inter-temporal budget constraint rather than evidence of low capital mobility (see for example: Coakley et al., 1996; Coakley and Kulasi, 1997; Coiteux and Oliver, 2000). The long-run equilibrium between savings and investment is in line with the inter-temporal budget constraints of an open economy as current account deficits cannot be sustained indefinitely. In this line of research, Lau and Baharumshah (2002) have also provided evidence that most of the major Asian economies do not violate the inter-temporal budget constraints.

One explanation for the relatively high degree of capital mobility when China, Korea and Japan are included in the ASEAN5 sample suggest that there is great potential of integration in the financial markets in these eight economies in the future. Gradual elimination of restrictions on capital inflow (FDI) so as to take advantage of the substantial benefits from higher investments, faster growth and higher living standards in these Asian countries are ongoing process. One important conclusion of this study is that low savings-investment retention suggests that Asian countries has already satisfied one of the criterion of the optimum Currency Area (OCA) put forward by Mundell (1961).

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Table 1: Results of IPS (t bar) Panel Unit Root Tests

Sample country	Investment rate		Saving rate	
	No time trend	With time trend	No time trend	With time trend
ASEAN5	-0.31 (0.38)	1.63 (0.05)	-1.01 (0.15)	0.39 (0.35)
ASEAN5+3	-2.15 (0.02)	-1.85 (0.03)	-1.67 (0.05)	-1.07 (0.14)

Note: Figures in brackets are p-values.

Table 2: Results of Panel Cointegration Tests

	ASEAN5	ASEAN5+3
Kao (1999)		
DF_{ρ}	-12.61 (0.00)	-3.69 (0.00)
DF_t	-7.23 (0.00)	-2.12 (0.01)
DF_{ρ}^*	-23.00 (0.00)	-8.46 (0.00)
DF_t^*	-6.01 (0.00)	-2.70 (0.00)
ADF	-2.22 (0.01)	-4.02 (0.00)
Pedroni (1995)		
PC_1	-48.00 (0.00)	-15.35 (0.00)
PC_2	-47.22 (0.00)	-15.10 (0.00)

Note: Figures in brackets are p-values.

Table 3: Results of Estimated Saving Retention Coefficient from DOLS Estimates

	β (saving retention coefficient)	R^2 /Adjusted R^2
ASEAN5	0.89 (7.26)	0.55/ -0.72
ASEAN5+3	0.58 (6.53)	0.29/ 0.03

Note: Figures in brackets are t-statistics.