Seminar FEP2001 15

Long Run Behavior of Malaysia's Current Account: Does the Deficit Matter?

EVAN LAU[1]
AHMAD ZUBAIDI BAHARUMSHAH[2]

Introduction

Current account sustainability has been interpreted in many different ways. Under the least restrictive interpretation, the current account deficit is sustainable if the country is solvent in the sense that its present value of intertemporal budget constraint is satisfied. This implies that the country must be able to generate sufficient trade surplus in the future to repay its debt. A more restrictive interpretation of sustainability is given by Frenkel and Razin (1996, p. 512) who define an unsustainable path as one which would eventually require a "drastic" policy shift which would lead to either a large recession, which can be regarded as politically infeasible, or a "crisis" such as an exchange rate collapse or an inability to service external obligation. Such crises may occur along an optimal path, implying that some optimal paths may be infeasible, as shown by Pitchford (1995), or it may occur as a result of current account deficits which are misaligned, in the sense of being greater than their equilibrium values.

Temporary or short run current account deficits represent the natural outcome of reallocation capital to the country where capital yield the

[1] Ph D candidate Department of Economics and Management, Faculty of Economics and Management, Universiti Putra Malaysia, Serdang
[2] Professor, Department of Economics, Faculty of Economics and Management Universiti Putra Malaysia, Serdang

highest possible returns and therefore are not expected to pose serious problem (Hakkio, 1995). However, large and persistent current account deficits tend to have certain harmful effects on the domestic economy. Specifically, they tend to increase domestic interest rates relative to their foreign rates, while simultaneously, they impose an excessive burden on future generations, who will have to pay back high amounts of accumulated external debts and thus lower the standards of living. Persistence in external balance are regarded as a signal of macroeconomic imbalance, which calls for the devaluation of certain variables and policy change. In addition, large current account deficits are often assumed to play an important role in the propagation of currency crises in the recent decades. The currency crisis in Chile and Mexico (early 1980s), in the UK and Nordic countries (late 1980s), Mexico and Argentina (mid-1990) and more recently in Asian countries (1997) are often associated with large and persistent current account deficits.

In this study, we draw some lessons from Malaysia's experience with current account deficits dating back from the early 1960s. Malaysia offers an interesting case study because of the following reasons: First, the economy has been severely affected by the 1997 Asian financial crisis and has experienced the worsening of current accounts balance since the late 1980s and for the most part of 1990s. The deterioration in current account balances took place during the period when the economy was growing rapidly and the current account appears to be volatile. Second, in the past four decades the economy recorded three episodes of current account imbalances. The first was in the 1971-1975 period where the deficits were mainly due to oil price shocks. The second was during the 1980-1985 commodity crisis following the world recession and more recently 1988-1997 mainly due to the surge of capital inflows from Japan and Taiwan. The deficits prior to the crisis were closely related to private sector saving-investment decisions. In contrast, the large current account deficits in the early 1980s were due to imbalances in the public sector. Third, the current account deficit in the 1990s were funded by long-term investments (FDI) and the surge in imports was linked to the surge in investments, rather than a fall in the saving rate, which trended upward for the sample period under investigation.

The main objective of this paper is to assess empirically the sustainability of Malaysia's current account deficits. We pursue this debate by taking the issue of modern time series econometric techniques like the Augmented Dickey Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski, Phillips, Schmidt and Shin (abbreviated as KPSS) for the integration of the variables. The Johansen and Juselius (1990) (hereafter referred to as Johansen) multivariate is applied to test for the long-run relationship. This paper also considers the issue of potential structural break(s) by using the cointegration procedure of Gregory and Hansen (1996). For the long run equilibria, we adopted the method of dynamic OLS (DOLS) proposed by Stock and Watson (1993).

To preview our results, we find conclusive evidence that Malaysia satisfies the intertemporal external constraint over the sample period that ended in 1997. However, recent trends in current account surpluses following the Asian financial crisis are found to be inconsistent with the intertemporal external constraint, hence suggesting that current account surpluses experienced by the economy in the recent years are not sustainable in the future. The rest of the paper is structured as follows. Section II provides an overview of the Malaysian economy and its current account patterns for the 1961-1999 period. In Section III the theoretical model for intertemporal approach to determination of current account is presented. Section IV provides the methodology as well as the data utilized in the analysis. Section V contains the results of the analysis and Section VI concludes the paper and provides some policy lessons.

An Overview of the Malaysian Economy

Malaysia's financial system is fairly well developed and many authors have documented that its financial markets are closely linked with the global markets before establishing a formal peg of the ringgit to the US dollar on September 1, 1998 (see Aggarwal and Mougoue, 1996 and Baharumshah and Goh, 2001). After experiencing a negative growth (-1.1 %) brought about by the collapse of commodity prices in 1985-1986, the economy has experienced high growth rates averaging about 8.0 % annually. For most of the 1990s GDP growth averaged at about 8.5 % in real terms before the financial crisis hit the Asian region. The spectacular growth performance of the Malaysian economy during the last decade was matched with low inflation. Gross national savings rose from 29.3 % of GNP in the 1980s to 39.4 % in 1997. The saving rate of 40.4 % recorded in 1998 was among the highest in the world. The debt service ratio was 6.1 % of total exports as at end-1996. The banking sector was healthy, with non-performing loans (NPLs) at only 3.6 % of total loans as in June 1997.

Foreign funds flowed in at accelerating rates throughout the 1990s. The investors were attracted to this country because of the strong macroeconomic fundamentals as well as political stability. 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 reached as high as 12 % of GDP. Foreign commercial banks provided the bulk of private external credit to Malaysia and the other crisis affected Asian countries[1]. The combination of high savings rate and large capital inflows produced an investment boom[2].

During the same period the external events began to adversely affect the competitive position of Malaysia whose currency was pegged to the US dollar. Early in 1994, China devalued its currency by 35%. Additionally, the dollar began to appreciate globally after mid-1995 as the yen weakened. Together the events began to produce overcapacity problems and affect the country's competitiveness in the global markets. When Thailand was forced to devalue, the pressure spread contagiously to the Philippine, Malaysia, South Korea, and Indonesia. The pegged exchange regime, banking sector, and other highly leveraged borrowers all collapsed at about the same time[3].

---

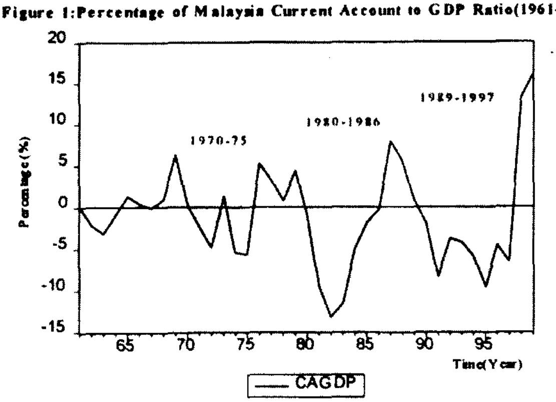
[1] In the peak year of 1996, about $90 billion flowed into South Korea, Indonesia, Thailand, Malaysia and the Philippines. Foreign commercial banks provided the bulk of the private external credit to these countries- $8 billion out of the total new external credit of $76 billion.

[2] The large capital inflows led also to a boom of bank credit into the private sector. Accordingly, the lending boom created an asset bubble in the non-tradable sector, a reduction in asset quality and a greater laxity in risk assessment in borrowing and lending decisions. This increased the fragility in the domestic financial sector.

[3] For more detailed account of the 1997 Asian financial crisis, see Radelet and Sachs (1998) and Corsetti *et al.* (1999).

Figure 1 charts Malaysia's current account from 1961 to 1999. A clear picture that has emerged from this figure is that the current account imbalances are affected by three major events: first, the 1973-1974 oil price shocks; second, the commodity crisis and the 1985 Plaza Accord that pushed up the yen; and finally, more recently the pre-crisis period 1988-1997 due to the surge of capital inflows from Japan and Taiwan[4]. The current account deficit grew from 5 % of GDP in 1993 to 8 % in 1994 and 10.5 % in 1995. External adjustments had begun in 1995 but were not effective enough to lead to a balance in the current account. It is the sharp depreciation of the ringgit (50 % against the US dollar) following the reversal of international capital inflows that has led to a large external surplus. Hence, the question now is: Are the surpluses experienced in the recent years sustainable? Fiscal deficits contributed to the current account imbalances during the 1980s and early 1990s[5]. The overall financial position of the government recorded a surplus from 1993 (US $131 million) to 1997 (US $1.7 billion) but recorded deficits after the financial crisis. The size of the deficit increased from 2.4 % of the GDP in 1997 to 5.8 % in 2000. However, there is no evidence to suggest that these budget deficits are linked to the current account deficits[6].

Figure 1:Percentage of Malaysia Current Account to GDP Ratio(1961-1999)



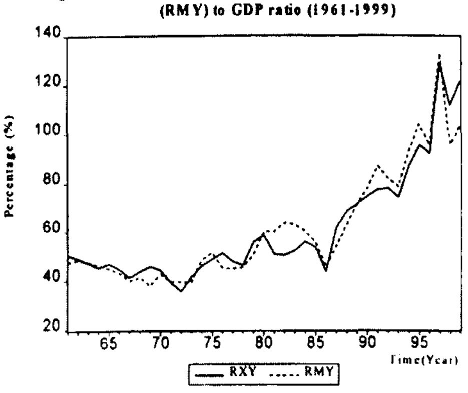
[4] In the aftermath of the first oil price increase in 1973-1974, there was a sizeable increase in Malaysia current account deficits. The deficits reach its peak in 1975 (5 % of GDP) before showing a marked improvement in 1976-1977 due to favorable movements in commodity prices.

[5] See Milesi-Ferretti and Razin, 1996b and Monetary Authority of Singapore, 1997.

[6] A number of authors have stated that the large deficits experienced by the industrialized countries were due to the government budget deficits (Darrat, 1988; Ibrahim and Kumah, 1996 and Fountas and Tsoukis, 2000).

The relationship between real exports and imports to GDP ratio are shown in Figure 2. The same story emerged in this figure as both imports and exports grew at accelerating rates after the 1985 recession as the economy transformed from an agriculture based economy to a manufacture based economy. The country became an exporter of manufactured products[7]. The trend for both variables in the post-1985 recession reflects the fact that both imports and exports drive economic growth. For most of the 1990s imports of investment and intermediate goods formed a significant percentage of Malaysia's import bills (86 % in 1998). It appears that for most of the sample period imports and exports are closely linked together, except during the major episodes mentioned above. Notice that following the 1997 crisis both imports and exports took a sharp fall before revising upward following the formal pegging of the ringgit to the US dollar and not surprisingly growth rate slid to -7.5 % in 1998.

Figure 2: Percentage of Malaysia Real Export (RXY) and Real Import (RMY) to GDP ratio (1961-1999)



Theoretical Model

Cashin and McDermott (1998) made the following remarks about previous works on the determination of sustainability of current accounts. They argued that conclusions drawn based only on a theoretical model of this important argument without testing it with the actual data are

[7] In 1985 the agriculture sector contributed 20.8 % of the GDP but declined to 11.9 % (9.4 % in 1999). During the same period, the manufacturing sector increased its share from 19.7 % to 35.7 % (29.1 % in 1999).

unsatisfactory. Similarly, conclusions by simply observing the data without any theoretical background are also unsatisfactory. Following this line of argument, we adopted the theoretical model from Hakkio and Rush (1991a) and Husted (1992) to test for the sustainability of Malaysia's current account imbalance. Briefly, the intertemporal approach to current account balances looks at the long-run relationship between exports and imports. The usefulness of this model or its variation in explaining the behavior of current accounts in the US and other developed nations have already been explored by numerous authors (see for example Wickens and Uctum, 1993; Cashin and McDermott, 1998; Fountas and Wu, 1999; Irandoust and Boo Sjoo, 2000; Leachman and Francis, 2000 and Wu *et al.*, 2001). Less emphasis has been placed on testing of the issues in the developing countries (see for example, Milesi-Ferretti and Razin, 1996 a, b; Reisen, 1998; Yan, 1999 and Apergis *et al.*, 2000)[8]. To the best of our knowledge, there are no other studies that have been conducted for Malaysia except for the work by Monetary Authority of Singapore (1997) and Yan (1999). However, our modeling strategy differs from most of the earlier studies and the sampling period includes the recent Asian financial crisis.

The model starts with the budget constraint of an individual who is able to borrow and lend freely in the international market. The current-period budget constraint of this representative household is:

$$C_0 = Y_0 + B_0 - I_0 - (1+ir_0)\, B_{-1} \tag{1}$$

where C_0 denotes the current consumption; Y_0 is output; I_0 is investment; ir_0 is the world interest rate; B_0 is international borrowing, which could be positive or negative; and $(1+ir_0)B_{-1}$ is the initial debt of the representative household, corresponding to the country's external debt.

[8] Methodologically, the issues considered in this paper are analogous to the problem of satisfying the government's intertemporal budget constraint (IBC) used in the literature that can be employed after suitable modification. See for example, Hamilton and Flavin (1986), Hakkio and Rush (1991a), Trehan and Walsh (1991), Martin (2000) and Green *et al.* (2001).

Since equation 1 must hold for every time period, the period-by-period budget constraints can be added-up to form the economy's intertemporal budget constraint. This constraint can be expressed as:

$$B_0 = \sum_{t=1}^{\infty} \delta_t TB + \lim_{n \to \infty} \delta_n B_n \tag{2}$$

where $TB_t = EX_t - MM_t = Y_t - C_t - I_t$ represents the trade balance in period t (income minus absorption), EX_t = exports, MM_t = imports, $\delta_t = \prod_{s=1}^{t} \beta_s$ where $\beta s = 1/(1+i_s)$, *and* dt is the discount factor. The crucial element in equation 2 is the last term $lim\ \delta_n B_n$, where the limit is taken as $n \to \infty$. When this limit term equals zero, the amount that a country borrows (lends) in international markets is equal to the present value of the future trade surpluses (deficits). If B_0 is positive then the country is 'bubble-financing' its external debt and in the case that B_0 is negative and the limit term is non-zero, the country is making Pareto-inferior decisions: welfare could be raised by lending less (Husted, 1992).

By assuming that the world interest rate is stationary with unconditional mean ir, equation 1 may be expressed as[9]:

$$Z_t + (1 + ir)B_{t-1} = EX_t + B_t \tag{3}$$

where $Z_t = MM_t + (ir_t - ir)B_{t-1}$. Solving equation 3 by forward substitution, Hakkio and Rush (1991a) and Husted (1992) obtained the following relationship:

$$MM_t + ir_t B_{t-1} = EX_t + \sum_{j=0}^{\infty} \phi^{j-1} [\Delta EX_{t+j} - \Delta Z_{t+j}] + \lim_{j \to \infty} \phi^{t+j} B_{t+j} \tag{4}$$

where $\phi = 1/(1 + r)$ and Δ denotes the first difference operator. The left-hand side of (4) represents spending on imports as well as interest payments (receipts) on net foreign debt (assets). By subtracting EX_t on both sides of equation 4 and multiplying the results by (-1), the left-hand side of equation 4 then represents the current account of an economy.

[9] See for example, Husted (1992), Wu et al. (1996) and Apergis et al. (2000).

Further by assuming the limit term that appears in equation 4 to be equal to zero and adding the residual term to equation 4, we obtained the following regression model:

$$EX_t = \alpha + \beta MM^*_t + e_t \tag{5}$$

where $MM^*_t = (MM_t + ir_t B_{t-1})$ measures imports of goods and services plus net unilateral transfers. The necessary condition (weak form) for the economy to satisfy its intertemporal budget constraints is the existence of a stationary error structure, that is, e_t in equation 5 should be $I(0)$ process. But the necessary and sufficient condition (strong form) for an intertemporal budget constraint model is the existence of a vector (α, β) such that is a stationary process and $(\alpha, \beta) = (0,1)$. In other words, if exports and imports are cointegrated with cointegrating vector $b=(1\ -1)$, then the economy is said to satisfy its intertemporal budget constraint in the long run. On the other hand, the absence of cointegrating relationship between inflows and outflows implies that the economy is not working properly and fails to satisfy its budget constraint (Hakkio and Rush, 1991a; Husted, 1992). Therefore, it is expected to default on its international debt. Equation 5 above provides a useful framework for testing the sustainability of current account deficits (or surpluses).

Econometric Methodology and Data

Unit root tests

Prior to testing the time series data, the degree of the integration of the series had to be tested. According to Granger (1986), a non-stationary time series can achieve stationarity if the series is differenced appropriately. The appropriate number of differencing is called the order of integration. To this end, we performed both unit roots test and the mean stationary tests. Although this is a necessary condition prior to testing for cointegration, it should be pointed out here that the Johansen procedure also allows series that are integrated of mixed orders up to [$I(1)$]. In other words, both variables that are stationary in levels [$I(0)$] and stationary in its first difference [$I(1)$] can be accommodated by the Johansen procedure (see Diamandis *et al.*, 2000).

The classical unit root tests namely, the Augmented Dickey-Fuller and Phillips-Perron are convenient testing procedures and both tests are based on the null hypothesis that a unit root exists in the time series. The Augmented Dickey-Fuller (ADF) procedure requires homoscedastic and uncorrelated errors in the underlying structure. The Phillips-Perron (PP) nonparametric test generalizes the ADF procedure allowing for less restrictive assumptions and hence, eliminating any nuisance parameters.

A major criticism of the ADF and PP tests is that it cannot distinguish between unit roots and near unit root stationary process and as a result the tests suffer from lack of power (Campbell and Perron, 1991and DeJong *et al.*, 1992). Moreover, the ADF and PP statistics are known to have performed poorly in small sample, such as ours. This prompted us to use the mean stationary test developed by Kwiatkowski *et al.* (1992) to justify the *I(1)* specification in the analysis. Unlike the classical method, the KPSS tests impose the null of unit root to determine the nature of nonstationarity in data. Hence, a vast array of unit root tests was conducted in this study in order to confirm the order of integration of the series under consideration.

Multivariate Cointegration test

Unlike its predecessor, the Johansen procedure poses several advantages over the residual-based Engle-Granger two-step approach in testing for cointegration. Phillips (1991) in his article has documented the desirability of this technique in terms of symmetry, unbiasedness and efficiency. It does not suffer from problems associated with normalization and it is robust to departures from normality (Cheung and Lai, 1993; Gonzalo, 1994). The test utilizes two likelihood ratio (LR) test statistics for the number of cointegrating vectors: the trace $[-T\sum(1-\lambda_1)]$ and maximum eigenvalue $[-T \log(1-\lambda_1)]$ statistics. In the trace test, the null hypothesis (H_0) is that there is at most r cointegrating relationship, for example, r= 0, 1, 2, 3 is tested against a general alternative. Meanwhile, the maximum eigenvalue test (λ-max) is based of the comparison on H_1 (r-1) against the alternative H_1 (r). In general, the null hypothesis (H_0: r=0) is tested against an alternative (H_1: r=1) against (H_1: r=2), and so on. Since the procedure is now well known, we have not discussed it in detail here. Readers may refer to Johansen and

Juselius (1990) for a complete discussion on the procedure. Critical values for both the trace and maximum eigenvalue tests are tabulated in Osterwald-Lenum (1992).

Gregory and Hansen Cointegration Method

Results of the Johansen procedure are sensitive to structural breaks in the cointegrating relationship. Given that such break(s) is likely to exist in estimating a cointegrating relationship (given the major events in Figure 1), we applied the Gregory and Hansen (1996)[10] cointegration test that accounts for the break endogenously. In general, it is similar to the Engle and Granger (1987) two-step cointegration test, except that a dummy variable is included to account for a shift in the cointegrating vector. Four different models corresponding to the four different assumptions made by Gregory and Hansen (1996), concerning the nature of the shift in the cointegrating vector. Model 2, 3 and 4 in Gregory and Hansen, are given by the following relationships:

Model 2: Level Shift (C)

$$RXY_t = \mu_1 + \mu_2 D_{t\tau} + \delta^T RMY_t + e_t \qquad t=1,\dots n \tag{6}$$

Model 3: Level Shift with Trend (C/T)

$$RXY_t = \mu_1 + \mu_2 D_{t\tau} + \psi t + \delta^T RMY_t + e_t \qquad t=1,\dots n \tag{7}$$

Model 4: Regime Shift (C/S)

$$RXY_t = \mu_1 + \mu_2 D_{t\tau} + \delta_1^T RMY_t + \delta_2^T RMY_t D_{t\tau} + e_t \qquad t=1,\dots n \tag{8}$$

and

$$D_{t\tau} = \begin{cases} 0 \text{ if } t \leq [n\tau], \\ 1 \text{ if } t > [n\tau], \end{cases}$$

[10] We followed Gregory and Hansen (1996) to compute the ADF statistics for each breakpoint in the interval, 0.15T to 0.85T (where T is the number of observations). We chose the breakpoint associated with the smallest value as that point at which the structural break occurred.

where μ_1 represents the intercept before the shift and μ_2 represents the change in the intercept at the time of the shift while t represents a time trend. The unknown parameter $\tau\varepsilon(0, 1)$ denotes the (relative) timing of the change point and $[\ ]$ denotes an integer part. δ_1^T denotes the cointegrating slope coefficients before the regime shift while δ_2^T denotes the change in the slope coefficients (model 4). The dummy variable, ($D_{t\tau}$) is a sequence of zeros prior to the break point and ones thereafter. Specifically, for each of τ, estimated for the above models (depending upon the alternative hypothesis) by OLS, yielding the residuals. The breakpoint is identified as the one where the test statistic is maximized in absolute value. As such, the Gregory and Hansen (1996) procedure allows us to determine the break point endogenously from the data set instead of selecting the break point based on *a priori* information. As a result, the problem of data mining can be avoided by employing this procedure. These tests are shown to be more flexible than the Zivot and Andrews (1992) test since the cointegration parameter is estimated and is not restricted to the value of one.

Annual frequency data spanning from 1961 to 1999 is utilized in the present analysis, hence providing a total of 39 observations[11]. The sample period includes the 1997 Asian financial crisis. To address the issue of structural break due to the recent currency crisis, the analysis is conducted for two sub-periods. The first period begins in 1961 and ends in 1997, the year the crisis hit the region. The second sub-period includes data during the crisis period and ends in 1999. In this way we hope to find out any difference between the two versions of the model. All of the data are gathered from several issues of the *International Financial Statistics* published by the International Monetary Fund (IMF). Real exports (RXY) include exports of goods and services, while real imports (RMY) includes

[11] One may argue that 39 years of data may not provide enough long-run information for the purpose of examining the sustainability of the current account balances using the Johansen procedure. This is typically the case of developing countries where a small number of annual observations is available for analysis. This number is small for cointegration analysis but this is the largest possible series for the Malaysian case. In fact, this issue has been a matter of debate in the literature. Indeed, as we will show later that, even with 39 years of data, we are able to find a unique cointegrating relationship between imports and exports. Moreover, as Hakkio and Rush (1991b) and Campbell and Perron (1991) pointed out, the ability to detect cointegration is a function of the total sample length and not a function of data frequency. Instead, we prefer to use the small sample degree-of-freedom correction factor as suggested in Reimers (1992) and Cheung and Lai (1993), among others.

imports of goods and services plus net transfer payments and net interest payments (see Husted, 1992). Both exports and imports are measured in real terms as a percentage of real GDP. The Consumer Price Index (CPI) is used as a proxy for the national price. The current account balances (RXMY) is constructed using RXMY=RXY-RMY (see Wu *et al.* 1996 and Fountas and Wu, 1999). All the variables are expressed in domestic currency, that is the ringgit Malaysia.

Empirical Results

Univariate Integration

Table 1 presents the results of the unit roots tests in order to determine the nature of nonstationarity of the data. Overall, the ADF and PP statistics show that all the variables are nonstationary at their level but tests for the first difference of the series is strongly rejected by both statistics. In other words, all the variables (RXY, RMY and RXMY) are integrated at order one based on the standard ADF and PP tests. As mentioned earlier, it may be useful to perform a test of the null hypothesis of stationarity as well as a test of the null of a unit root. To complement the results of the classical methods, we also conducted the KPSS tests. The KPSS mean stationary tests indicate that the null hypothesis of mean stationary is largely rejected for all the variables under investigation at the conventional significance level for the full sample period. Thus, it provides strong evidence that RXY, RMY and RXMY all have a unit root. The stationarity of current account imbalances (RXMY) implies that macroeconomic forces do not pull the current account imbalances to its long-run steady state (Fountas and Wu, 1999; Yan, 1999)[12].

[12] We also tested the unit roots for the period between 1961 and end of 1997. Overwhelmingly, the evidence also support the I(1) properties of all the series.

Table 1: Unit Root Tests[a]

Series	Test statistics						
	t_μ	t_τ	$Z(t_\mu)$	$Z(t_\tau)$	η_μ	η_τ	Conclusion
Level							
RXY	-1.569	-0.736	-1.504	-1.175	0.838[b]	0.244[b]	*I(1)*
	(1)	(1)	(3)	(3)	(3)	(3)	
RMY	-0.042	-2.049	-0.355	-2.721	1.100[b]	0.261[b]	*I(1)*
	(1)	(1)	(3)	(3)	(2)	(2)	
RXMY	-1.394	-2.794	-1.599	-2.585	0.713[b]	0.164[b]	*I(1)*
	(2)	(2)	(3)	(3)	(2)	(2)	
First Difference							
Δ(RXY)	-4.806[c]	-6.144[c]	-8.585[c]	-11.117[c]	0.511	0.061	*I(1)*
	(1)	(1)	(3)	(3)	(3)	(3)	
Δ(RMY)	-4.132[c]	-4.336[c]	-9.563[c]	-10.197[c]	0.177	0.041	*I(1)*
	(1)	(1)	(3)	(3)	(2)	(2)	
Δ(RXMY)	-4.906[c]	-4.883[c]	-13.786[c]	-15.406[c]	0.151	0.068	*I(1)*
	(2)	(2)	(3)	(3)	(2)	(2)	

[a] The t, Z(t) and η statistics are for ADF, PP and KPSS respectively. μ are the model allows a drift term while τ allowing for a drift and deterministic trend. The following notations apply in all the tables followed: RXY = Export measured in real term as a percentage of real GDP, RMY = Import measured in real term as a percentage of real GDP, RXMY = RXY-RMY. Critical values were obtained from MacKinnon (1991) for ADF and PP while KPSS from Kwiatkowski *et al.* (1992). Both the ADF and PP test examine the null hypothesis of a unit root against the stationary alternative. KPSS tests the null hypothesis series of stationary against the alternative hypothesis of a unit root.
[b] denotes significance at the 95 % level.
[c] denotes significance at the 99 % level.

Johansen Cointegration Analysis

Having established that all the variables are integrated of the same order (i.e. they are all I(1)), allowed us to proceed with the Johansen multivariate cointegration analysis. To test for the sustainability of the current account balances, we relied on equation 5 to estimate the cointegrating relationship. Several authors have emphasized the importance of the lag length in the VAR model. They indicate that the Johansen tests are sensitive to under-parameterization and over-parameterization in the lag length. This paper determines the optimal lag length using the Akaike's information criterion (AIC). Despite the relatively short lag structures in the equation of the VAR (2), the residuals do not exhibit any form of serial correlation or ARCH effects. The results of these diagnostic tests seem to suggest that the model is adequately specified and there is no evidence to suggest that the VAR model is under parameterized.

The importance of applying a degree of freedom correction for the Johansen procedure in small samples is now well known. The correction factor is necessary to reduce the excessive tendency of the test to falsely reject the null hypothesis of no cointegration often associated with data of relatively short span. A number of recent papers, including Reimers (1992) and Cheung and Lai (1993) have documented the importance of this correction factor in small samples[13]. Cheung and Lai (1993) had provided the correction factor for small sample sizes of the Johansen likelihood ratio test while Reinsel and Ahn (1988) suggested an adjustment to the estimate for both trace and maximum eigenvalue statistics. In the analysis that follows, we relied on the latter suggestion to deal with the short data span utilized in this study[14].

Table 2 reports the result of the Johansen cointegration tests. The hypothesis of no cointegrating vector cannot be rejected at conventional significance levels for the full sample period (1961-1999). Both the maximal eigenvalue and trace statistic are insignificant even at the 10 percent level and the results hold with or without applying the Reinsel and Ahn (1988) small sample correction factor. The absence of cointegration between exports and imports indicates that there is no long-run relationship between inflows and outflows in the current account. Upon examining the data we observed that the current account switched from a large deficit to surplus in 1997 following the sharp depreciation of the ringgit with the US dollar[15].

Next, we reexamined the long run relationship using data that ended in 1997. As indicated in table 2 Panel B, the null hypothesis of no cointegration is easily rejected at 5 percent for the trace (10 percent for

[13] Under Johansen procedure, the trace statistics were more robust to both skewness and excess kurtosis in innovations than the eigenvalue statistics in testing of cointegration (Cheung and Lai, 1993). It is also important to point out here that the power of these tests tends to be low when the cointegration relationship is close to the nonstationary boundary (see Johansen, 1991). Thus, it seems reasonable to allow for type 1 error probability higher than the standard 5 percent level.

[14] The degree-of-freedom correction suggested is to multiply the test statistic by (T-pk)/T, where T is the sample size, p is the number of variables, and k is the lag length for the VAR model.

[15] The ringgit was under selling pressure soon after the Thai's Baht. Bank Negara Malaysia (BNM) valiantly upheld the value of the ringgit for a week before it finally were forced to float. At that time BNM had already lost close to $ 1.5 billion in the effort to prop up the ringgit. By early 1998, the ringgit had depreciated almost 50% hitting the high RM 4.88 to a US dollar. After a brief stability in the few months ahead, the ringgit began to fluctuate again until it was fixed at the rate of RM 3.80.

the maximal eigenvalue)[16] test. In what follows we assumed a unique cointegrating vector in the annual VAR(2) specification. Rejecting the null hypothesis of no cointegrating between the *I(1)* variables appearing in equation 5 implies that the two variables do not drift apart in the long-run. This highlights the sensitivity of the cointegration tests to the sampling period as documented by Gonzalo (1994) and others. The fact that the cointegration results are sensitive to the financial crisis episode suggests that a model that ignores the stability of the relationship is likely to yield unreliable results and policy conclusions.

Table 2: Cointegration Test Result

A: Sample Period 1961-1999							
Null	Alternative	$k^a=2$ $r^b=0$					
		λ-max			Trace		
		Unadjusted[d]	Adjusted[e]	95% C.V.	Unadjusted	Adjusted	95% C.V.
r = 0	r = 1	10.446	9.373	15.870	12.626	11.331	20.180
r<= 1	r = 2	2.179	1.955	9.160	2.179	1.955	9.160

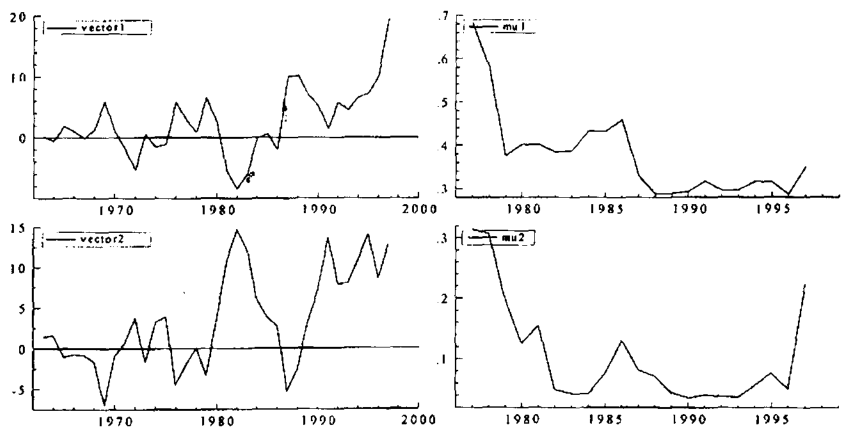
B: Sample Period 1961-1997							
Null	Alternative	$k^a=2$ $r^b=1$					
		λ-max			Trace		
		Unadjusted	Adjusted	95% C.V.	Unadjusted	Adjusted	95% C.V.
r = 0	r = 1	15.110	13.380	15.870	23.990[c]	21.240[c]	20.180
r<= 1	r = 2	8.880	7.866	9.160	8.880	7.866	9.160

[a] k is the number of lag length.
[b] r is the number of cointegrating vector.
[c] indicates statistically significant at 5% level.
[d] indicates the standard Johansen statistics (for both λ- max and trace).
[e] indicates the adjusted Johansen statistics for small sample size (for both λ- max and trace).

It can be observed in Figure 3 that the first vector (largest eigenvalue) clearly exhibits mean reverting behavior. On the other hand, the second vector presents relationships with a longer cycle. Two eigenvalues have also been established recursively. Notice that first recursive eigenvalue exhibits a more stable relationship while the same conclusion cannot be made about the second vector. The evidence provided so far suggests that several events over the sample period may have altered the long run relationship between imports and exports. Next, we consider the issue of structural break(s) by using the procedure suggested by Gregory and Hansen (1996).

[16] It is possible to get different results using the two test statistics. According to Johansen and Juselius (1990) this conflicting result may be due to low power in the case when the cointegration relation is quite close to the nonstationary bound.

Figure 3: Eigenvectors and Recursive Eigenvalues (1961-1997)



Structural Break

To allow for possible changes in the cointegrating vector over the estimation period, we applied the Gregory and Hansen (1996) procedure for the period up to 1997. As Gregory and Hansen (1996, p.101) remark, "their residual-based tests are useful in helping the applied researcher to a correct model specification." A major advantage of this method is that it allows one to search for a break at an unknown shift point and to test for cointegration. Here we imposed a priori technique as well as estimated endogenously the breakpoints.

The results of applying the Gregory and Hansen (1996) cointegration test are summarized in Table 3. In particular, the first model (mean model) reports that cointegration is present with a break point at 1985 while the second model (slope model) shows that cointegration is present with a break at 1975. Finally, the third model that takes into consideration the simultaneous presence of both a mean break and a slope break (regime shift) exhibits empirical support for cointegration with a break point at 1973. The break point detected in the first model coincides with the second major event in Figure 1 presented earlier. The breaks in the second and third models represent the first oil shock and its aftermath.

Table 3: Gregory-Hansen Cointegration Tests[a]

Model	ADF	Estimated Break Point
C	-7.453[b]	1985
C/T	-26.004[b]	1975
C/S	-5.320[c]	1973

[a] All the critical values obtained from Table 1 (p.109) of Gregory and Hansen (1996)
[b] denotes statistically significant at 5% level.
[c] denotes statistically significant at 10% level.

Estimation of Long run Equilibria

The Johansen procedure may be used to extract the long run coefficients but a more robust method proposed by Stock and Watson (1993)[17] also corrects for possible simultaneity bias among the regressors. The method involves estimation of the long run equilibria via dynamic OLS (DOLS). The procedure advocated is similar to estimators proposed by Phillips and Loretan (1991) but it is much more practically convenient to implement and estimate. Moreover, DOLS is preferred due to its favorable performance in small samples as well.

In this study, we relied on the methodology adopted from Stock and Watson (1993) that allows the (dynamic) estimation of cointegrating vectors for systems involving deterministic components. The estimators can be computed using a simple OLS procedure and the results appear in Table 4. We also tested the null hypothesis that the coefficient of the RMY equals to one (strong form) for the sample period that ended in 1997. As shown in Table 4, the restriction on the coefficients of $a_1 + a_2 = 1$, yields $\chi^2 = 0.222$ *[p-value = 0.637]*, which implies that the current account deficits in Malaysia was indeed sustainable prior to the Asian financial crisis. The estimated model seems to be robust to various departures from standard regression assumptions in terms of residual correlation, autoregressive conditional heteroscedasticity (ARCH), misspecification of functional form, non-normality or heteroscedasticity

[17] They offer a parametric approach for estimating long run equilibria in systems that involve variables integrated of different orders but are still cointegrated. The potential of simultaneity bias and small sample bias among the regressors is dealt with the inclusion of lagged and lead values of the change in the regressors. Moreover, Monte Carlo results shows that the DOLS estimator has the lowest root mean square error (RMSE) and therefore performs well in finite samples relative to other asymptotically efficient estimators.

of residuals. Furthermore, CUSUM and CUSUM squares stability tests are conducted in the estimated model. If the plot of the CUSUM or CUSUM squares sample path moves outside the critical region, and in this case at 5 percent significant level, the null hypothesis of stability over time of the intercept and slope parameters is rejected (assuming the model is correctly specified)[18]. In this study we only report the results of CUSUM squares test.

Table 4: Dynamic OLS Model (DOLS)[a]

Dynamic OLS (DOLS): $RXY = a_0 + a_1RMY^*D_2 + a_2RMY_{t+1}$

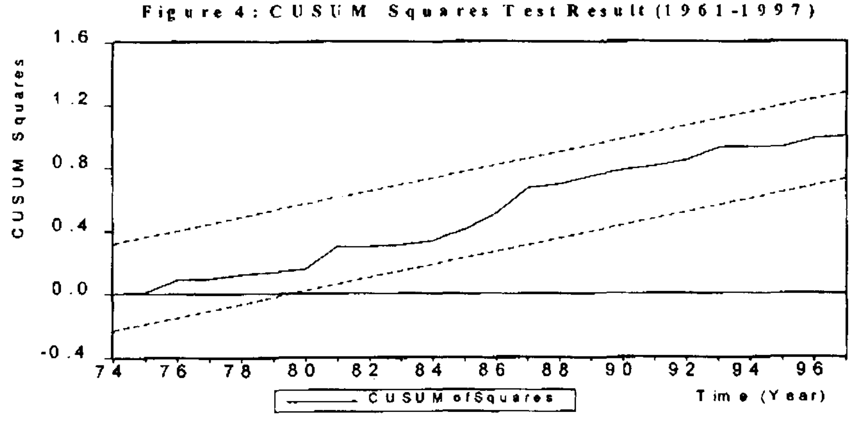
	Coefficients	t-statistics	p-values
a_0	-1.145	-1.767	0.086[c]
a_1	0.764	9.005	0.000[b]
a_2	0.205	3.018	0.005[b]

Diagnostic Checking

AR(2)	ARCH (1)	RESET(1)	J-B	White
0.850	0.932	0.865	4.086	1.321
(0.439)	(0.341)	(0.359)	(0.129)	(0.277)

[a] Distributional properties of diagnostic checking are respectively: LM (2) test of serial correlation of the 2nd order. ARCH (m) is a m-order test for autoregressive conditional heteroskedasticity. Ramsey's RESET (Regression Specification Test) test using the square of the fitted values. J-B (Jarque-Bera) is the test of the normality of the residuals. White general heteroscedasticity test is based on the regression of squared residuals on squared fitted values. The figures in parenthesis is the p-values.
[b] denotes significance at 5 % level.
[c] denotes significance at 10 % level.

Figure 4: CUSUM Squares Test Result (1961-1997)



[18] The CUSUMSQ has a beta distribution with a mean of (t-k)/(T-K). For more detailed discussion on the test, see Harvey (1990).

Short run Dynamics: Vector Error Correction Modelling (VECM)

Engle and Granger (1987) demonstrate that in the presence of cointegration, there always exists a corresponding error correction representation. This implies that changes in the dependent variable are a function of the level of disequilibrium in the cointegrating relationship (captured by the error correction term) as well as changes in other explanatory variable(s). The error correction terms (ECT) can be consistently obtained from the corresponding lagged residuals of the single equation cointegration regression (King *et al.*, 1991). Endogeneity and the exogeneity can be judged through this channel. It can be exposed through the statistical significance of: (i) the lagged ECTs by a separate t test; (ii) a joint test applied to the significance of the sum of the lags of each explanatory variable by a joint F or Wald χ^2 test or (iii) a joint test of all the set of terms described in (i) and (ii) by a joint F or Wald χ^2 test. The non-significance of t and F or χ^2 tests indicate the exogeneity of the dependent variable (Masih and Masih, 2000).

Table 5 reports the Granger non-causality tests using the VECM framework for the period 1961-1997 while a standard VAR using first difference causality is applied for the full sample period. Panel A shows that the causal relationships between the two variables are not rejected in both directions. This implies that imports and exports move independently with no tendency to converge even in the long run in the post crisis period. Meanwhile, in Panel B, unidirectional causality runs from import (RMY) to real export (RXY). The deviation from the cointegrating relationships as measured by the ECT is mainly caused by the changes in export. In other words, export bears the brunt from the short run adjustment to the long run equilibrium. Import is found to be strongly exogenous due to the insignificance of the ECT and the jointly explanatory variables.

Table 5: Short Run Elasticities: VECM[a]

Dependent variables	ΔRXY	ΔRMY	ECT_{t-1}	t-statistics (p-value)
A: Sample period 1961-1999				
	χ^2-statistics (p-value)			
ΔRXY	-	0.8123 (0.367)	-	-
ΔRMY	0.327(0.567)	-	-	-
B: Sample period 1961-1997				
	χ^2-statistics (p-value)			
ΔRXY	-	7.087 (0.080)[c]	-0.752	-2.211 (0.034)[b]
ΔRMY	1.781	-	-0.503	-1.467 (0.153)

[a] The χ^2-statistic tests the joint significance of the lagged values of the independent variables, and the t-statistics tests the significance of the error correction term (ECT). Figures in parentheses are the *p*-values. The definitions of RXY and RMY indicate as in Table 1.
[b] indicates significance at 5% level.
[c] indicates significance at 10% level.

Conclusion and Policy Implication

A country may be able to sustain current account deficits for consumption or investments purposes by borrowing from abroad. However, when the deficits are large and persistent then the ability to service and repay debt is questionable. Motivated by this issue, we examined the sustainability of current account imbalances in Malaysia, a country with large current account deficits and excessive risk-taking in the banking system but maintains a high savings rate by world standard in the past ten years or so. This paper utilized the theory of cointegration that accounts for possible structural break(s) to investigate the sustainability of current account imbalances using the model built upon intertemporal budget constraint.

The analysis leads to the following: First, this study finds that imports and exports shared a common stochastic trend in such a manner that the country's external imbalances were consistent with the intertemporal budget constraint in the pre-crisis period. In other words, we find no evidence of a violation of the intertemporal balance prior to the crisis. We view this result as supporting the notion that both imports and exports are driven by the same fundamental variable. The economic policies installed prior to the crisis (including the pegging exchange rate system) did not violate the expected intertemporal constraint. In addition, this finding suggests that the current account by itself cannot be used as an indicator or a warning signal to predict financial crisis. Hence, it discredits the conventional wisdom concerning the ability of the current account imbalances to predict financial crisis.

Second, the cointegration analysis that accounts for parameter stability finds that the long-run relationship between exports and imports are unstable. This may have been due to the major events discussed earlier in the text. Clearly, models that use long data span and fail to account for regime shift are likely to lead to unreliable results. As such, the result of this study is in line with that of recent authors for example, Wu *et al.* (1996), Apergis *et al.* (2000) and Martin (2000).

Third, Malaysia experienced an intertemporal imbalance due to current account surplus in the post crisis period. The fixing of the ringgit at 3.8 to the US dollar is not enough to suppress its current account surplus to turn around and satisfy its intertemporal budget constraint hypothesis. The role of imports (intermediate and capital goods) on the growth process of the Malaysian economy has been established elsewhere (Baharumshah and Rashid, 1999). Imports of capital goods, knowledge and technology from abroad through trade facilitate the export sector by increasing the productive capacity of the economy. The import that largely compromised the capital goods including machinery, which contain high R & D created a dynamic positive spillover effect to all sectors of the economy. This highlights the importance of trade for Malaysia and implies that restrictions on trade, particularly an imports restriction policy, responded to the short run external imbalances will lead to decline in exports and possibly of productive capacity and growth prospect for the long term period. Export expansion programs, which have been practiced by Malaysia, could lead to an increase of imports in the long run. Thus, the results cast some doubt on the appropriateness of fixing the ringgit to the US dollar.

The findings also suggest that more recently Malaysia's external sector no longer adhere to its intertemporal budget constraint. The conflicting results indicate that the economy has shifted from a strategy of borrowing from the rest of the world to one where it is a net lender in the global market.

References

Aggrawal, R. and Mougoue, M., (1996). Cointegration among Asian Currencies: Evidence of the Increasing Influence of the Japanese Yen. *Japan and World Economy* 8: 291-308.

Apergis, N. K., Konstantinos P. and Tabakis, N. M., (2000). Current Account Deficit Sustainability. *Applied Economics Letters* 7: 599-603.

Baharumshah, A. Z. and Rashid, S., (1999). Exports, Imports and Economic Growth in Malaysia: Empirical Evidence Based on Multivariate Time Series. *Asian Economic Journal* 13: 389-406.

Baharumshah, A. Z. and Goh, W. K., (2001). Financial Integration of East Asia: Is There A Yen-Block?, Paper Presented at National Workshop on Capacity Towards Excellence in Economic Research and Policy Formulation. 23-24 April, UUM Sintok.

Campbell, J.Y. and Perron, P., (1991). Pitfalls and Opportunities: What Macroeconomists Should Know About Unit Roots. In National Bureau of Economic Research Macroeconomics Annual, ed. O. J. Blanchard and S. Fischer, p. 144-201, MIT Press, Cambridge.

Cashin, P. and Mcdermott, C. J., (1998). Are Australia's Current Account Deficits Excessive? *The Economic Record* 74: 346-361.

Cheung, Y. W., and Lai, K. S., (1993). Finite-sample Sizes of Johansen's Likelihood Ratio Tests for Cointegration. *Oxford Bulletin of Economics and Statistics* 55: 313-328.

Corsetti, G., Pesenti, P. and Roubini, N., (1999). What Caused the Asian Currency and Financial Crisis? *Japan and World Economy* 11: 305-373.

Darrat, A. F., (1988). Have Large Budget Deficits Caused Rising Trade Deficits? *Southern Economic Journal* 54: 879-886.

DeJong, D. N., Nankervis, J. C., Savin, N.E. and Whiteman, C. H., (1992). Integration versus Trend Stationarity in Time Series. *Econometrica* 60: 423-433.

Diamandis, P. F., Georgoutsos, D. A. and Kouretas, G. P., (2000). The Monetary Model in the Presence of I(2) Components: Long-run Relationships, Short-run Dynamics and Forecasting of the Greek Drachma. *Journal of International Money and Finance* 19: 917-941.

Engle, R. F. and Granger, C. W. J., (1987). Cointegration and Error Correction: Representation, Estimation and Testing. *Econometrica* 55: 1987, 251-276.

Frenkel, J. A. and Razin, A., (1996). Fiscal Policies and Growth in the World Economy. Cambridge, MA: MIT Press.

Fountas, S. and Wu, J. L., (1999), Are the U.S. Current Account Deficits Really Sustainable? *International Economic Journal* 13: 51-58.

Fountas, S. and Tsoukis, C., (2000). Twin Deficits, Real Interest Rates and International Capital Mobility. Department of Economics, National University of Ireland, Working Paper No. 49.

Granger, C. W. J., (1986), Developments in the Study of Cointegrated Economic Variables," *Oxford Bulletin of Economics and Statistics* 48: 213-228.

Green, C. J., Holmes, M. J. and Kowalski T., (2001). Poland: A Successful Transition to Budget Sustainability? *Emerging Market Review* 2: 160-182.

Gregory, A. W. and Hansen, B. E., (1996). Residual-Based Tests for Cointegration in Models with Regime Shifts *Journal of Econometrics* 70: 99-126.

Gonzalo, J., (1994). Five Alternative Methods of Estimating Long Run Equilibrium Relationships. *Journal of Econometrics* 60: 203-233.

Hakkio, C. S., (1995). The U.S. Current Account: The Other Deficit. Economic Review, Federal Reserve Bank of Kansas City, 11-24.

Hakkio, C. S. and Rush, M., (1991a). Is the Budget Deficit 'Too Large'? *Economic Inquiry* 29: 429-425.

Hakkio, C. S. and Rush, M., 1991b. Cointegration: How Short is the Long Run? *Journal of International Money and Finance* 10: 571-581.

Hamilton, J. D. and Falvin, M. A., (1986). On the Limitations of Government Borrowing: A Framework for Empirical Testing. *American Economic Review* 76: 808-819.

Harvey, A., (1990). The Econometric Analysis of Time Series. Second Edition. Cambridge: MIT Press.

Husted, S., (1992). The Emerging U.S. Current Account Deficit in the 1980s: A Cointegration Analysis. *The Review of Economic and Statistics* 74: 159-166.

Ibrahim, S. B. and Kumah, F. Y., (1996). Comovements in Budget Deficits, Money, Interest Rate, Exchange Rate and the Current Account Balance: Some Empirical Evidence. *Applied Economics* 28: 117-130.

Irandoust, M. and Boo, S., (2000). The Behavior of the Current Account in Response to Unobservable and Observable Shocks. *International Economic Journal* 14: 41-57.

Johansen, S. and Juselius, K., (1990). Maximum Likelihood Estimated and Inference on Cointegration with Application to the Demand for Money. *Oxford Bulletin of Economics and Statistics* 52: 169-210.

Johansen, S., (1991). The Power Function of the Likelihood Ratio test for Cointegration. In Econometric Decision Models: New Methods of Modelling and Application, ed. J. Gruber, p. 323-335, Springer Verlag, New York.

King, R. G., Plosser, C. I., Stock, J. H. and Watson, M. W., (1991), Stochastic Trends and Economic Fluctuations. *American Economic Review* 81: 819-840.

Kwiatkowski, D., Phillips, P. C.B., Schmidt, P. and Shin, Y., (1992). Testing the Null Hypothesis of Stationarity Against the Alternative of a Unit Root. How Sure Are We that Economic Time Series Have a Unit Root? *Journal of Econometrics* 54: 159-178.

Leachman, L. L. and Francis, B. B., (2000). Multicointegration Analysis of the Sustainability of Foreign Debt. *Journal Of Macroeconomics* 22: 207-227.

MacKinnon, J.G., (1991). Critical Value for Cointegration Tests. In *Long-Run Economic Relationships: Readings in Cointegration*, ed. R. F. Engle and C. W. J. Granger, Oxford University Press.

Martin, G. M., (2000). US Deficit Sustainability: A New Approach Based on Multiple Endogenous Breaks. *Journal of Applied Econometrics* 15: 83-105.

Masih, R. and Masih A. M. M., (2000). A Reassessment of Long-Run Elasticities of Japanese Import Demand. *Journal of Policy Modeling* 22: 625-639.

Milesi-Ferretti, G. M. and Razin, A., (1996a). Sustainability of Persistent Current Account Deficits. National Bureau of Economic Research (NBER), Working Paper No. 5467.

Milesi-Ferretti, G. M. and Razin, A., (1996b). Current Account Sustainability: Selected East Asian and Latin American Experiences. National Bureau of Economic Research (NBER), Working Paper No. 5791.

Monetary Authority of Singapore (MAS), (1997). Current Account Deficits in the ASEAN-3. Is there Cause for Concern? Occasional Paper, No 1.

Osterwald-Lenum, M., (1992). A Note with Quantiles of the Asymptotic Distribution of Maximum Likelihood Cointegration Rank Test Statistic. *Oxford Bulletin of Economics and Statistics* 54: 461-472.

Phillips, P. C. B., (1991). Optimal Inference in Cointegrated Systems. *Econometrica* 59: 283-306.

Phillips, P. C. B. and Loretan, M., (1991). Estimating Long run Equilibria. *Review of Economic Studies* 58: 407-436.

Pitchford, J., (1995). Current Account and Foreign Debt. UK, Routledge.

Radelat, S. and Sachs, J. D., (1998). The Onset of the East Asian Financial Crisis. National Bureau of Economic Research (NBER) Working Paper No. 6680.

Reimers, H. E., (1992). Comparison of Tests for Multivariate Cointegration. *Statistical Papers* 33: 335-359.

Reinsel, G. C. and Ahn, S. K., (1988). Asymptotic Distribution of the Likelihood Ratio Test for Cointegration in the Nonstationary Vector Autoregressive Model. Working Paper, University of Wisconsin-Madison.

Reisen, H., (1998). Sustainable and Excessive Current Account Deficits. OECD Development Centre, Technical Paper, No. 132.

Stock, J. H. and Watson, M. W., (1993). A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems. *Econometrica* 61: 783-820.

Trehan, B. and Walsh, C. E., (1991). Testing Intertemporal Budget Constraints: Theory and Applications to U.S. Federal Budget and Current Account Deficits. *Journal of Money, Credit, and Banking* 23: 206-223.

Wickens M. R. and Uctum, M., (1993). The Sustainability of Current Account Deficits: A Test of the U.S. Intertemporal Budget Constraint. *Journal of Economic Dynamics and Control* 17: 423-441

Wu, J. L., Fountas, S. and Chen, S. L., (1996). Testing for the Sustainability of the Current Account Deficit in Two Industrial Countries. *Economic Letters* 52: 193-198.

Wu, J. L., Chen, S. L. and Lee H. Y., (2001). Are Current Account Deficits Sustainable? Evidence from Panel Cointegration. *Economic Letters* 72: 219-224.

Yan, H. D., (1999). Intertemporal Current Account Balance and the East Asian Currency Crisis. *International Advances in Economic Research* 5: 277-288.

Zivot, E. and Andrews, D. W. K., (1992). Further Evidence on the Great Crash, the Oil-Price Shock and the Unit Root Hypothesis. *Journal of Business and Economic Statistics* 10: 251-270.