

On the Twin Deficits Hypothesis: Is Malaysia Different?

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Keywords: Current account deficit, budget deficit, Granger non-causality, JEL classification: F30, H60, H62

ABSTRAK

Kajian ini membincangkan isu semasa berkaitan defisit berkembar di Malaysia. Teknik statistik yang dipelopori oleh Toda dan Yamamoto (1995) digunakan di dalam kajian ini untuk menganalisis hubungan penyebab jangka panjang di antara defisit akaun semasa dan belanjawan kerajaan. Keputusan empirikal jelas menunjukkan bahawa terdapat hubungan penyebab dua hala di antara kedua-dua defisit di Malaysia. Keputusan ini menunjukkan dengan jelas bahawa Malaysia berbeza sekali daripada kebanyakan negara-negara industri. Dari satu perspektif, keputusan ini mencadangkan bahawa hubungan penyebab daripada defisit belanjawan kerajaan kepada defisit akaun semasa yang membuktikan fenomena defisit berkembar. Dari sudut lain, hubungan penyebab daripada defisit akaun semasa kepada defisit belanjawan kerajaan mencadangkan elemen-elemen polisi pengukuhan akaun semasa. Oleh itu, masalah menguruskan akaun semasa defisit dalam akaun semasa tidak hanya boleh bergantung sepenuhnya pada mengurangkan defisit di dalam belanjawan kerajaan.

ABSTRACT

This paper discusses the on-going debates surrounding the issue of twin deficits in Malaysia. The statistical technique advocated by Toda and Yamamoto (1995) for handling economic variables that might spuriously move together is utilized to examine the long run causal relationships between budget and current account deficits. We examine more than the three decades of time series data to answer the question of whether the budget deficit had led to current account deficit. The empirical result reveals the presence of bi-directional causality between the two deficits in Malaysia. It is this finding that makes Malaysia different from the major industrialized countries. On the one hand, we find that the causal relationship is from budget to current account deficits providing evidence of twin deficits phenomena. On the other hand, the reverse causation as detected in this study tends to suggest some evidence of current account targeting. Therefore, policy to curb 'chronic' current account deficit cannot be achieved if the policy markers simply rely on curtailing budget deficit.

INTRODUCTION

The past two decades have witnessed large swings in budget as well as large fluctuations in employment, output, interest rates, exchange rate and the trade balance in the major industrialized countries. Economists view these

events as harmful to the economy. The best known events took place during the "Reagan fiscal experiment" in the 1980s which marked a period of strong appreciation of the dollar and an unusual shift in external balance not in favor of the United States.¹ In Europe, both Germany

¹ In the period 1981-1985, budgetary deficits in US rose from almost zero to a total of USD140 billion in 1985. In the same period, there was simultaneous depreciation of US dollar in real as well as nominal terms as well as deterioration in current account balance from a current account surplus of USD6.0 billion in 1981 to a deficit of USD120 billion by the year 1985. The two deficits were called twin deficits because they move in the same direction (amount) and they derived from the same economic fundamentals.

and Sweden faced similar problems in the early part of the 1990s where the rise in the budget deficits was accompanied by a real appreciation of their national currencies. This in turn adversely affects the current account balances. Developing countries have also experienced severe problems with external debts in the early 1980s. The huge budget deficits during these periods widen current account deficits in these debt-crisis countries. The emergence of current account deficit and budget deficit phenomena in many countries in recent years has drawn increasing attention to the problem of "twin deficits".

The issues relating to the two deficits have important policy implications on the economic performance of a country. Large and persistent current account deficits are troublesome due to the transfer of a nation's wealth to foreigners. More importantly, countries with large deficits face difficult economic problems that necessitated some kind of policy response if such tendencies are expected to continue for a long period of time. Suppose that the basic reason for the rising of current account imbalances is primarily due to the escalating of government budget deficit, then the deficit in current account cannot be remedied unless policies that address government budget deficit are put into place. The success of such policy measures of course depends upon whether budget deficit causes current account deficit or the other way round. If the causal link between the two variables is incorrect, then reduction in the government budget deficit may not solve the dilemma of current account imbalances. In other words, to design an appropriate policy stance, the essence of the problems has to be examined thoroughly.²

It is worth noting that the experiences of a developing country can sometimes be very different from large industrialized nations. For instance, the developing nations have poor infrastructure, trade impediments and tight regulations in the financial sector, not to mention political uncertainty that usually follows these problems. We can expect some differences in the macroeconomic dynamics governing budget and current account deficits between developing

and developed economies. Therefore, lessons from the industrialized countries may not apply to the emerging economies because the circumstances may differ. In addition, the discussion is also especially relevant given the backdrop of the financial crisis that engulfed Malaysia. Malaysia and most of the crisis-affected Asian countries recorded large current (and budget) deficits. Indeed, due to the size of the external deficit, some economists have questioned the sustainability of the deficit in periods prior to the 1997 crisis (Lau and Baharumshah 2003).

Malaysia now belongs to the upper middle-income developing country with per capita GNP of USD 3,640 in 2001 (World Bank 2003). Following the recent Asian financial crisis, the ringgit was pegged to the US dollar in September 1, 1998. Prior to the financial crisis, the economy recorded persistent current account deficits going as far back as 1989. The current account deficits grew from 5% of GDP in 1993 to 8% in 1994 and increased to 10.5% in 1995. Although the current account deficits have alternated in the past two decades or so with some years of surpluses it had, on average, a larger deficit (5%) compared to its neighboring countries like Thailand (2%) and Indonesia (2.5%) over the same period.

Malaysia's current account deficits in the last decade reflected the movements of foreign capital inflow, mainly foreign direct investment (FDI) from the US, Japan and the Newly Industrialized Countries (NIEs). FDI accounted more than 60% of the capital inflows in the 1990s. The FDI boom provides the needed capital for investment, employment, managerial skills as well as technology and therefore, accelerates growth and development (DeMello 1997). The nation's experience with budget deficits in the 1990s differs somewhat from that of the previous decade. Budget deficits, which exceeded 10% of GDP in the early 1980s, were closely related to the current account deficits. The current account deficits during these periods were closely connected to the imbalances in fiscal budget largely due to investments in large infrastructure

² Some authors like Edwards (2001) and Megarbane (2002) address the twin deficits issue from the point of view of macroeconomic stability of the country. They underlined that the negative implications of a combination of adverse factors (e.g. twin deficits, high interest rates and exchange rate depreciation) would increase the vulnerability of a country and that the fiscal instruments are crucial for sound macroeconomic policy for transition and developing countries. Therefore, twin deficits should be avoided.

projects. On the other hand, in the late 1980s and 1990s fiscal deficit shrank (sometime positive) but external deficit was large suggesting that the external imbalances in the recent years were mainly due to private saving-investment decisions. It is worth noting that Malaysia's saving rates are one of the highest in the world but they were insufficient to close-up the saving-investment gap because of the increase in marginal propensity to invest. In other words, the gap between the national savings and investments were filled by the foreign savings.

Figs. 1 and 2 plot Malaysia's current account and budgetary positions from 1975 to 2000. In the early 1980s and the most part of the 1990s the current account balance is in deficit and so is the budgetary position. Visual inspection of the plot suggests that fiscal deficits are accompanied by wide current account deficits, reflecting the twin deficit phenomena as experienced in the industrialized countries. This observation is also supported by the high correlation ($r=0.801$) between the two deficits for the sample period under investigation.⁵ The two variables appear to move closely together overtime, but the budget deficits appear to be more volatile than the current account imbalances, especially as one moves to the recent years. In spite of the importance of the effect of

fiscal (budget) policy on current account deficit, the subject on twin deficits is under research in Malaysia. The reason is partly because Malaysia has not experienced any difficulty in managing the two deficits in the past except in the early 1980s due to the collapse of the commodity prices and the recent 1997/98 Asian financial crisis.

The aim of the paper is to investigate the causal link between the two deficits. To this end, the Toda and Yamamoto (1995) *Granger non-causality* test is utilized to examine the long run relationship of the two deficits. Based on the experience of Malaysia, this present work aims to seek and contribute to the debate on the twin deficit phenomena in emerging economies, which we find is still lacking in the literature. Specifically, the purpose is to identify the causal direction of the relationship between the two variables. This in our view is important as it will provide the right policy option (or mix) to combat the above-mentioned issue.

The present paper differs from all previous studies in the following ways: First, we utilized an alternative testing methodology, endorsed by Toda and Yamamoto (1995) which has very good power properties against the causality test based on vector error correction model (VECM). Importantly, the Toda-Yamamoto overcome the

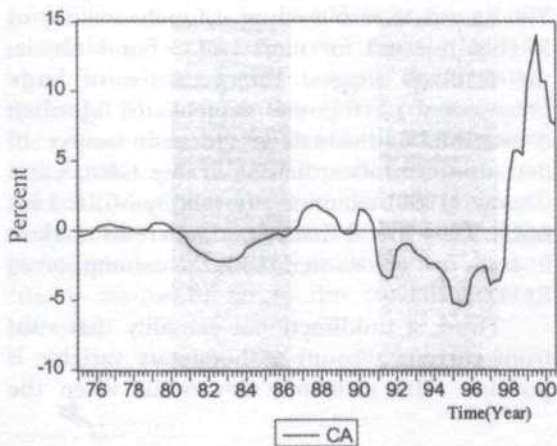


Fig. 1: Malaysian current account

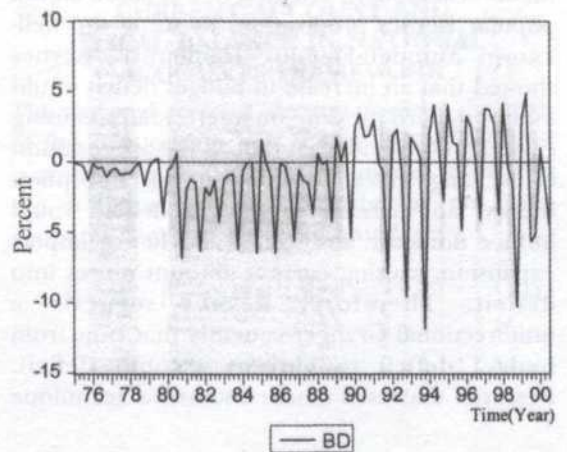


Fig. 2: Malaysian budgetary position

⁵ The correlation coefficient analysis measures the strength or the degree of linear association between two variables. In this study, we are interested in finding the correlation between current account and budget deficits. The two variables are treated in a symmetrically fashion where there is no distinction between the dependent and the explanatory variable. After all, the correlation between current account and budget deficits is the same as that between budget and current account deficits. We like to express gratitude for the anonymous referee for providing this insight.

pretest bias associated with unit root and cointegration tests.⁴ Second, the empirical evidence on the link between the two deficits is drawn from the experience of an emerging market economy - Malaysia. Few studies investigated the twin deficit hypothesis based on the data from emerging market economies (exceptions are Anoruo and Ramchander 1998 and Khalid and Teo 1999). In this way, we hope to add to existing literature on the host subject.

The remainder of this paper is structured as follows. Section II provides the relevant literature in the research area. A simple theoretical framework for analyzing the causal relationship between the budgetary and current account deficits is also given in Section III. In section IV, we briefly outlined the methodology and data used in the analysis. Section V presents our empirical results. We also included the further analysis of the multivariate setting in this section. The concluding remarks and policy implications are contained in the final section.

PREVIOUS LITERATURE

The connection between budget deficit and current account deficit has sparked a considerable amount of interest among economists in the past few decades. The discussion has mainly centered on two major theoretical models. The first view is based on the popular Keynes proposition. By using the well-known Mundell-Fleming framework, Keynes showed that an increase in budget deficit would induce upward pressure on interest rates, causing capital inflows and what follows the appreciation of exchange rates. According to this absorption theory, an increase in budget deficit would induce domestic absorption and hence import expansion, causing current account moves into deficit. Therefore, Keynes suggests a unidirectional Granger causality that runs from budget deficit to current account deficit. Research that used modern statistical technique

includes authors like Vamvoukas (1999), Piersanti (2000) and Leachman and Francis (2002) who have all found convincing evidence to support the Keynesian view that the budget deficits cause the current account deficits.⁵

Second, the more controversial and probably least accepted view is the Ricardian Equivalence Hypothesis (REH)⁶, initially developed by Ricardo (Buchanan 1976). According to this hypothesis, an intertemporal shift between taxes and budget deficits does not matter for the real interest rate, the quantity of investment or the current account balance. In fact, neither a crowding-out effect of domestic investment nor a trade deficit necessarily emerges from a budget deficit. Hence, non-Granger causality relationship between the two deficits would be in accordance with the REH. Meanwhile, the empirical evidence found in Seater and Mariano (1985), Enders and Lee (1990), Evans and Hasan (1994), among others are supportive of REH. Moreover, the validity of the REH is questionable for an emerging economy like Malaysia.

Khalid (1996) examined the effectiveness of the policy applied on the developing countries. He argued that if the REH is a valid approximation for developing economies, then the International Monetary Fund (IMF) should revise their policies to curtail problems like fiscal deficits and the misalignment of exchange rate. The empirical results support for the validity of REH is rejected for most LDCs. For Malaysia, the findings suggest the presence of large proportion of income subject to liquidity-constrained individuals is the main source of deviation from Ricardian neutrality. Ghatak and Ghatak (1996) examine the validity of REH for India. They found that imperfect credit markets in India are inconsistent with the assumption of REH.

Third, a unidirectional causality that runs from current account to budgetary variable is possible. This outcome may occur when the

⁴ In most application as in ours, it is not known a priori of which order of integration the variables are and whether they are cointegrated or not. Consequently, unit root and cointegration are normally required before estimating the VAR model and the hypothesis therefore conditional on these pretests. As the power of unit root test are known to be low and test of cointegration are known not to be very reliable for small sample, these pretest biased might be severe (see Toda 1995).

⁵ Some earlier work that attempted to resolve the issue includes Hutchison and Pigott (1984) and Bachman (1992). These studies also identify a causal relationship running from budget to current account deficits.

⁶ For a comprehensive understanding on the REH, interested reader could refer to Barro (1974), Barro (1989) and Seater (1993).

deterioration in current account leads to slower pace of economic growth and hence increases the budget deficits. This outcome is possible for a small open developing economy (e.g. Malaysia) that depends largely on foreign capital inflows to finance economic developments. The budgetary position of a country is usually affected by large capital inflows or through debt accumulations from a donor country and with that the host country will eventually run into budget deficits. The experience of Latin American and to some extent East Asian countries illustrate this point (Reisen 1998). For instance, in the 1980s most of the Latin American domestic investment is growing more than the domestic savings that have adverse effects on current account. The fiscal position had exacerbated the private sector imbalances. This reverse causality usually observed in LDCs is termed as 'current account targeting' by Summers (1988), where he argued that external adjustment may be sought via fiscal policy.

Motivated by the large and unprecedented current account deficits as well as massive federal budget deficits in the developing countries, Anoruo and Ramchander (1998) examine the twin deficits issue in five developing Asian countries includes India, Indonesia, Korea, Malaysia and Philippines. They found a unidirectional Granger causal link running from current account to budget deficits for all the sample countries investigated, except for Malaysia where a bi-directional causality is documented. Recently, Khalid and Teo (1999) documented the reverse causality for Indonesia and Pakistan while Alkswani (2000) reported the reverse causation between the two deficits for Saudi Arabia. According to them, this will occur if the government of a country utilized their budget (fiscal) stance to target the current account balance.

Lastly, a bi-directional causality between the two deficits is also possible. The results obtained by Darrat (1988), Islam (1998) and Normandin (1999) are supportive of this outcome. Islam (1998), for example, analyzed the relevance of twin deficit hypothesis in Brazil for the period 1973-1991. He found a bi-directional link between budget and trade imbalances. This finding is in accordance with the result reported by Darrat (1988). These authors went on to argue that in the case of a bi-directional relationship, budget cut will not be effective to overcome the problem with current account deficit. In fact, complementary options such as interest rate policy, exchange rate policy, trade policy with a budget cut are a better option. The above discussion identified four direct possible links between budget and current account deficits.⁷

The body of evidence, however, does not yield a consensus on the causal relationship between the two deficits. The results were found to be affected by the sampling period as well as the method used in the investigation. To sum up, the role of fiscal deficit in correct current account imbalances is not without controversy. Henceforth, the issue has become very important in developing nations and we are motivated to reexamine the relationship between the two, if any, for Malaysia.

CURRENT ACCOUNT AND FISCAL BALANCE IN NATIONAL ACCOUNTS FRAMEWORK

The national account identity provides the basis of the relationship between budget deficit and current account deficit.⁸ The model starts with the national income identity for an open economy that can be represented as:

$$Y = C + I + G + X - M \quad (1)$$

⁷ Studies by Haug (1996) and Cardia (1997) found contradict perspective of the REH when they nested Ricardian equivalence within a non-Ricardian equivalence. Their simulation results also show that the lack of a strong relationship between the current account deficit ratio and budget deficit ratio has been found for the G-7 countries. A low correlation exists between the two series in the nested and non-nested hypothesis. Moreover, they did not supports any testable hypothesis presented in this study.

⁸ We adopt a simple bivariate model discussed in Khalid and Teo (1999), Vamvoukas (1999) and Akbostanci and Tunc (2001) to identify a casual relationship between the two deficits in developing countries. Similarly, Piersanti (2000), Hatemi and Shukur (2002) and Leachman and Francis (2002) also use the same framework to identify the causality between current account and budget deficits for developed nations. As such, the bivariate analysis adopted in this study well is accepted in the previous literature on the subject matter.

where Y = gross domestic product (GDP), C = consumption, I = investment, G = government expenditure, X = export and M = import. Defining current account (CA) as the difference between export (X) and import (M), equation (1) becomes:

$$CA = Y - (C + I + G) \quad (2)$$

where $(C + I + G)$ are the spending of domestic residents (domestic absorption). In a closed economy saving (S) equals investment (I) and given that $Y - C = S$, we have:

$$S = I + CA \quad (3)$$

Equation (3) states that unlike a closed economy, an open economy can source domestically and internationally for the necessary funds for investments to enhance its income. In other words, external borrowing allows investment at levels beyond those that could be financed through domestic savings. The national saving(s) can be further decomposed into private (S_p) and government savings (S_g):

$$S_p = Y - T - C \quad (4)$$

and

$$S_g = T - G \quad (5)$$

where T is the government revenue. Using equations (4) and (5) and substituting into equation (3) yield:

$$S_p = I + CA + (G - T) \quad (6)$$

or

$$CA = S_p - I - (G - T) \quad (7)$$

Equation (7) states that a rise in the government (budget) deficits will increase the current account deficit if and only if, the rise in government deficit decreases total national saving. Supposing that current tax revenues are held constant and $(S_p - I)$ remains the same, an increase in temporary government spending will

cause government deficit to rise $(G - T)^9$ which will affect the current account positively. In this way the government deficit resulting from increased purchase reduces the nation's current account surplus, which, in other words, suggests the worsening of current account balances.

METHODOLOGY AND DATA

The standard procedure used for testing non-causality such as the error correction model (ECM) and vector error correction model (VECM) when the variables are cointegrated are cumbersome and sensitive to the values of nuisance parameters in finite samples and therefore 'the virtues of simplicity and ease of application have been largely lost' (Rambaldi and Doran 1996:3). Alternatively, Toda and Yamamoto (1995) have proposed a procedure for testing *Granger non-causality* which allows causal inference to be conducted in the level VARs that may contain integrated processes but does not rely upon integration and cointegration properties of any or all the variables. The procedure offers a simple formulation and is convenient to apply which permits linear as well as non-linear tests of restrictions. Moreover, it has a normal standard limiting chi-square distribution and the usual lag selection procedures can be applied even if there is no cointegration and /or the stability and rank conditions are not satisfied 'so long as the order of integration of the process does not exceed the true lag length of the model' (Toda and Yamamoto 1995:225). The MWALD statistics is valid regardless the series is $I(0)$, $I(1)$ or $I(2)$, non cointegrated or cointegrated of a arbitrary order. Rambaldi and Doran (1996) had shown that the MWALD could be easily computed by Seemingly Unrelated Regression (SUR).

They showed that in the integrated and (non-) cointegrated system, the MWALD test for restrictions on the parameters of a VAR(k) has an asymptotic χ^2 distribution when a VAR ($p = k + d_{max}$) is estimated, where d_{max} is the maximum order of integration suspected to occur in the system and k is the lag length selected for the estimation. These restrictions themselves would then imply long run causal inference since unlike ordinary difference VARs, the formulation

⁹ The difference between $(G - T)$ is the government budget position. If $G > T$ the government will experiencing budget deficit while analogously if $T > G$ the country would experiencing budget surplus.

involves only variables appearing in their levels. Moreover, the twin deficit nexus is a long run behavioral relationship that requires methodologies for estimating long run equilibria. Thus, the application of the Toda and Yamamoto method is suitable in permitting the long run equilibrium states.

We now turn to the causal inference between the two deficits. We note that the negative relationship between the accumulation of foreign assets and budget deficit can be causally linked in a two-dimensional VAR system (assuming $p=3$):

$$\begin{bmatrix} CAD_t \\ BD_t \end{bmatrix} = A_0 + A_1 \begin{bmatrix} CAD_{t-1} \\ BD_{t-1} \end{bmatrix} + A_2 \begin{bmatrix} CAD_{t-2} \\ BD_{t-2} \end{bmatrix} + A_3 \begin{bmatrix} CAD_{t-3} \\ BD_{t-3} \end{bmatrix} + \begin{bmatrix} \epsilon_{CAD} \\ \epsilon_{BD} \end{bmatrix} \quad (8)$$

where A_0 is an identity matrix. To test whether BD does not Granger cause movement in CAD (if $k=2$ and $d_{max}=1$), the null hypothesis $H_0: \beta_{12}^{(1)} = \beta_{12}^{(2)} = 0$ where $\beta_{12}^{(i)}$ are the coefficients of BD_{it} , $i=1,2,\dots,K$ in the first equation of the system. The existence of the causality from BD to CAD can be established through rejecting the above null hypothesis, which requires finding the significance of the MWALD statistics for BD_{t1} and BD_{t2} identified above while BD_{t3} is left unrestricted as a long run correction mechanism.

Similar analogous restrictions and testing procedures can be applied in testing the hypothesis that CAD does not Granger cause movement in BD, i.e. to test $H_0: \beta_{21}^{(1)} = \beta_{21}^{(2)} = 0$ where $\beta_{21}^{(i)}$ are the coefficients of CAD_{it} , $i=1,2,\dots,K$ of the second equation of the system (Equation 8). Equation (8) has been used as the basis to assess the causality between current account and budget deficits in the literature. This procedure

can be easily generalized for a larger number of lags in the VAR system.

Quarterly data that spans from the first quarter of 1976 to the third quarter of 2000 is utilized in the analysis, providing a total of 99 observations for the analysis.¹⁰ The data are taken from *International Financial Statistics*, published by the International Monetary Fund (IMF). The variables employed in the study are the current account (CAD) and the budgetary variables (BD) where the variables are expressed as ratio of the GDP in order to account for the economy's growth.¹¹ The IFS provided CAD denominated in US dollars while the BD and the nominal GDP are measured in domestic currency (Ringgit Malaysia). In this study, we express all the variables in Ringgit Malaysia.¹² The data for GDP are available on the annual basis and hence, the quarterly GDP data for this study were interpolated from the annual series by employing the approach suggested by Gandolfo(1981).¹³ All the data used here are seasonally unadjusted data. We are aware of the seasonality problem in testing high frequency data. To overcome this problem, seasonal dummies are included in the estimation.

EMPIRICAL RESULTS

Prior to testing for causality relationship between the time series, it is necessary to determine the order of integration and establish that they are integrated of the same order. To this end, the Augmented Dickey-Fuller test is carried out on the series, first on level and then on first difference forms. Overwhelmingly, the results presented in Table 1 suggest that all the series are $I(1)$ variables based on conventional significance levels. We also adopt the Phillips-Perron tests and the results obtained are similar to the ADF tests. To conserve space these results are not reported here. Our unit root test results

¹⁰ The power of unit root and cointegration tests depends on the data's span. It does not help by using data of higher frequency (e.g. monthly) as the power of most of the test used in the analysis depends on the data's span rather than its frequencies.

¹¹ We expressed both variables in the straightforward manner of CAD and BD per output following Vamvoukas (1999), Piersanti (2000) and Hatemi and Shukur (2002) rather than the decomposed components of exports and imports for CAD and revenues and expenditures for BD. The authors are grateful to an anonymous referee for pointing this point to clear the uncertainties of data descriptions for this study.

¹² We convert the CAD into Ringgit Malaysia by the using the exchange rate between Malaysia and US dollar reported in IFS.

¹³ This method provides the convenient and straightforward manner to interpolate the annual basis of GDP into quarterly observations compared to other interpolation method. The interpolation technique of the continuous flow variables from the annual basis of GDP to the quarterly observations is documented in the Appendix A of this paper.

indicate among other things, shocks in the current account and budget deficits tend to be permanent implying that they are on an unsustainable path. Nevertheless, we caution the reader that the results of these standard unit root tests may be biased due to the low power of the test.

Next, we proceeded with the estimation of the VAR model after determining that the $d_{max} = 1$. In order to check the robustness and consistency of the results, we also estimated the same model with $d=2$. The lag selection is commonly done by setting arbitrary lags or by applying an order estimation criterion such as Akaike Information Criterion and Schwartz Criterion. The choice of the lag length is tested from one up to twelve. The optimal lag is based on minimum Akaike Information Criterion (AIC). Following this criterion we obtain $k=6$. Therefore, VAR ($p = d_{max} + k = 7$) and VAR ($p = d_{max} + k = 8$) models were then estimated and the MWALD statistic were was computed. Table 2 presented the result of the *Granger non-causality*. The null hypotheses that the CAD (current account deficits) does not cause the BD (budget deficits) and BD (budget deficits) does not cause the CAD (current account deficits) are easily rejected at the usual significance levels, hence, suggesting the existence of a bi-directional causality between the two deficits. It is worth noting that both Panels A ($d=1$) and B ($d=2$) yield similar quantitative conclusions on the budget-current account deficits nexus.

The finding implies that two deficits move simultaneously and are connected to each other in the long run. It turns out that the results replicate the picture drawn in a number of studies conducted for the developing economies e.g. (Anoruo and Ramchander 1998; Khalid and Teo 1999 ; Chinn and Prasad 2000). Specifically, Khalid and Teo (1999) and Chinn and Prasad (2000) pointed out that a high correspondence between the two deficits is more likely to occur in the developing rather than the developed economies. We note that the results contradict with those studies conducted in the US and EU. It is this finding that makes Malaysia different from the major industrialized countries where large budget deficits normally lead to current account deficit – a one way causal relationship. It also worth noting that the evidence refuted the Ricardian hypothesis that suggests that a budget deficit does not matter.

Further Evidence

Further evidence on the interplay between budget deficit and various economic variables that affect the real economic activities are examined to validate the Keynesian propositions. The literature has identified several potential variables that may serve as the mediating variables (exchange rate, interest¹⁴ rate, investment, inflation, to name a few). In what follows, we extended the 2-vector variable model to include two additional variables namely exchange rate and interest rates.¹⁵ The results of the causality tests, which are available from the authors, do not change the causal inference reported earlier.

TABLE 1
Augmented Dickey Fuller (ADF) unit root test results^a

Series	Test Statistics			
	t_{μ}	t_{τ}	t_{μ}	t_{τ}
	Series in Level		Series in first Difference	
CAD	-1.879 (4)	-1.966 (4)	-4.655 ^b (4)	-4.766 ^b (4)
BD	-1.844 (4)	-2.526 (4)	-5.705 ^b (4)	-5.673 ^b (4)

^a The t statistics is the ADF unit root test. t_{μ} are the model with constant term and t_{τ} are the model with constant and a time trend. The value in the parentheses represents the number of lag order. The ADF unit root test examine the null hypothesis of a unit root against the stationary alternative. The notation applied in all tables followed: CAD and BD denotes current account deficits and budget deficits respectively.

^b denotes significant at 5% level.

¹⁴ We are grateful to the anonymous referee for pointing out this suggestion.

¹⁵ For more discussion on this issue, refer to Lau (2004).

TABLE 2
Long run *Granger non-causality* test for Malaysia based on Toda and Yamamoto (1995)

Null Hypothesis	Test Statistics		Conclusion
	MWALD	p-value	
Panel A: ($k=6, d_{max}=1$)			
Budget deficits does not <i>Granger cause</i> current account deficits	15.252	0.018 ^a	Reject Ho
Current account deficits does not <i>Granger cause</i> budget deficits	18.865	0.004 ^a	Reject Ho
Panel B: ($k=6, d_{max}=2$)			
Budget deficits does not <i>Granger cause</i> current account deficits	12.856	0.045 ^a	Reject Ho
Current account deficits does not <i>Granger cause</i> budget deficits	13.795	0.032 ^a	Reject Ho

^a denotes statistically significant at 5 percent level. k = optimum lag and d_{max} = maximal order of integration.

To analyze the dynamics as well as the importance of the variables in the system, we conduct both the generalized variance decomposition (GVDCs) and the generalized impulse response function (GIRFs). Briefly, the GVDCs provide the strength of each variable in the system while GIRFs provide the dynamic response of each variable to its own shocks as well as of other variables included in the system. Intuitively, the GIRFs trace the response over time of a variable say x due to a unit shock given to another variable, say y . The mapping of the GIRFs is represented by a graphical illustrative.

Table 3 provides the decomposition of the forecast error variances of each variable up to 24-quarter horizon. The results from this table may be summarized as follows.

1. BD seems to be the most interactive variable among the four variables. The GVDCs show that almost 46% of the forecast error variance can be explained by current account (24%), interest rate (13%) and exchange rate (9%) at the end of 24-quarter horizon.
2. Exchange rate is the most exogenous variable in the system with only about 10% of its forecast variance being explained by the remaining variables in the entire forecast horizon.
3. Changes in interest rates (budget) are largely due to the movement in budget deficit (interest rate). The relationship becomes stronger as the horizon increases. The picture that emerged seems to suggest a bi-direction relationship between the two variables. Nevertheless the influence of budget on interest rate is much stronger. The variance in BD explains 23% of the error variance in IR but only 13% of error variance of BD are explained by IR.

Together, all these results support the Keynesian proposition i.e. higher budget deficit will lead to higher interest rates. These results clearly do not support the REH that suggest interest rate movements are independent of the deficit in the government's budget. A major policy implication of this finding is that budget deficit can cause crowding out of private investment and the extent depends on how much interest rate is forced up. This in turn can adversely affect capital formation and eventually retard long-term growth.

Finally, we examine the pattern of dynamic responses of each variable using the GIRFs. Given a system of four-dimensional variables, we may construct up to 12 possible scenario of GIRFs for each of the variables taken separately (ignoring their own shocks). The results of GIRFs are traced out up to 50 quarters in Fig. 3. In all cases, the responses of shock to the subsequent variable under investigation seems to settle back to its post-shock level after a period of about 6-9 quarters. This suggests that most of the adjustments are rapid and relatively settle as the transitory impact. Additionally, we observed that the impact patterns of CAD and BD to each other are rather similar. Both adjust back to the long run equilibrium after 8 quarters. We also detect that CA reverts rapidly back to the equilibrium, after the shock from EXC, implying that devaluation is taking place in the subsequent quarters. This of course does not follow the J-curve pattern observed in Baharumshah (2001) where the rapid adjustment in trade balance from one-time shock of real exchange rate negates any theoretical J-curve pattern.

TABLE 3
Generalized variance decomposition^a

Percentage of variations in	Horizon (Quarters)	due to innovation in:				
		Δ CAD	Δ BD	Δ IR	Δ EXC	Δ CU
Quarters Relative Variance in: Δ CAD						
	1	85.674	8.760	3.251	2.315	14.326
	4	81.710	10.186	4.755	3.350	18.290
	8	80.721	10.858	4.455	3.965	19.279
	24	80.218	11.196	4.363	4.223	19.782
Quarters Relative Variance in: Δ BD						
	1	4.653	94.658	0.647	0.042	5.342
	4	11.556	82.326	3.688	2.430	17.674
	8	16.599	70.776	7.213	5.412	29.224
	24	24.048	54.231	12.725	8.996	45.769
Quarters Relative Variance in: Δ IR						
	1	6.566	7.070	76.134	10.230	23.866
	4	5.908	17.518	63.188	13.386	36.812
	8	6.020	20.970	59.938	13.072	40.062
	24	6.190	22.782	58.064	12.964	41.936
Quarters Relative Variance in: Δ EXC						
	1	2.333	0.173	7.705	89.789	10.211
	4	1.008	0.080	8.217	90.694	9.306
	8	0.708	0.076	8.627	90.589	9.411
	24	0.498	0.070	8.960	90.471	9.529

^a The last column provides the percentage of forecast error variances of each variable explained collectively by the other variables. The column in bold represent their own shock.

CONCLUSION AND POLICY IMPLICATIONS

Economists have long argued that for developing countries to reduce 'chronic' current account deficits, national savings must rise by reducing the budget deficits and/or increasing the rate of private savings. The results of this study point to suggest bi-directional causality between budget deficits and current account deficits. This is not a surprising result for an emerging economy like Malaysia. On the one hand, governments can have large budget deficits by heavily borrowing in international markets. Furthermore, even the deficits financed by excessive money creation, these are more likely to affect the current account. Excessive monetary expansion in an economy with fixed exchange rate will cause disequilibrium in the money market and will in turn lead to increase in import demand and a larger current account deficit, other things being equal. Therefore, we would expect to observe causality running from budget deficits to current account deficits.

On the other hand, higher export prices (or export volumes) generated by increase in

world demand will not only raise export earnings and improve the current account but also reduce the budget deficit (since taxes on export earnings are a significant portion of governments' revenue for a small economy that depends on export sectors like Malaysia). Also, an increase in export prices (or volume) will raise domestic income for expansionary or countercycle fiscal policy. In both cases, the improvement in the current account could be reflected in an improvement in fiscal balance suggesting the causal relationship from current account deficits to budget deficits (reverse causation). Since both mechanisms are at work in the case of Malaysia, this explained the main results recorded in this study.

It is evident from the finding of this paper that the decision to curb the problem with current account imbalances cannot be achieved by simply relying on fiscal cuts. Policy measures focusing on monetary and productivity enchantment may have to be complemented with the budget cut policy. Monetarists claim that fiscal policy cannot correct the disequilibrium in external account. The findings of this study reject this claim but our research

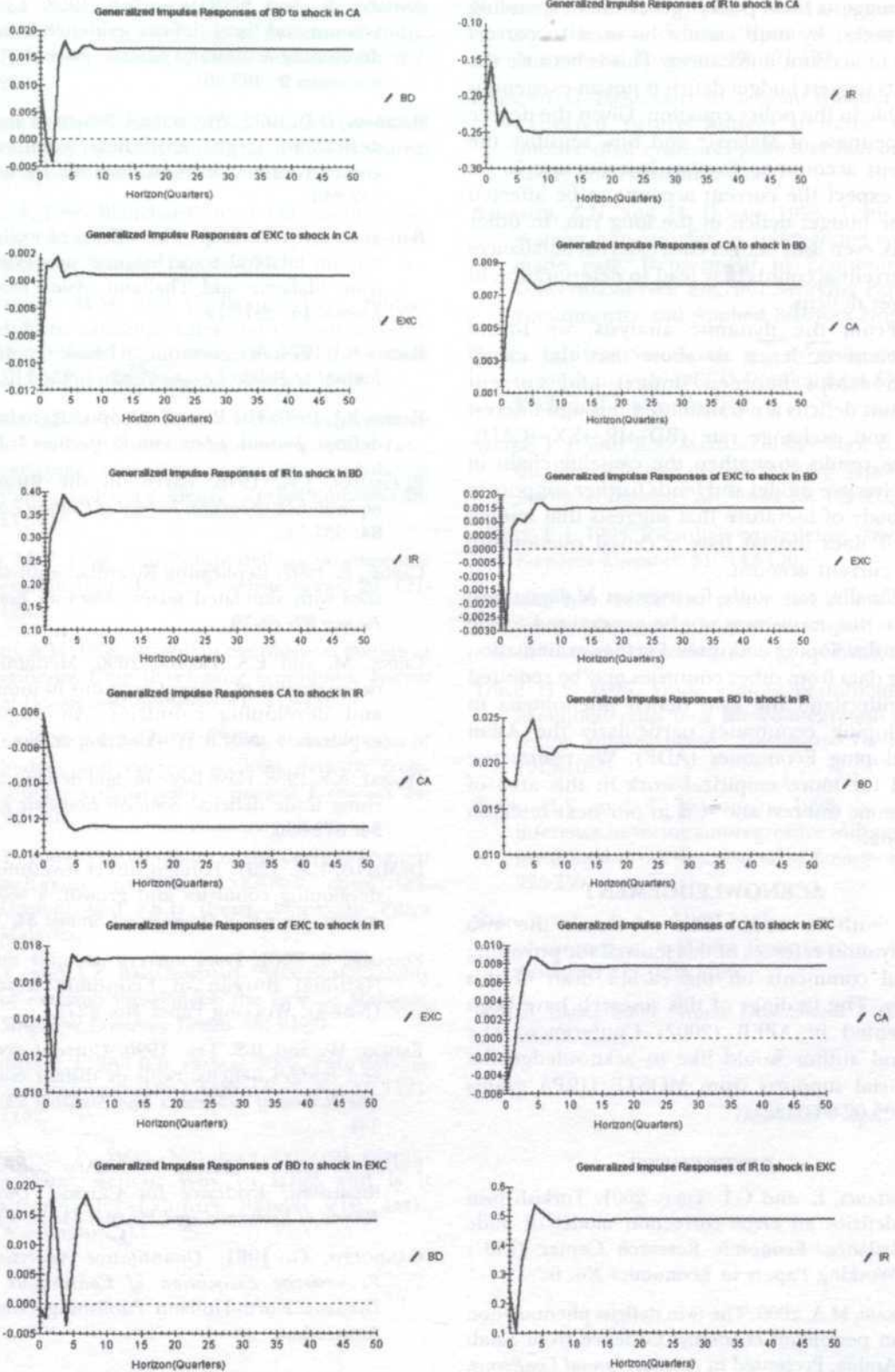


Fig. 3: Generalized impulse response function

also suggests fiscal policy (government spending and taxes) by itself cannot be used to correct current account imbalances. This is because the results suggest budget deficit is not an exogenous variable in the policy equation. Given the degree of openness of Malaysia and how sensitive the current account to foreign interest rate is, we may expect the current account to be affected by the budget deficit in the long run. In other words, even with budget cuts, external imbalances in current accounts may lead to deterioration in budget deficits.

From the dynamic analysis, we found sufficient evidence to show that the causal relationships between budget and current account deficits are transmitted through interest rate and exchange rate (BD→IR→EX→CAD). These results strengthen the causality chain in the bivariate model and lends further support to the body of literature that suggests that budget deficit does indeed have a causal relationship with current account.

Finally, our study focuses on Malaysia and hence the results may not be generalized to the other developing countries. Further examination using data from other countries may be required to understand the twin deficit phenomena in developing economies particularly the Asian Developing Economies (ADE). We realize the need for more empirical work in this area of academic interest and it is in our next research agenda.

ACKNOWLEDGEMENT

The authors would like to thank the two anonymous referees of this journal for providing useful comments on the earlier draft of this paper. The findings of this research have been presented in APEB (2002) Conference. The second author would like to acknowledge the financial supports from MOSTE [IRPA grants No: 05-02-04-0532].

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(Received: 3 April 2002)

APPENDIX A

Quarterly interpolation of GDP from annual observations

Let us assume that y_t, y_{t-1}, y_{t+1} be three consecutive annual observations of continuous flow variables of year $y(t)$. In deriving the interpolation formulae, the observed values are actually integrals. Thus, the rule of thumb is to integrate the quadratic function in order to obtain the quarterly formulae. The quarterly formulae after satisfying each of the conditions in any year t are as follows:

$$y_t^{(1)} = 0.0546875y_{t-1} + 0.234375y_t - 0.0390625y_{t+1} \quad (1)$$

$$y_t^{(2)} = 0.0078125y_{t-1} + 0.265625y_t - 0.0234375y_{t+1} \quad (2)$$

$$y_t^{(3)} = 0.0234375y_{t-1} + 0.265625y_t - 0.0078125y_{t+1} \quad (3)$$

$$y_t^{(4)} = 0.0390625y_{t-1} + 0.234375y_t - 0.0546875y_{t+1} \quad (4)$$

where y_t, y_{t-1}, y_{t+1} are the current, lag and lead values of the variables in question at time t (annual). In other words, three continuous annual observations of variable $y(t)$ are adopted in each of the equations. In order to calculate the value for the first quarter, we apply the formulae for the first quarter and subsequently for the remaining quarters. For example, one may substitute the GDP values for y_t, y_{t-1}, y_{t+1} in Equation 1 to obtain the calculated value for the first quarter. One advantage of the interpolation technique is being able to generate the higher frequency data series for the time series analysis. Thus, we adopted the Gandolfo (1981) interpolation technique of extracting the quarterly observations based on the annual GDP in this study.