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THE RELATIONSHIP BETWEEN GOVERNMENT REVENUE AND EXPENDITURE IN MALAYSIA

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ABSTRACT

The study examines the relationship between government revenue and expenditure in Malaysia. The results of the Dickey and Fuller (1979) and Phillips and Perron (1988) unit root test statistics show that government revenue and expenditure are integrated of order one. The results of the Johansen (1988) and Gregory and Hansen (1996) cointegration methods show that government revenue and expenditure are cointegrated. Thus, there is a long-run relationship between the government revenue and expenditure. The intertemporal budget constraint is not violated and the budget deficit of the Malaysian government is generally said to be sustainable. The results of the Granger-causality test generally show that the government revenue leads to government expenditure in Malaysia.

Keywords: *Budget deficit; Intertemporal budget constraint; Government revenue and expenditure; Cointegration; Malaysia.*

ABSTRAK

Kajian ini menguji hubungan di antara hasil dan perbelanjaan kerajaan di Malaysia. Keputusan statistik ujian unit root Dickey dan Fuller (1979) dan Phillips dan Perron (1988) menunjukkan bahawa hasil dan perbelanjaan kerajaan adalah integrasi darjah satu. Keputusan kaedah kointegrasi Johansen (1988) dan Gregory and Hansen (1996) menunjukkan bahawa hasil dan perbelanjaan kerajaan adalah kointegrasi. Maka, terdapat hubungan jangka panjang di antara hasil dan perbelanjaan kerajaan. Konstrain bajet antara tempoh tidak dilanggar dan defisit bajet kerajaan Malaysia pada umumnya

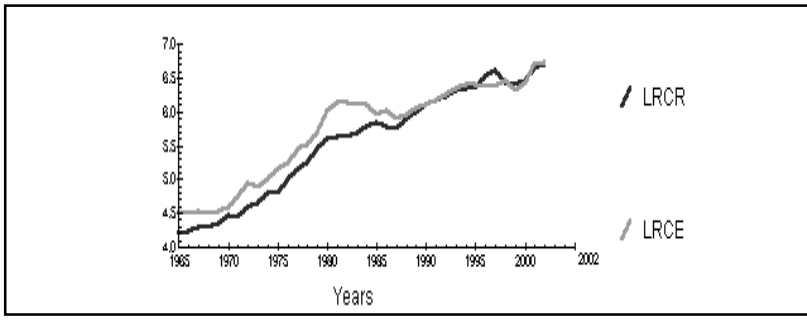
dikatakan berkekalan. Keputusan ujian penyebab Granger menunjukkan bahawa hasil kerajaan menyebabkan perbelanjaan kerajaan di Malaysia.

Kata kunci: *Defisit bajet; Konstrain bajet antara-tempoh; Hasil dan perbelanjaan kerajaan; Kointegrasi; Malaysia.*

INTRODUCTION

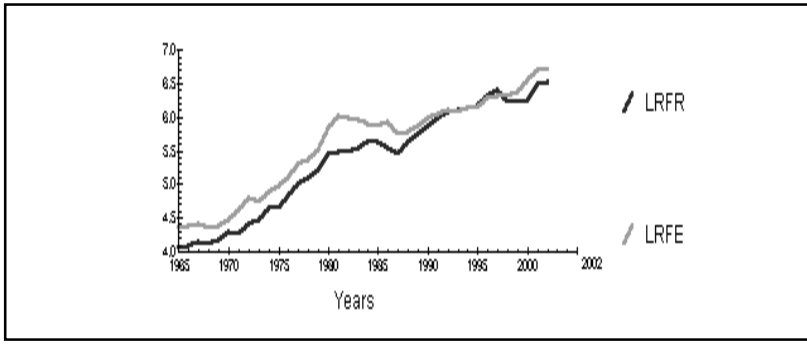
The Malaysian government experienced budget deficits prior to 1990, which tended to increase and persist, and generated considerable concern that it would reduce economic growth and development and lead to a crisis of some type, if it continued too long or became too large. Furthermore, it raised the question of the ability of the government in settling its deficit in the long run. Nevertheless, the Malaysian government experienced a mixture of budget deficits and surpluses in the 1990s. For the consolidated public sector from 1965 to 1969, the average budget deficit was RM541.8 million per annum, which increased to RM1,957.9 million per annum from 1970 to 1979.[1] The budget deficit reached a peak in the 1980s with the average of RM7,000.6 million per annum. In the 1990s, it experienced budget surpluses with the average of RM2,278.9 million per annum, while in 2002, the budget deficit was RM2,488 million. For the federal government, the average budget deficit was RM532.2 million per annum from 1965 to 1969, increased to RM1,858.8 million per annum from 1970 to 1979, and RM7,348.6 million per annum in the 1980s. In the 1990s, the average budget deficit reduced to RM1,183.5 million per annum, while in 2002, the budget deficit was RM20,253 million (Ministry of Finance Malaysia, 1975/76, 1977/78, 1982/83, 1984/85, 1989/90, 1994/95, 2003/04). In Budget 2003, the Malaysian government made a clear statement to consolidate its fiscal finance, which reflected on the Malaysian government to strongly implement the budget balance in line with the policy objective of the Eight Malaysia Plan, 2001-2005 (Ministry of Finance Malaysia, 2003). The plots of the logarithms of the real revenues and expenditures of consolidated public sector and federal government are presented in Figure 1 and Figure 2, respectively. The figures show that the real revenues and expenditures of consolidated public sector and federal government tend to move in the same direction.

The budget deficit has important implications for economic growth. It could reduce national savings and in turn will retard economic growth. Thus, to induce economic growth in a budget deficit economy, at least two things can be done, i.e. 1) raising the national savings, and 2) reducing the budget deficit (Aziz, Habibullah, Azman-Saini & Azali,



Notes: LRCR and LRCE indicate the logarithms of the real revenue and expenditure of consolidated public sector, respectively.

Figure 1
The logarithms of the real revenue and expenditure of consolidated public sector against time (1965-2002)



Notes: LRFR and LRFE indicate the logarithms of the real revenue and expenditure of federal government, respectively.

Figure 2
The logarithms of the real revenue and expenditure of federal government against time (1965-2002)

2001). A government will be able to sustain its deficits if it can raise the necessary funds by borrowing. However, it is feasible in the short run, but the ability of the government to service its deficits by resorting to further borrowing is likely to be questioned once the deficits become persistent. Nevertheless, it is argued that it is more important to achieve intertemporal budget constraint instead of emphasis on the size of the deficit at any particular point in time. Thus, the issue focuses on the long-run path of the government revenue and expenditure (Jyh-Lin,

1998).[2] In other words, does the size of the budget deficit imply that the intertemporal budget constraint is being violated? The issue of whether the budget deficit violates the intertemporal budget constraint is getting much attention among public, economists and policy makers. Nonetheless, empirical studies on this issue are contradictory (Trehan & Walsh, 1991). There is extensive literature on this issue, with most of the study focusing on the United States (Bravo & Silvestre, 2002). The study on this issue for developing countries is relatively limited.

The government revenue and expenditure nexus also requires investigation. The causal direction between the government revenue and expenditure assists policy makers in identifying the source of fiscal imbalances and designing a suitable fiscal reform. Generally, government revenue and expenditure could be classified into four types: (i) fiscal synchronisation implies that decisions of government revenue and expenditure are made simultaneously; (ii) the revenue and expenditure hypothesis implies that government revenue causes change in government expenditure; (iii) the expenditure and revenue hypothesis implies that government expenditure causes change in government revenue and (iv) the independent revenue and expenditure hypothesis implies that independence of government revenue and expenditure. Nevertheless, the empirical evidence on this issue is mixed, depending on time period used, and the levels of government (Aziz *et al.*, 2001).

The aim of the study is to investigate the sustainability of the budget deficit of the Malaysian government over the period 1965 - 2002 and a sub-period of 1965 - 1996. The study also examines the causal relationship between government revenue and expenditure. Therefore, the study employs the Dickey and Fuller (1979) and Phillips and Perron (1988) unit root test statistics to test the stationarity of the data. The sustainability of the budget deficit of government is tested by examining the long-run relationship between government revenue and expenditure using the Johansen (1988) and Gregory and Hansen (1996) cointegration methods. Finally, the Error-Correction Models (ECMs) are estimated for testing Granger causality between the government revenue and expenditure.

The article is organised as follows. Section 2 discusses fiscal policy in Malaysia. Section 3 presents the intertemporal budget constraint. Section 4 gives a literature review of the relationship between government revenue and expenditure. Section 5 explains data and methodology in this study. Section 6 gives the empirical results and discussions. Section 7 provides some concluding remarks.

A DISCUSSION OF FISCAL POLICY IN MALAYSIA

Fiscal policy has contributed significantly to management of economy in Malaysia. The main aims of the fiscal policy are to achieve national socio-economic objectives, contained in the medium-and long-run development plans, and to counter cyclical economic fluctuation (Ministry of Finance Malaysia, 2003/04). In the 1970s, the Malaysian government played an important role in the economy. In line with New Economic Policy, the government went beyond its conventional functions and took on a more active and direct role in the overall social and economic development process in the country. Fiscal policy was an important tool for economic restructuring. During this period, the government participated directly in the private sector through the establishment of various public enterprises, which increased public sector expenditure.

Nonetheless, the government reduced its role in the private sector with the implementation of the privatisation policy in 1983. The private sector became the engine of growth. The role of the government has been mainly in facilitating the initiatives and development of the private sector. The tax structure was reshaped to promote national savings and increase international competitiveness to meet future levels of economic growth and investment requirements. The privatisation policy had contributed significantly to the improvement of the financial position of the government and reduction of the need of borrowing. In the late 1980s, the government was able to reduce its external debt and therefore improving the external debt position of the country (Ministry of Finance Malaysia, 2003/04).

During the Asian financial crisis, which began in mid-1997 and ended in 1998 (Bank Negara Malaysia, 1999), the Malaysian government tightened its fiscal policy with the fear that the economy of the country would become worse. The fiscal policy was mainly implemented to reduce the current account deficit and inflationary pressure arising from the depreciation of the Malaysian currency. However, in the years immediately after the Asian financial crisis, the government implemented the fiscal expansionary policy to stimulate the economy. The fiscal measures included construction activities, establishment of funds to support small-and medium-sized enterprises, a higher allocation for social sector development and a reduction in taxes. The government also allocated more funds for socio-economic projects to cushion the impact of the crisis. Special funds were also established or expanded to provide credit to priority sectors at concessionary rates (Ministry of Finance Malaysia, 2003/04).

In the 1999 through to 2003 budgets, the fiscal expansionary policy was implemented as global economic uncertainties continued. The counter cyclical fiscal policy was largely and implemented largely was effective in supporting economic recovery and sustaining domestic demand. In particular, when external demand contracted significantly in 2001, Malaysia was still able to record a positive economic growth rate. The effectiveness of the fiscal policy was also supported by other strategies and policies that continued to build on strong economic fundamentals of Malaysia (Ministry of Finance Malaysia, 2003/04).

There are many factors to be considered in determining the size of the fiscal deficit such as ensuring that revenue is able to meet operating expenditure, the availability of domestic and external financing without crowding out the private sector, and debt servicing does not exceed 20% of total operating expenditure. Overall, to ensure that public debt remains at manageable levels, a legislated borrowing rule stipulates a ceiling for federal government, debt. The fiscal sustainability is crucial for the long-run economic growth and development, and also macroeconomic stability. The impact of counter cyclical measures on the fiscal deficit is expected to be transitory. The government will closely monitor its spending and its fiscal position will be consolidated as the economy recovers. The pace of consolidation will be guided by developments in international and domestic economic developments (Vijayaledchumy, 2003; Ministry of Finance Malaysia, 2003/04).

THE INTERTEMPORAL BUDGET CONSTRAINT

The intertemporal budget constraint is a key issue in the study of the sustainability of public finance. It states that if a government runs into deficit for some years, it is expected that the government will run into surpluses in the future. On the whole and over the time period, the government runs no deficits or surpluses. The intertemporal budget constraint is derived from the accounting identity. More specifically, the one-period budget constraint of a government under the assumption that government bonds have a one year maturity could be written as follows:

$$GE_t + (1 + i_t)B_{t-1} = R_t + B_t \quad (1)$$

where GE_t is the government expenditure net of the interest payment; R_t is the government revenue; i_t is the interest rate and B is the government debt. Using the budget constraint for each period and

solving equation (1) forward leads to:

$$B_0 = \sum_{i=1}^{\infty} r_t (R_t - GE_t) + \lim_{n\to\infty} r_n B_n \quad (2)$$

where $r_t = \prod_{s=1}^{t} (1 + i_s)^{-1}$. A necessary condition for sustainability is that as n goes to infinity, the discounted value of the debt measure converges to zero, i.e. the second term of the right-hand-side of equation (2) is zero. This is also known as the transversality condition, which implies that no Ponzi games are allowed, meaning no new debt is issued to meet interest payments. With the imposition of this limit, the stock of government debt, B_0 must equal the present value of primary budget surpluses $\sum_{i=1}^{\infty} r_t (R_t - GE_t)$. Assuming the interest rate is stationary, Hakkio and Rush (1991) transform equation (1) into an equation that has testable implications and in the logarithmic form as:[3]

$$\ln E_t = \alpha + B \ln R_t + e_t \quad (3)$$

where ln is the logarithms; E_t is the government spending including interest payments on the debt and e_t is an error term. For budget deficits to be sustainable, ln E_t and ln R_t must be cointegrated provided they are non-stationary. The cointegration between government revenue and expenditure is a sufficient condition for the sustainability of the fiscal policy.[4] Although finding cointegration is sufficient for the deficit to be sustainable, it is inconsistent with the ability of the government to settle its debt in the long run. In fact, it would provide incentives for the government to default on its debt (Jyh-Lin, 1998; Bravo & Silvestre, 2002).

A LITERATURE REVIEW OF THE GOVERNMENT REVENUE AND EXPENDITURE

There is extensive literature on the intertemporal budget constraint with most of the studies focused on American cases. Nonetheless, there are some studies that focus on other countries. Generally, the results show that the intertemporal budget constraint is found to hold for some countries, but not for other countries (Bravo & Silvestre, 2002). Hamilton and Flavin (1986), Trehan and Walsh (1991) and Haug (1991) examined the relationship between government revenue and expenditure for the United States using the cointegration method. In summary, they concluded that government behaviour is consistent with the intertemporal budget constraint. Jyh-Lin (1998) examined budget deficits for Taiwan using annual data over the period from

1955 to 1994. The cointegration method was employed. The study concluded that although budget deficits have increased and persisted since 1990, there is no evidence to show that budget deficits are too large, thus the budget policy is sustainable.

Bravo and Silvestre (2002) examined fiscal sustainability or the intertemporal budget constraint in the present value terms by performing the cointegration test between public revenues and expenditures in eleven member states of the European Union during the period from 1960 to 2000. The results show the possibility of sustainable budgetary paths in Austria, France, Germany, Netherlands and United Kingdom, but not in Belgium, Denmark, Ireland, Portugal, Italy and Finland. On the other hand, Hakkio and Rush (1991) found cointegration between the government revenue and expenditure in the early years but found no cointegration in the years starting from the mid-1970s. Thus, they concluded that the budget deficit has become a problem only in recent years and is not sustainable. Generally, the empirical studies on this issue are contradictory (Trehan & Walsh, 1991).

Goyal, Khundrakpam and Ray (2004) examined the public finance sustainable for India using the intertemporal budget constraint approach. They employed Johansen (1988) and Gregory and Hansen (1996) cointegration methods to examine the intertemporal budget constraint for the central and state governments separately and together. They reported that the intertemporal budget constraint does not hold for the central and state governments separately, but holds weakly for them combine. On the whole, they claimed that the public finance is sustainable for India.

There are a number of studies on government revenue and expenditure nexus with the aim to assist policy makers in identifying the source of fiscal imbalances and to identify a suitable fiscal reform. Nonetheless, the empirical studies on the matter are inconclusive. The results amongst others are said to depend on the time period and the level of government in questioning (Aziz *et al.*, 2001). Aziz *et al.* (2001) employed the Toda and Yamamoto (1995) method to test Granger causality between federal government revenue and expenditure of Malaysia using annual data over the period from 1960 to 1996.[5] The results show that a two-way causality between federal government revenue and expenditure exits. Thus, they concluded a bi-directional causal relationship between federal government revenue and expenditure, which supports the fiscal synchronisation in Malaysia. This implies that the government compares marginal benefits and costs of budget

change when formulating a decision in terms of the appropriate levels of government revenue and expenditure. However, the study did not address the issue of the long-run relationship between government revenue and expenditure.

DATA AND METHODOLOGY

The data for government revenue and expenditure are the revenues and expenditures of the consolidated public sector and federal government divided by consumer price index (1995=100). The government revenues and expenditures data were obtained from the Ministry of Finance Malaysia. The consumer price index (1995=100) data were obtained from the International Monetary Fund. The data were observed annually over the period 1965-2002 and a sub-period of 1965 - 1996. All the data were transformed into logarithms.

Testing for the existence of cointegration among variables involves two steps. First, the individual series is examined to determine its order of integration and then the series are examined for cointegration. In this study, the Dickey and Fuller (1979) and Phillips and Perron (1988) unit root test statistics are employed to test the stationarity the data.[6] The Augmented Dickey-Fuller (ADF) unit root test statistic is computed by estimating the following auxiliary regression:

$$\Delta y_t = \mu + \beta t + \gamma y_{t-1} + \sum^{p}_{i=1} \phi_i \Delta y_{t-i} + \varepsilon_{1,t} \quad (4)$$

where Δ is the first difference operator; y_t is a series being examined; m is a drift parameter; t is a time trend and p is the number of lagged differences included such that the disturbance term, $\varepsilon_{1,t}$ in equation (4) is white noise. If p is equal to zero, then equation (4) is equivalent to the Dickey-Fuller (DF) unit root test. The Dickey and Fuller (1979) t-statistic (t_γ) is to test the null hypothesis of a unit root or equivalently to test the coefficient of $\gamma = 0$ against the alternative hypothesis of $\gamma < 0$. If the null hypothesis is accepted then y_t is said to be a difference stationary series.

The Phillips and Perron (1988) unit root test statistic is computed by estimating the following equation:

$$y_t = \alpha_0 + \alpha_1 t + \alpha_2 y_{t-1} + \varepsilon_{2,t} \quad (5)$$

where α_0 is a drift parameter and $\varepsilon_{2,t}$ is a disturbance term. The test statistic, $Z(t_\gamma)$ is computed to test the null hypothesis of a unit root or equivalently to test the coefficient of $\alpha_2 = 1$.[7]

According to Engle and Granger (1987), any series that are integrated of the same order may cointegrate together. The cointegrated series may drift apart from each other in the short run but the distance between them tends to be constant or in a stationary process in the long run. In this study, the Johansen (1988) cointegration method is used to test the long-run relationship between the series in equation (3). The Johansen (1988) cointegration method can be used to compute two likelihood ratio tests for testing the number of cointegrating vectors in the system, namely the maximum eigenvalue (λ_{Max}) and trace (λ_{Trace}) statistics, which are respectively computed as:

$$\lambda_{Max} = -T \ln (1 - \lambda_{r+1}) \tag{6}$$

$$\lambda_{Trace} = -T \sum^{P}_{i=r+1} \ln (1 - \lambda_{i}) \tag{7}$$

where T is the sample size and λ_i are the eigenvalues. The λ_{Max} test statistic tests the null hypothesis (H_0) of r cointegrating against the alternative hypothesis (H_a) that there are (r + 1) cointegrating vectors. The λ_{Trace} test statistic tests the H_0 that has at most r cointegrating vectors in the system. That is, the number of cointegrating vectors is less than or equal to r (Johansen, 1988). The likelihood ratio test statistics can be sensitive to the choice of the lag length used in the estimation of the test statistics. Thus, the choice of the lag length in this study is determined by the Schwarz Bayesian criterion (SBC).

The Gregory and Hansen (1996) cointegration method, which allows for the presence of a possible regime shift is also employed to examine the cointegration relationship between the government revenue and expenditure.[8] Gregory and Hansen (1996) considered three different assumptions made concerning the nature of the shift in the cointegrating regression, namely the models with level shift (C), level shift and a time trend (C/T) and regime shift (C/S), respectively as:

$$\ln E_t = \mu_{11} + \mu_{12} \varphi_{t,\tau} + \alpha^{T}_{13} \ln R_t + e_{1,t}, \quad t = 1, ..., T \tag{8}$$

$$\ln E_t = \mu_{21} + \mu_{22} \varphi_{t,\tau} + \beta t + \alpha^{T}_{23} \ln R_t + e_{2,t}, \quad t = 1, ..., T \tag{9}$$

$$\ln E_t = \mu_{31} + \mu_{32} \varphi_{t,\tau} + \alpha^{T}_{33} \ln R_t + \alpha^{T}_{34} \ln R_t \varphi_{t,t} + e_{3,t}, \quad t = 1, ..., T \tag{10}$$

where $\varphi_{t,\tau} = 0$ if $t \leq [T_\tau]$ and 1 if $t > [T_\tau]$; $t \in (0,1)$ is the unknown parameter which denotes the timing of the change point and [ ] denotes the integer part; t is a time trend and $e_{i,t}$ (i = 1, 2, 3) is an error term. In the model with level shift (C), μ_{11} represents the intercept before the shift and μ_{12} represents the change in the intercept at the time of the shift. This

implies that the cointegrating relationship has shifted in a parallel fashion. In the model with level shift and a time trend (C/T), in addition to the feature in the model with level shift, a time trend is included. In the model with regime shift (C/S), in addition to the feature in the model with level shift, α^{T}_{34} denotes the change in the slope coefficient is considered. Thus, this model allows a level and the slope vector in the cointegrating relationship to shift.

The estimation of the above models by using the ordinary least squares estimator yields the estimated error terms, which the unit root tests (ADF^{*}_{t}, Z^{*}_{t}) are applied to them. The unit root tests, ADF^{*}_{t} and Z^{*}_{t}, are designed to test the null hypothesis of no cointegration against the alternative hypothesis of cointegration in the presence of a possible regime shift. The procedure is similar to the Engle and Granger (1987) cointegration method which included a dummy variable in the cointegrating regression to consider a shift in the long-run relationship. The advantage of the Gregory and Hansen (1996) cointegration method is that it does not require information regarding the timing of or indeed the occurrence of a break. In other words, it determines the break point endogenously from the data rather than on the basis of prior information, which the problem of data mining can be avoided.

When a series are cointegrated, the simple Granger causality test becomes inappropriate. Thus, the testing of Granger causality is in ECMs. More specifically, ECMs to be estimated in the study are:

$$\Delta \ln E_t = \sum^{u}_{i=1} \beta_{11i} \Delta \ln R_{t-i} + \sum^{v}_{i=1} \beta_{12i} \Delta \ln E_{t-i} + \gamma_1 EC_{1,t-1} + u_{1,t} \quad (11)$$

$$\Delta \ln R_t = \sum^{w}_{i=1} \beta_{21i} \Delta \ln R_{t-i} + \sum^{x}_{i=1} \beta_{22i} \Delta \ln E_{t-i} + \gamma_2 EC_{2,t-1} + u_{2,t} \quad (12)$$

where $EC_{i,t-1}$ $(i = 1, 2)$ is the first lagged value of the error term, which is obtained from the cointegrating regressions and $u_{i,t}$ $(i = 1, 2)$ is an error term. The joint test of lagged variables, namely $\ln R_t$ and $\ln E_t$, by the mean of the F-statistic that is significantly different from zero, implies the presence of Granger causality. For example, if the joint test of lagged variables of $\ln R_t$ in equation (11) is significantly different from zero, then it implies that $\ln R_t$ Granger causes $\ln E_t$. The minimum Final Prediction Error (FPE) criterion proposed by Akaike (1970) is used to determine the optimal lags of the model.

EMPIRICAL RESULTS AND DISCUSSIONS

The results of the Dickey and Fuller (1979) and Phillips and Perron (1988) unit root test statistics are reported in Table 1. The lag length

used to compute the Dickey and Fuller (1979) test statistics is based on the Akaike (1973) Information Criterion (AIC). For the Phillips and Perron (1988) unit root test statistics, the results that are reported are based on three truncation lags, which are used to compute the test statistics after considering truncation lags one to three in computing the test statistics. The results of the Dickey and Fuller (1979) unit root test statistics show the null hypothesis of a unit root for level data is not rejected. However, they reject the non-stationary hypothesis for differenced data. The same conclusion is shown by the Phillips and Perron (1988) unit root test statistics.

Table 1
The Results of the Dickey and Fuller (1979) and Phillips and Perron (1988) Unit Root Test Statistics

Consolidated Public Sector

1965-2002

	t_γ - no trend	t_γ - trend	$Z(t_\gamma)$ - no trend	$Z(t_\gamma)$ - trend
$\ln R_t$	-1.5956(0)	-1.5433(0)	-0.9266(3)	-1.4626(3)
$\Delta \ln R_t$	-4.9357**(0)	-4.6183**(1)	-5.2233**(3)	-5.2483**(3)
$\ln E_t$	-2.0155(0)	-1.8795(0)	-0.9556(3)	-1.5799(3)
$\Delta \ln E_t$	-4.5200**(0)	-4.6828**(0)	-4.7566**(3)	-4.7215**(3)
1965-1996				
$\ln R_t$	-1.0689(0)	-1.4731(0)	-0.2629(3)	-1.8167(3)
$\Delta \ln R_t$	-4.4904**(0)	-4.4587**(0)	-4.8083**(3)	-4.7176**(3)
$\ln E_t$	-2.4021(0)	-1.4807(1)	-1.0852(3)	-1.2725(3)
$\Delta \ln E_t$	-3.5069*(0)	-3.9699*(0)	-3.7794**(3)	-3.8130*(3)

Federal Government

1965-2002

	t_γ - no trend	t_γ - trend	$Z(t_\gamma)$ - no trend	$Z(t_\gamma)$ - trend
$\ln R_t$	-1.4335(0)	-1.7841(0)	-0.7331(3)	-1.7895(3)
$\Delta \ln R_t$	-5.1058**(0)	-5.1757**(0)	-5.4103**(3)	-5.3807**(3)
$\ln E_t$	-1.8203(0)	-2.1178(1)	-0.7257(3)	-1.6028(3)
$\Delta \ln E_t$	-4.1571**(0)	-4.2551**(0)	-4.3243**(3)	-4.2659**(3)
1965-1996				
$\ln R_t$	-1.0021(0)	-1.5561(0)	-0.2037(3)	-1.9386(3)
$\Delta \ln R_t$	-4.3596**(0)	-4.2991**(0)	-4.6770**(3)	-4.5904**(3)
$\ln E_t$	-2.1581(0)	-1.7141(1)	-0.9150(3)	-1.3840(3)
$\Delta \ln E_t$	-3.6159*(0)	-3.8194*(0)	-3.8288**(3)	-3.7830*(3)

Notes: ln is logarithm. Δ is the first difference operator. t_γ is the Dickey-Fuller (DF) or Augmented Dickey-Fuller (ADF) t-statistic. $Z(t_\gamma)$ is the Phillips and Perron (1988) t-statistic. Values in parentheses are the lag length used in the estimation of the unit root test statistics. Critical values are obtained from MacKinnon (1996). ** denotes significance at 1% level. * denotes significance at 5% level.

Table 2
The Results of the Johansen (1988) Likelihood Ratio Test Statistics

	λ_{Max} Test Statistic		λ_{Trace} Test Statistic	
H_0:	r=0	r<= 1	r=0	r<= 1
H_a:	r=1	r= 2	r≥1	r≥2
Consolidated Public Sector				
1965-2002	24.1995*	5.2386	29.4381*	5.2386
1965-1996	26.4610*	2.8530	29.3140*	2.8530
Federal Government				
1965-2002	19.3147*	3.3221	22.6368*	3.3221
1965-1996	20.8525*	2.3025	23.1551*	2.3025
c.v.	15.8700	9.1600	20.1800	9.1600

Notes: The VAR=1 is used in the estimation of 1965-2002 and 1965-1996, respectively. * denotes significance at 95% critical value.

The results of the Johansen (1988) cointegration method are reported in Table 2. The results of the λ_{Max} and λ_{Trace} test statistics are computed with restricted intercepts and no trends. For periods 1965-2002 and 1965-1996, the results of the λ_{Max} and λ_{Trace} test statistics show that the null hypotheses, i.e. H_0: $r = 0$ and H_0: $r \leq 1$, are not rejected at 95% critical value, which indicate that the real revenues and expenditures of consolidated public sector and federal government, are cointegrated. The results of the Gregory and Hansen (1996) cointegration method are reported in Table 3. For periods 1965-2002 and 1965-1996, the results of ADF^*_t and Z^*_t test statistics show that the null hypotheses of no cointegration are generally rejected at 10% level or close to 10% level. Thus, the results show the same conclusion as the Johansen (1988) cointegration method. The study suggests that there is a long run relationship between government revenue and expenditure. In other words, government revenue and expenditure would not drift too far apart. Furthermore, cointegration implies that the intertemporal budget constraint is not being violated. The public spending is sustainable in the long run, i.e. if there has been a deficit for some years, a government is expected to run surpluses in the future (Bravo & Silvestre, 2002).

The results of the normalised cointegrating vector are reported in Table 4. For the period 1965-2002, the cointegration slope is greater than one for both consolidated public sector and federal government. On the other hand for the period 1965-1996, the cointegration slope is close to one for both consolidated public sector and federal government. Generally, the results show that the strong form of deficit sustainability

defined by Quintos (1995) is satisfied, i.e. the government revenue and expenditure are cointegrated and the cointegrating vector is [1, -1]'. The finding is consistent with the findings of Hamilton and Flavin (1986), Trehan and Walsh (1991) and Haug (1991), when examining the relationship between government revenue and expenditure for the United States, and Jyh-Lin (1998), when examining the relationship between government revenue and expenditure for Taiwan. Goyal, Khundrakpam and Ray (2004) reported that the intertemporal budget constraint does not hold for the central and state governments separately, but holds weakly for them combine. On the other hand, the study shows that the intertemporal budget constraint holds for both consolidated the public sector and federal government.

Table 3
The Results of the Gregory and Hansen (1996) Cointegration Test Statistics

Consolidated Public Sector 1965-2002			
	C	C/T	C/S
ADF^*_t	-4.47#(0.55)	-4.82# (0.55)	-4.85# (0.58)
Z^*_t	-4.54# (0.55)	-4.89# (0.55)	-5.01*(0.55)
1965-1996			
ADF^*_t	-4.27(0.69)	-4.57(0.16)	-4.47(0.66)
Z^*_t	-4.15(0.66)	-4.65(0.16)	-4.54(0.6
Federal Government 1965-2002			
	C	C/T	C/S
ADF^*_t	-4.03(0.61)	-4.15(0.61)	-4.02(0.66)
Z^*_t	-3.43(0.63)	-3.46(0.63)	-3.56(0.63)
1965-1996			
ADF^*_t	-4.21(0.78)	-6.19**(0.78)	-6.55**(0.63)
Z^*_t	-3.70(0.75)	-4.21(0.75)	-4.07(0.65)

Notes: ** denotes significance at 1 % level. * denotes significance at 5% level. # denotes significance at 10% level. The values in brackets show the breakpoint, i.e. the point in the sample where the smallest value of the test statistic is obtained.

The strong commitment of the government to maintain its budget balance is important. The unchecked budget deficit would reduce savings and then retard economic growth. Moreover, it could lead to external imbalance and weakness of the currency, which in turn could cause the instability of the economy to experience external shock and

financial crisis. The study shows that the intertemporal budget constraint holds over the period before the Asian financial crisis, which implies fiscal sustainability. The healthy fiscal finance before the crisis could be a reason why Malaysia had little difficulty in confronting the crisis. During the crisis, total external debt in Malaysia rose from 37.5% of GDP in 1996 to 52.1% in 1998. However, the debt service burden remained quite small. Although Malaysia was hit by the financial contagion, it did not have much problem in managing its budget when compared to other countries. Malaysia was also depending less on external finance to finance its budget. In 1998, external finance was only 16.2% of domestic borrowing, which was used to finance the budget deficit (Green & Campos, 2001). Moreover, the study showed that the intertemporal budget constraint holds over the period, which includes the crisis. This could imply that there is no fiscal unsustainable after the crisis. Thus, fiscal sustainability, amongst others is important for preventing future financial crisis. Moreover, fiscal sustainability is important for the long run economic growth.

Table 4
The Results of the Normalised Cointegrating Vector

	The Normalised Cointegrating Vector
Consolidated Public Sector	
1965-2002	ln E = - 4.4356 + 1.4023 ln R
1965-1996	ln E = 4.5711 + .66264 ln R
Federal Government	
1965-2002	ln E = - 6.6330 + 1.6078 ln R
1965-1996	ln E = 2.0415 + .85930 ln R

The results of Granger-causality test are reported in Table 5.[9] On the whole, there is evidence that the real revenue of consolidated public sector Granger causes the real expenditure of consolidated public sector, and not vice versa over the period 1965-2002 and a sub-period of 1965-1996. On the other hand, there is no evidence that the real revenue of federal government Granger causes the real expenditure of federal government or vice versa for the same periods. Thus, the results are rather mixed. For consolidated the public sector, the government revenue and expenditure nexus tends to support the revenue and expenditure hypothesis, i.e. government revenue causes change in government expenditure. For the federal government, government revenue and expenditure nexus tends to support the independent revenue and expenditure hypothesis, i.e. independence of the government revenue and expenditure.

Table 5
The Results of the Granger-Causality Test

	$\Delta \ln R_t \rightarrow \Delta \ln E_t$	$\Delta \ln E_t \rightarrow \Delta \ln R_t$
Consolidated Public Sector		
1965-2002	7.8536**	2.5053
1965-1996	8.6927**	1.7468
Federal Government		
1965-2002	.0654	.12
1965-1996	.8487	.0183

Notes: The arrow "→" denotes no Granger causality. ** denotes significance at 1% level.

Overall in Malaysia, it can be said that government expenditure is determined by government revenue or government revenue leads government expenditure. Buchanan and Wagner (1978) and Darrat (1998) amongst others reported the revenue and expenditure hypothesis. Nonetheless, the empirical finding in the literature on government revenue and expenditure nexus is mixed. For example, Aziz *et al.* (2001) reported that a two-way causality between federal government revenue and expenditure of Malaysia over a different period 1960-1996. Thus, the government may not strictly stick to one rule in implementing its fiscal policy, subject to the situation of the economy and the interest of the nation to be achieved, which could influence the direction of Granger causality between government revenue and expenditure.

CONCLUDING REMARKS

The main aim of the study is to investigate the relationship between government expenditure and revenue in Malaysia. The Dickey and Fuller (1979) and Phillips and Perron (1988) unit root test results show that the real expenditures and revenues of consolidated public sector and federal government are found to be integrated of order one. Moreover, the results of the Johansen (1988) and Gregory and Hansen (1996) cointegration methods generally show that the real revenues and expenditures of consolidated public sector and federal government are cointegrated over the period 1965-2002 and sub-period of 1965-1996. In other words, there is a long run relationship between government revenue and expenditure. Generally, the intertemporal budget constraint is not violated or the budget deficit is sustainable.

Furthermore, the study examines the Granger causality between the real revenues and expenditures of the consolidated public sector and federal government. Generally, the results show that the real revenue of the consolidated public sector Granger causes the real expenditure of consolidated public sector and not vice versa. For the federal government, there is no Granger causality between the real revenue and expenditure. Overall, it can be said that the government expenditure is determined by the government revenue.

The government expenditure and revenue are found to be cointegrated. Thus, it implies that the requirement of the intertemporal budget constraint is satisfied. In other words, the discounted value of the differences between the government revenue and expenditure tends to converge in the long run. For the period 1965-2002, the cointegration slope is greater than one, which implies that the government spending is keeping pace with its revenues and budget deficit, and are said to be sustainable. Thus, although the budget deficits tended to increase and persist prior to the 1990s, there is no evidence to show that the budget deficit of Malaysia is at a critical level.

ENDNOTES

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1 Consolidated public sector comprises of the federal government, state governments, statutory authorities and local governments (Ministry of Finance Malaysia, 2003/04).

2 See Hamilton and Flavin (1986), Trehan and Walsh (1991) and Hakkio and Rush (1991) for the intertemporal budget constraint.

3 A necessary and sufficient condition for the intertemporal budget constraint is that the expected real rate of interest is constant or positive (Trehan & Walsh, 1991: 208).

4 Hakkio and Rush (1991) and Quintos (1995) demonstrated that the cointegration vector [1 - B]', where $0 > B > 1$ is consistent with deficit sustainability.

5 Toda and Yamamoto (1995) proposed a modified WALD (MWALD) test statistic to test Granger causality, which is said to have a comparable performance in size and power to the

likelihood ratio (LR) and WALD test statistics if the correct number of lags for estimating $k + d_{max}$ (the maximal order of integration in the system) is identified and no important variables are omitted, and provided a sample of 50 or more observations is used in the estimation (Shan & Sun, 1998: 1060).

[6] If a time series has to be differenced once to become stationary, the time series is said to be integrated of order one. In general, if a time series has to be differenced d times to become stationary, the time series is said to be integrated of order d (Gujarati, 2003: 804-805).

[7] See Phillips and Perron (1988) for the detail of the test statistic.

[8] If there is one unknown point in the sample, the standard tests for cointegration are not appropriate, since they presume that the cointegrating vector is time-invariant under the alternative hypothesis.

[9] The plots of CUSUM and CUSUMSQ statistics for all the estimated ECMs, which are not reported, show no evidence of instability.

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