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AN EMPIRICAL STUDY ON FISCAL SUSTAINABILITY IN MALAYSIA

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ABSTRACT

Fiscal sustainability has become a prominent issue in developing countries, and fiscal sustainability assessments have become an increasingly demanded component of macroeconomic analysis. Unfortunately, there is no single basic source of information on fiscal sustainability. Country economists who are new to fiscal sustainability analysis could rely on sample work by other economists and could delve into scattered journal articles for the theoretical background. This paper focuses on a particular country: Malaysia. The main purpose of this paper is to monitor fiscal sustainability in Malaysia using empirical analysis, and see whether the fiscal sustainability indicators are consistent with the co-integration framework. We employ VAR analysis as it is simple to compute and easily automated. We show how it is possible to analyze a change of policy within a VAR framework. We also use a Multivariate Co-integration Test methodology to conduct inference about the co-integrating relationship between fiscal sustainability indicators and output (GDP). Empirical validation from the time series analysis finds that fiscal sustainability indicators and Gross domestic Product (GDP) are co-integrated, which provides some support for the position that Malaysia's fiscal sustainability is sustainable in the long run in sampling period. This finding suggests that the Government should improve the presentation of sustainability of fiscal policy and develop the analysis, review the sustainability indicators, and strengthen the role of the long term estimates in the design of short term fiscal policy.

Keywords: Fiscal sustainability, Co integration, VAR, Multivariate Co integration

1. INTRODUCTION

The basic fundamental of an economy is closely related to the interaction of the government and market. Researchers and philosophers have explored quite extensively on how the chain of reaction between these two entities works. Fiscal policy refers to the government attempts to influence the direction of the economy through changes in government taxes, or through spending. The way the government uses its money, thus becomes a major concern in stimulating the performance of the economy. Fiscal policy will reflect the overall effect of the budget outcome on economic activities.

The three possible stances of fiscal policy are neutral, expansionary and contractionary. A neutral stance of fiscal policy implies a balanced budget where the amount of government spending is equal to the tax revenue collected. Government spending is fully funded by tax revenue and the overall budget outcome has a neutral effect on the level of economic activities. An expansionary stance of fiscal policy involves a net increase in government spending through a rise in government spending or a fall in tax revenue, or a combination of both. This will lead to a larger budget deficit or a smaller budget surplus than the government previously had, or a deficit if the government previously had a balanced budget. Expansionary fiscal policy is usually associated with a budget deficit. Contractionary fiscal policy occurs when net government spending is reduced either through higher tax revenue or reduced government spending, or a combination of both. This would lead to a lower budget deficit or a larger surplus than the government previously had, or a surplus if the government previously had a balanced budget. Contractionary fiscal policy is usually associated with a budget surplus.

Sustainability, in general, concerns current and expected future policies. If economic agents do not expect the current and future policies will lead to an intertemporal budget constraint, then the fiscal process would be unsustainable and government insolvency would be possible. Most of the empirical works in this area focused on the time-series behaviour of tax revenues and expenditures as well as debt series. These studies investigate if the behaviour of the series is consistent with the intertemporal budget balance.

Fiscal sustainability is always associated with the capability of the government to remain solvent, which is being able to payback their debt in perpetuity without explicit default. There is also a need to analyze whether the government can preserve its policy and capability of running a budget deficit in the long run to remain solvent. Thus, the fiscal and monetary tools are needed to achieve the solvency of the government. For a longer period of time, fiscal sustainability will play a big role in stimulating market sentiment among financial market player. More importantly, fiscal sustainability analysis has encompassed discussions centered on the optimality of policy rather than its mere feasibility.

Fiscal policy was neither a cause of the 1997/98 economic crisis nor a critical determinant of economic growth. Nevertheless, its role in both the pre-crisis and post-crisis periods in Malaysia has been seen as crucial, primarily in terms of its contribution to economic growth. The total amount of government debt was expected to rise over the following years in the wake of the economic crisis in Malaysia, raising concern about the sustainability of government deficit and fiscal consolidation.

The Malaysian government finances have run large budget deficits in terms of GDP, as can be seen from table 1. The raw data on fiscal balances support the general perception of fiscal discipline and prudence or conservative fiscal policy. The government was facing budget deficits from 1990-1992 and even bigger ones from 1999-2007. These budget deficits, led by increased government spending, is a proper prescription in circumstances where the private sector cannot or will not be able to move the economy out of the doldrums, such when facing with imperfect information or poor level of business confidence.

Table 1
Government Finances (percentage of GDP at current market prices)

	Total revenue	Total expenditure	Overall budgetary surplus/deficit
1990	24.8	27.7	-2.9
1991	25.2	27.2	-2.0
1992	26.0	26.9	-0.8
1993	24.2	24.0	0.2
1994	25.3	23.0	2.3
1995	22.9	22.1	0.8
1996	23.0	22.3	0.7
1997	23.3	21.0	2.4
1998	20.0	21.8	-1.8
1999	19.5	22.7	-3.2
2000	17.4	22.9	-5.5
2001	22.6	27.8	-5.2
2002	21.8	27.1	-5.3
2003	22.1	27.1	-5.0
2004	21.0	25.1	-4.1
2005	20.3	23.9	-3.6
2006	21.5	24.9	-3.3
2007	21.8	25.0	-3.2

Sources: Economic Report, various years

The original literature on fiscal sustainability mainly focused on industrial countries (Buiter, 1985 and Blanchard, 1990). Currently, there are papers that focused on fiscal sustainability in Emerging Market countries (EMS). Studies that are closely related to ours include Mendoza (2003), IMF (2002, 2003b), Chalk & Hemming (2000), and Cuddington (1996). Izquierdo and Panizza (2003) used an approach that is identical to that of this paper to evaluate sustainability in Egypt. Four papers on Ecuador that are closely related to ours are Artana, Tour and Navajas (2002), and López-Cálix (2003).

It is generally agreed that a fiscal stance is sustainable if it satisfies the government's intertemporal budget constraint. In practice, this does not solve the problem as the intertemporal budget constraint is forward-looking over an infinite horizon. Most of the literature on fiscal sustainability focuses on past deficits and debts, but a government may attempt to circumvent such assessments by announcing its intention to offset current deficits and debts by generating future surpluses. This raises the question of whether such announcement is credible given the performance and structure of the economy; should the government improve the presentation of the sustainability of fiscal policy and develop the analysis?, should the government review the sustainability indicator?, and should the government strengthen the role of the long term estimates in the design of short term fiscal policy? To answer these questions, one would need a measure of sustainability of the current fiscal stance based on a model of the economy.

2. LITERATURE REVIEW

The fiscal sustainability (FS) tool will use insights on conducting fiscal sustainability analysis from papers such as Burnside (2005), Public debt sustainability in LICs, IMF (2002, 2003), Anand and van Wijnbergen (1988), and Buiter (1990), among others. Specifically, the FS tool will build on the joint World Bank-International Monetary Fund approach to public debt sustainability by using a scenario analysis to simulate the government budget constraint forward and by using sensitivity tests to detect major risks to fiscal sustainability.

Fiscal sustainability in theory is defined with both static and inter-temporal budget constraints. The static budget constraint is satisfied only if the public sector is able to finance its current expenditure with its revenue and new borrowing (new issuance of government securities), and meet or rollover its maturing liabilities; if it is not liquidity-constrained. Akyiiz (2007) found the inter-temporal budget constraint is often formulated with respect to conditions for solvency, which requires that the present discounted value of future primary budget balances should at least be equal to the value of the outstanding stock of debt.

Using the co-integration methodology, Goyal, Khundrakpam, and Ray (2004), for instance, found that the fiscal policy of the Central and State Governments in India is individually unsustainable, but when taken together, it is sustainable. Telatar, Bolatoglu, and Telatar (2004) followed Bohn's (1998) approach, but used the Bayesian Gibbs sampling simulation to observe changes in the behaviour of the Turkish government period by period. They found that the relationship between primary surpluses and government total liabilities might be unstable in Turkey as the intention of the government towards the sustainability of fiscal policy has been changing. A serious problem with the co-integration analysis, as mentioned by Bohn (1998), is that persistent deficits and the accumulation of debt do not necessarily imply that the debt is unmanageable and, hence, fiscal processes are unsustainable. In fact, the key issue with regards to sustainability depends on the growth of the economy and its impact on the stochastic discount factor. It was also mentioned by Leachman, Bester, Rosas, and Lange (2005) that the standard co-integration approach may not provide sufficient criteria for determining whether the fiscal process is truly sustainable under a stochastic environment. Leachman (1996), consequently, used a more encompassing set of criteria under more realistic assumptions for determining whether a country exhibits a sustainable budgeting process. His criteria for sustainability are based on the multi-cointegration approach first presented by Granger and Lee (1989, 1990). Leachman et al. (2005) used a one-step multi-cointegration approach, which was developed by Engsted, Gonzalo, and Haldrup (1997).

Akyiiz (2007) criticized the theoretical concept of sustainability based on solvency pioneered by Hamilton and Flavin (1986), and found that it is quite problematic because it does not impose specific constraints on debt and deficits at any point in time. Both the economic conditions as reflected by the growth-adjusted interest rate (the rate at which future primary balances are discounted) and the fiscal policy stance vary over time and are highly uncertain. Burnside (2003) stated that the market value based measure of debt is the most relevant one compared to the book value of debt because it is straightforward to demonstrate this in a finite horizon. IMF (2002) acknowledged that it is not possible to know if a liability position "satisfies the present value budget constraint without a major correction in the balance of income and expenditure". Even in the case of strict solvency criteria, it shows us that if the current debt ratio exceeds the threshold, sooner or later the government will have to alter its fiscal stance and generate a primary surplus in order to reduce it towards the threshold. Furthermore, it cannot tell us when the government needs to alter its fiscal stance since it is possible to postpone fiscal adjustment without violating the inter-temporal budget constraint and by how much since the discount rate is not stationary.

3. DATA AND METHODOLOGY

This study used annual time series data of 39 years for the entire period of 1970-2009. The data were sourced from Asian Development Bank, World Development Indicator, and Central Bank of Malaysia's dataset. The data used in this study are the gross domestic product (GDP), government net financial liability (GNFL), GDP deflator (PGDP), gross government interest payments (GGINTP), gross government interest receipts (GGINTR), net government interest payments (GNINTP), government total disbursement (YPGT), government total receipts (YRGT), short-term nominal interest rate (IRS), and long-term nominal interest rate (IRL). From these data, the following variables are generated; $ln\frac{b}{y}$ (GNFL deflated by GDP), $ln\frac{v}{y}$ (YRGT minus GGINTR and deflated by GDP), $ln\frac{g}{y}$ (YPGT minus GGINTP deflated by GDP), $\ln(1+R)$ (GNINTP deflated by the GNFL in the previous period value), $\ln(1+\pi)$ (the quarterly rate of change in the natural logarithm of PGDP), irs (IRS divided by 100), and irl (IRL divided by 100).

The findings of this study are present as follows. Section 1 presents the stationary tests; section 2 presents the Johansen-Juselius co-integration test and the long-run normalized co-integrating coefficients results; section 3 illustrates the VAR and VECM estimates; and finally, section 4 presents the Impulse Response Function analysis.

Single Equation-based Unit root tests

The main requirement in estimating time series model is that the variables must be stationary. One of the classical unit root tests namely the Augmented Dickey-Fuller or ADF test (Dickey and Fuller, 1981; Said and Dickey, 1984) provides convenient procedures to determine the univariate time series properties of time series data. This test is based on the null hypothesis that a unit root exists in time series.

The inference process of unit root is an important step in data analysis. We test the existence of unit root using the augmented Dickey-Fuller statistic (ADF) where a null hypothesis is non-stationary. Many researchers believe that this is a wise step to examine unit root in each time series used to form a model. There exist several differences in the unit root test. ADF is the extended version of Dickey-Fuller (DF) test that allows a higher order of autoregressive process. A common approach uses the ADF equation as shown here with time trend:

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \sum \beta_i \Delta Y_{t-i-1} \quad (1)$$

$$\Delta Y_t = \delta_0 + \delta_1 t + \delta_2 Y_{t-1} + \sum \delta_i \Delta Y_{t-i-1} \quad (2)$$

where $\Delta y_t = y_t - y_{t-1}$ and *t* shows time (See Campbell and Perron, 1991 and Enders, 1995). The null hypothesis of the ADF test is $\beta_1 = 0$ (or non-stationary), against its alternative of $\beta_1 < 0$ (or stationary). If the null hypothesis is rejected, we conclude that the series is stationary.

Multivariate Co-integration Test

The determination of the number of co-integrating vectors based on the Johansen and Juselius (1990) (Johansen procedure) multivariate procedure depends on the use of two likelihood ratios' (LR) test statistics: the trace test and the maximum eigenvalue test. This procedure is well known in the empirical analysis of time series data and the detailed explanations are not presented here. These two types of tests are conducted based on critical values tabulated in Osterwald-Lenum (1992).

The importance of applying a degree-of-freedom correction for the Johansen procedure in small samples is well known. The correction factor is necessary in order to reduce the excessive tendency of the test to falsely reject the null hypothesis of no cointegration often associated with data of a relatively short span. Cheung and Lai (1993) provided the correction factor for small sample sizes of the Johansen likelihood ratio tests while Reinsel and Ahn (1992) suggested an adjustment to the estimated trace and maximum eigenvalue statistics. The degree-of-freedom correction suggested by Reinsel and Ahn (1992) is to multiply the test statistics by *(T-pk)/T*, where *T* is the sample size, *p* is the number of variables, and *k* is the lag length of the estimated VAR system. In the analysis that follows, we rely on the latter suggestion to check for the significance and the robustness of the co-integration tests.

After assessing the stationarity of the series, we proceed with the Johansen multivariate co-integration tests that would allow us to test for long-run equilibrium between X and Y. To implement this procedure, an appropriate lag length in the VAR system has to be determined. The purpose is to allow for some dynamics and to eliminate serial correlation in the model. To this end, Akaike's Information Criteria (*AIC*) is used to determine the optimal lag length.

The VAR model is mainly used for the relevant time series prediction system and the dynamic impact of random disturbance on variables system. If Xt is a k-dimensional vector of endogenous variables, the mathematical expression of VAR(p) model in general is:

$$X_t = \alpha + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \cdots + \beta_p X_{t-p} + \mu_t \quad (4)$$

If there is no unit root among variables, estimate could be done directly on the Equation (4), otherwise co-integration test should be carried out with variables. If the co-integration relations do not exist, the one-order difference model should be adopted to estimate parameters:

$$\Delta X_t = \alpha + \beta_1 \Delta X_{t-1} + \beta_2 \Delta X_{t-2} + \cdots + \beta_p \Delta X_{t-p} + \Delta \mu_t \quad (5)$$

If the variable co-integration relationship exists, the following error correction model could be used for parameter estimation:

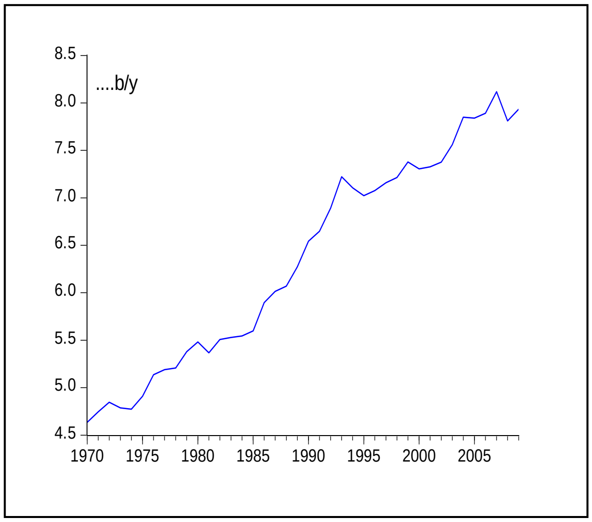
$$\Delta X_t = \alpha + \beta_1 \Delta X_{t-1} + \beta_2 \Delta X_{t-2} + \cdots . + \beta_p \Delta X_{t-p} - A\Gamma_{t-1} + \mu_t \quad (6)$$

of which, P is the variable lag order, r in the Γ (r*k) matrix is the number of co-integration vectors, and A (k * r) is the coefficient matrix.

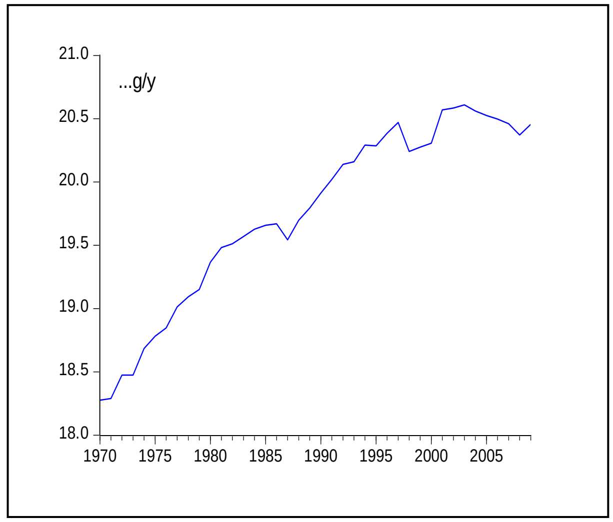
4. RESULTS AND DISCUSSIONS

This chapter discusses the major findings for all regression models used in the study. We begin with a discussion on the results obtained. Possible explanations of the findings are discussed in each section, along with their implications. This chapter concludes with a discussion on the relationship of the findings with the theoretical model proposed in the Methodology section.

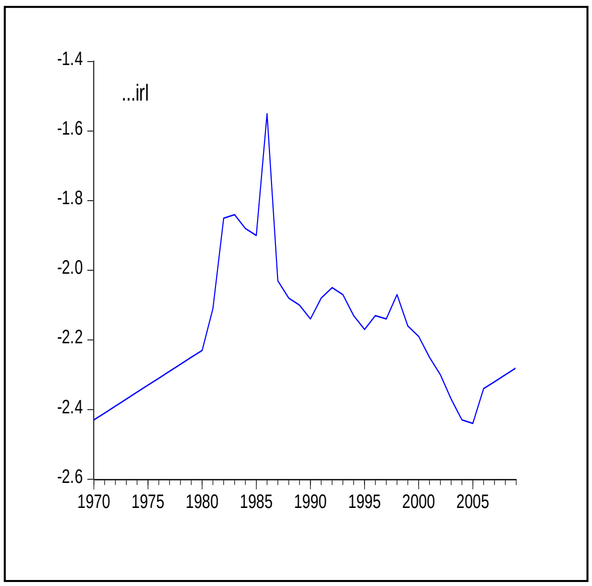
This study utilizes Malaysia's annual data from 1970 to 2009. The data sources and the construction of the variables are described in the Methodology. Debt is measured as net liabilities and consistent with the government budget constraint. Figures 1 show plots of seven key variables; $ln\frac{b}{y}$, $ln\frac{v}{y}$, $ln\frac{v}{y}$, $ln\frac{g}{y}$, $\ln(1+R)$, $\ln(1+\pi)$, irs, and irl.



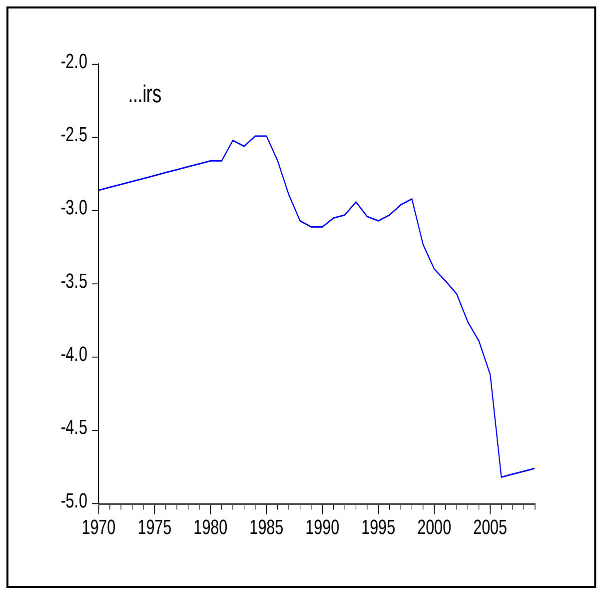
....b/y
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
1970 1975 1980 1985 1990 1995 2000 2005



...g/y
21.0
20.5
20.0
19.5
19.0
18.5
18.0
1970 1975 1980 1985 1990 1995 2000 2005



...irl
-1.4
-1.6
-1.8
-2.0
-2.2
-2.4
-2.6
1970 1975 1980 1985 1990 1995 2000 2005



...irs
-2.0
-2.5
-3.0
-3.5
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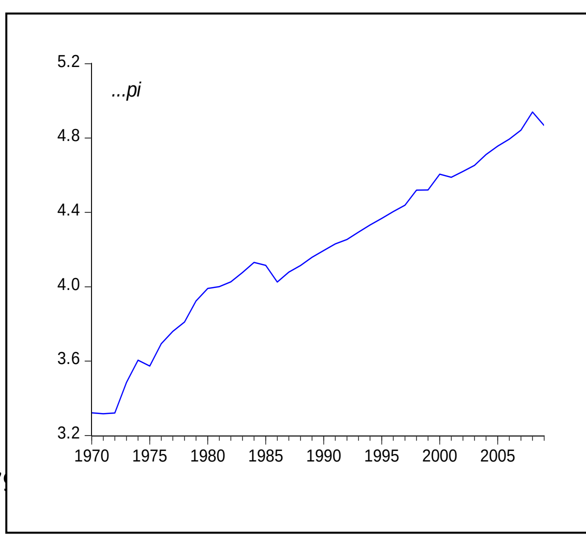
1970 1975 1980 1985 1990 1995 2000 2005



...pi
5.2
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4.0
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1970 1975 1980 1985 1990 1995 2000 2005

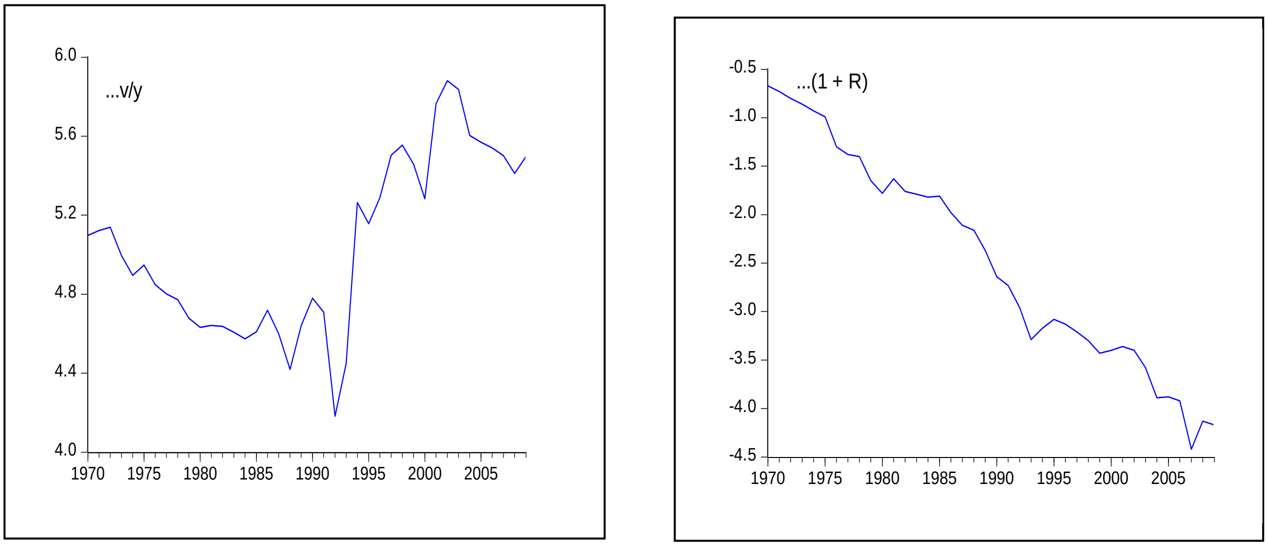


Figure 1: Malaysia's Data

Time Series Unit Root Tests

We begin our analysis by testing all the components of government expenditure for non-stationarity using the conventional ADF unit root test. The number of lags in the ADF regression is chosen using the method suggested by Campbell and Perron (1997). McKinnon's tables provide the cumulative distribution of the ADF test statistics. The unit root tests are carried out for both levels and first differences of the individual data of dependent variable and independent variables, where constant and constant plus time trend are included. This is likely to provide a more clear-cut conclusion with regards to the order of integration for all of the series.

Table 1 and Table 2 summarize the outcome of the ADF tests on all seven variables using up to 2 lags. The null hypothesis tested is that the variable under investigation has a unit root. Results in Table 1 do not allow us to reject the null hypothesis.

Table 1
Augmented Dickey-Fuller tests - Level at constant plus trend

D-Lag	Variables							
	$ln\frac{b}{y}$	$ln\frac{v}{y}$	$ln\frac{g}{y}$	$\ln(1+R)$	$\ln(1+\pi)$	irs	irl	lnY_t
2	-0.389 (0.900)	-2.028 (0.567)	-0.947 (0.939)	-2.123 (0.516)	-2.981 (0.151)	-1.028 (0.927)	-1.834 (0.667)	-2.726 (0.232)
1	-0.576 (0.861)	-2.425 (0.361)	-0.985 (0.934)	-2.764 (0.218)	-2.687 (0.247)	-1.214 (0.893)	-1.861 (0.654)	-2.345 (0.400)
0	-0.623 (0.853)	-2.199 (0.476)	-0.882 (0.947)	-3.018 (0.140)	-2.233 (0.458)	-0.734 (0.963)	-2.114 (0.521)	-1.938 (0.615)

Note: Asterisks (*) denote statistically significant at 1% significance levels. IRS=short term interest rate; IRL=long term interest rate; πt = the quarterly rate of change in the natural logarithm of P GDP; Rt=GNINTP deflated by the GNFL in the previous period value; gt/yt = YPGT minus CGINTP deflated by GDP; vt/yt,= YRGT minus GGINTP and deflated by GDP; bt/yt = GNFL deflated by GDP

However, after applying the first difference, the ADF test rejects the null hypothesis. Since the data appear to be stationary when applying the ADF test in first differences, no further tests are performed. Therefore, we concluded that the null hypothesis that each variable is integrated of order in the same order, which is in *I*(1):

Table 2
Augmented Dickey-Fuller tests - First Different at constant plus trend

D-Lag	Variables							
	$ln\frac{b}{y}$	$ln\frac{v}{y}$	$ln\frac{g}{y}$	$\ln(1+R)$	$\ln(1+\pi)$	irs	irl	lnY_t
2	-4.962* (0.000)	-6.532* (0.000)	-4.143** (0.012)	-4.899* (0.000)	-5.574* (0.000)	-3.531** (0.050)	-3.590** (0.044)	-4.0722* (0.000)
1	-4.934* (0.001)	-4.043** (0.015)	-4.187** (0.011)	-5.590* (0.000)	-5.462* (0.000)	-3.990** (0.017)	-4.869* (0.001)	-5.023* (0.001)
0	-6.189* (0.000)	-5.803* (0.000)	-6.912* (0.000)	-6.948* (0.000)	-6.305* (0.000)	-4.783* (0.002)	-7.416* (0.000)	-5.597* (0.000)

Note: Asterisks (*) denote statistically significant at 1% significance levels. IRS=short term interest rate; IRL=long term interest rate; πt = the quarterly rate of change in the natural logarithm of P GDP; Rt=GNINTP deflated by the GNFL in the previous period value; gt/yt = YPGT minus CGINTP deflated by GDP; vt/yt,= YRGT minus GGINTP and deflated by GDP; bt/yt = GNFL deflated by GDP

Given the fact that all series under ADF stationary test are at *I*(1), we proceed with integration identification between the variables to identify the level of co-integration using the Johansen-Juselius technique.

Co-integration and VEC Model

The co-integration method, based on the VAR model proposed by Johansen (1988, 1991) and Johansen and Juselius (1990), is carried out to test the possible long-term stable relationship that may exist in variables. Co-integration test results, as shown in Table 4.3, indicate that there are six co-integration equation existing between lnY_t and $ln\frac{b}{y}$, $ln\frac{v}{y}$, $\ln(1+R)$, $\ln(1+\pi)$, irs, and irl. The cointegration vector between lnY_t and $ln\frac{b}{y}$ is (1,-6.9204), lnY_t and $ln\frac{v}{y}$ is (1, 1.1522), lnY_t and $\ln(1+R)$, is (1, -8.4292), lnY_t and $\ln(1+\pi)$ is (1,-7.7725), lnY_t and irs is (1, 3.0522), and lnY_t and irl is (1, -1.9570) at 1 per cent significant level, respectively.

Table 3
VAR Model Variables Co-integration Test

Co-integration between lnY_t and other variables	CointEq
lnY_t	1.0000
$ln\frac{b}{y}$ (-1)	-6.9204* (0.3114) [-22.2226]
$ln\frac{g}{y}$(-1)	0.0928 (0.1205) [0.7702]
$ln\frac{v}{y}$(-1)	1.1522* (0.0546) [21.103]
$\ln(1+R)$ (-1)	-8.4292* (0.3804) [-22.1550]
$\ln(1+\pi)$ (-1)	-7.7725* (0.3237) [-24.0101]
irs (-1)	3.0522* (0.1410) [21.6429]
irl (-1)	-1.9570* (0.0637) [-15.016]
C	40.0497

Note: Standard errors in ( ) & t-statistics in [ ]

Vector Error Correction estimates can be done accordingly between lnY_t and $ln\frac{b}{y}$, $ln\frac{v}{y}$, $\ln(1+R)$, $\ln(1+\pi)$, irs, and irl. As shown in Table 4. The estimates in Table 4 indicate that the coefficient of Cointegration Equation 1 between lnY_t and $ln\frac{b}{y}$, $ln\frac{v}{y}$, $\ln(1+R)$, $\ln(1+\pi)$, irs, and irl is -1.049217 < 0, showing that the short term correction will be conducted with a 104.9 per cent speed within 1 year period, while there are any diversions away from the long term route.

Table 4
Vector Error Correction Estimates; D(lnY_t)

CointEq1	-1.049217* (0.16840) [-6.2305]
D(lnY_t(-1))	1.600988** (0.57654) [2.77689]
D(lnY_t(-2))	0.156087 (0.55011) [0.28374]
D($ln\frac{b}{y}$(-1))	-2.116099** (0.84709) [-2.49808]
D($ln\frac{b}{y}$(-2))	-1.081734** (0.39668) [-2.726969]
D($ln\frac{g}{y}$(-1))	1.045514* (0.27177) [4.802545]
D($ln\frac{g}{y}$(-2))	1.096161* (0.31494) [3.480539]
D($ln\frac{v}{y}$(-1))	1.015720* (0.14460) [7.024343]
D($ln\frac{v}{y}$(-2))	0.035360 (0.11361) [0.31125]
D($\ln(1+R)$ (-1))	-1.232031 (0.84474) [-1.45847]
D($\ln(1+R)$ (-2))	-1.116029* (0.36603) [-3.04901]
D($\ln(1+\pi)$(-1))	-2.100855*** (1.07874) [-1.94751]
D($\ln(1+\pi)$(-2))	-1.492706*** (0.88848) [-1.680067]
D(irs (-1))	-1.186354* (0.17883) [-6.63454]
D(irs (-2))	1.223841* (0.25463) [[4.80635]
D(irl (-1))	1.088033** (0.41783) [2.604009]
D(irl (-2))	1.046224* (0.27718) [3.774529]

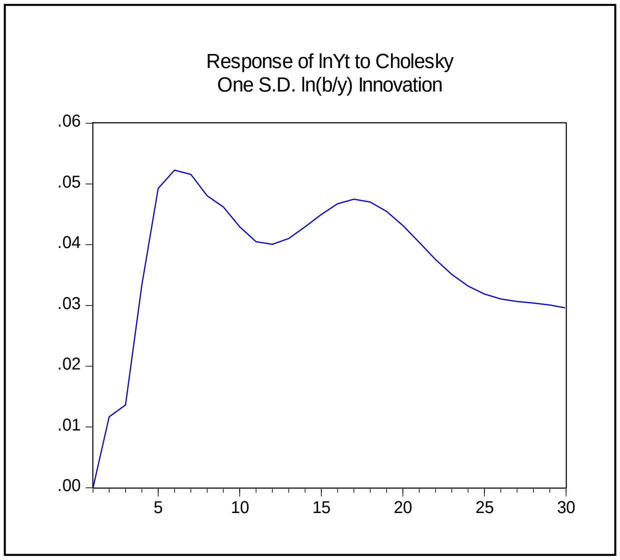
Note: Standard errors in ( ) & t-statistics in [ ]

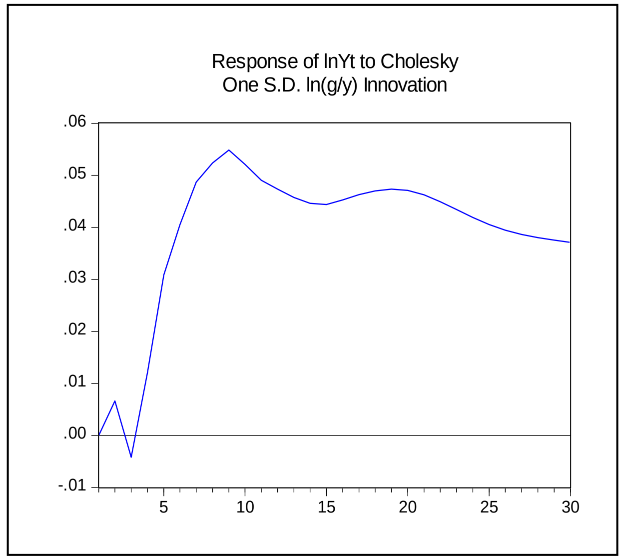
Impulse Response Function

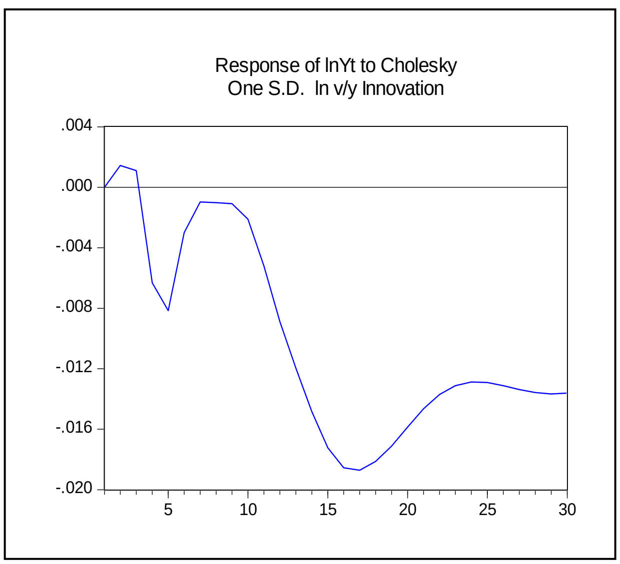
The impulse response function (IRF), which is based on co-integration model analysis, will measure the impact on current and future values of endogenous variables from a standard innovation shock of random perturbation (Ren and Li, 2010). The analysis results of the IRF are shown in Figure 2. It shows the response of lnY_t to Cholesky one Standard Deviation (S.D.) $\frac{b}{y}$, $ln\frac{v}{y}$, $\ln(1+R)$, $\ln(1+\pi)$, irs, and irl innovation.

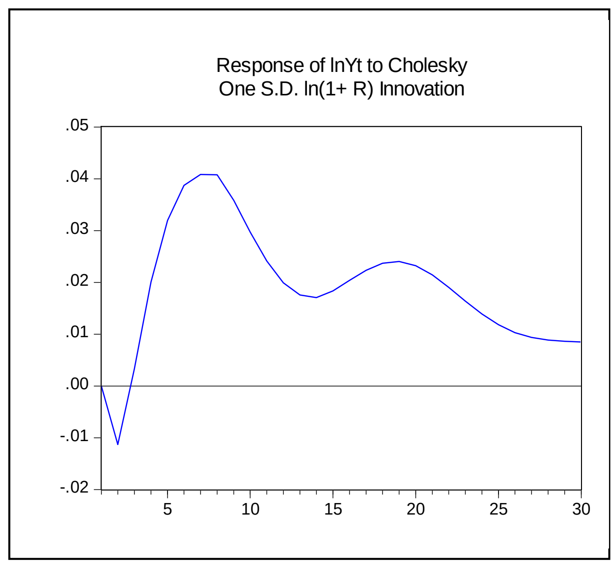
The results show that

a) shock from $ln\frac{b}{y}$ will lead to a positive response of lnY_t at the beginning, but the intensity of the impacts will go down from period 6 to 11. After period 11, the shock from $ln\frac{b}{y}$ becomes positive until period 18, and then it goes down gradually.
b) shock from $ln\frac{g}{y}$ will lead to a positive response of lnY_t at the beginning, but the intensity of the impacts will go down from period 3, then becomes positive until period 9. After period 9, the shock goes down gradually.
c) shock from $ln\frac{v}{y}$ will lead to a positive response of lnY_t at the beginning, but the intensity of the impacts will go down from period 5. After period 5 the shock from $ln\frac{b}{y}$ becomes positive until period 108, then gradually goes down.
d) shocks from $\ln(1+\pi)$, irs, and irl will lead to negative responses of lnY_t at the beginning, but the intensity of the impacts will go up at period 2, then they become positive until period 9. After period 9, shocks from $\ln(1+\pi)$, irs, and irl gradually decrease.


Response of lnYt to Cholesky
One S.D. ln(b/y) Innovation
.06
.05
.04
.03
.02
.01
.00
5
10
15
20
25
30


Response of lnYt to Cholesky
One S.D. ln(g/y) Innovation
.06
.05
.04
.03
.02
.01
.00
-.01
5
10
15
20
25
30


Response of lnYt to Cholesky
One S.D. ln v/y Innovation
.004
.000
-.004
-.008
-.012
-.016
-.020
5
10
15
20
25
30


Response of lnYt to Cholesky
One S.D. ln(1+ R) Innovation
.05
.04
.03
.02
.01
.00
-.01
-.02
5
10
15
20
25
30

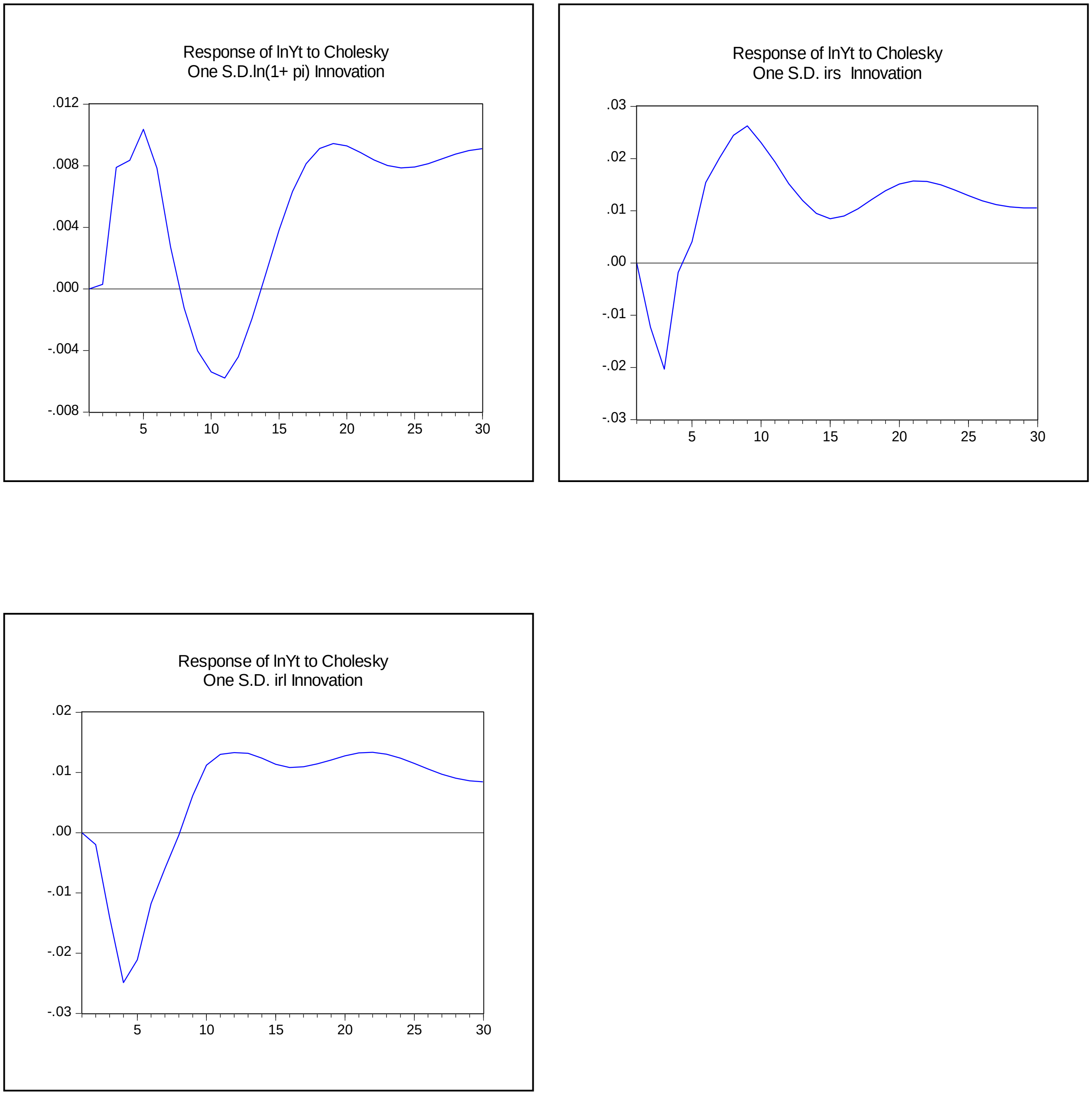


Figure 2: IRF analysis of lnY_t

5. CONCLUSIONS

Our analysis has highlighted three main problems; the choice of relevant variables, the measurement of sustainability, and the relationships between the sustainability indicators and output (GDP). We have shown that the existing fiscal sustainability measures could indicate whether the current policy stance is sustainable in the long run. We have argued that for practical purposes, this is not sufficiently helpful and what is needed is a short-term indicator. We have proposed the use of fiscal sustainability which can be applied to any time horizon and is easier to compute using VAR.

We analyzed the sustainability of Malaysia fiscal policy using historical data. In particular, we tested whether the Malaysia fiscal history displays a positive relationship between fiscal sustainability indicators and output (GDP). Our study also provided some useful results for policymakers. Firstly, all of the macroeconomic performance variables used in this study have an expected sign and have fulfilled our assumptions in the long-run. Our result indicates that the macroeconomic performance on the output (GDP) in Malaysia is "sustainable‟. That means empirical analysis indicates that the levels of fiscal sustainability are sustainable in Malaysia. The ect(-1) coefficient value indicates 104.9 % speed of adjustment to restore equilibrium in the long-run. Also, the output (GDP) is found to have a close relationship with macroeconomic performance variables (Gross Domestic Product (GDP) and fiscal sustainability indicators such as a ratio of government net financial liabilities, gross government interest payments, gross government interest receipts, net government interest payments, government total disbursement, government total receipts, short-term nominal interest rate, and long-term interest rate). According to our test, which is based on an Error Correction Model (to allow for the possibility that the primary surplus adjusts gradually to achieve sustainability), the conduct of fiscal policy within our sample is consistent with government policy. On the other hand, the indicators show the need for some fiscal adjustment.

Based on the simple econometric analysis, we come to the following conclusions. First, we found a significant long run co-integration relationship for Malaysia. The results hold for both sampling periods. Second, we found support for the strong form of sustainability condition in the sample, suggesting that Malaysia is on the sustainable path in governing its financial performance. It has become standard in the macro-econometric literature to interpret VAR impulse response estimates after accounting for sampling uncertainty.

Hence, monitoring, maintaining and sustaining stable fiscal position are important for the fiscal sustainability towards long run economic growth in Malaysia.

In accordance to the objectives of this study, several policy implications emerged from the analysis. Further efforts are obviously needed to guide more effectively fiscal sustainability policy. The government should improve the presentation of fiscal policy sustainability, and develop the analysis, review the sustainability indicators, and strengthen the role of the long term estimates in the design of short term fiscal policy.

In conclusion, an important insight of our paper is that empirical study of fiscal sustainability indicators (such as the ratio of government net financial liabilities, gross government interest payments, gross government interest receipts, net government interest payments, government total disbursement, government total receipts, short-term nominal interest rate, and long-term interest rate) requires simultaneous analysis of indicators and tests. Research aimed at further integrating the formulation of indicators of sustainability with testing techniques promises to be fruitful for policy evaluation and design.

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