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Budget Deficit and the Federal Government Debt in Malaysia

Mohamed Aslam and Raihan Jaafar

Abstract

In general, most countries in the world, particularly developing countries, are facing significant budget constraints, in which the collection of tax and nontax revenues is less than the government's total expenditure. Therefore, borrowing either from the local capital or international capital markets is made. Borrowing increases government debts. The budget deficits and the growth of the government debt are the major factors that determine the health of macroeconomics. There is a solid consensus among economists mainly on the effect of budget deficits on macroeconomics in terms of crowding out private investment, increasing interest rates, expanding money supply and escalating consumer price and in certain extent affect exchange rate. Government bonds issued to finance budget deficits are also in question as part of the net wealth of private sectors. On the other side, there is an agreement that the budget deficits financed by the issuance of bonds will crowd out private investment through increasing interest rate. This paper plans to investigate the impact of budget deficits on Malaysia's economy. Cointegration test and vector error correction models are used to examine the impact of budget deficits on certain macroeconomic variables.

Keywords: budget deficits, federal government debt, VECM, Malaysia

1. Introduction

In general, a persistent deficit in the government budgets would be a paramount issue to macroeconomic stability to any countries. Theory suggests that persistent and large budget deficits lead to a harmful effect on major macroeconomic fundamentals. In particular, massive budget deficits result in high interest rates as the government's demand for funds and this consequently conflicting with private sector demand for investment financing, thereby discouraging private investment expansion. The implications of high interest rates would affect severely residential construction, business investment in plant and equipment and consumer spending on durable goods by such a fiscal policy and along with non-accommodative monetary policy. Moreover, the budget deficits may affect interest rates via the channel of reduction in savings or deposits in the banking system.

Federal government debt relates to how much a country owes and is owed by a central government which acts as the liability of the nation. Changes in the government debt over time reflect the outcome of government deficits, for example when government spending exceeds its tax collections. When its tax collections are exceeded, it has a budget deficit, which it then finances by borrowing from the

private sector or from foreign governments. In other words, budget deficit occurs when government spending exceeds its revenue; meanwhile, federal government debt is the accumulation of the deficits. Budget deficit and federal government debt are interrelated as they affect each other, for example deficit affects the debt by selling bonds. When the bonds are sold, it increases the money; this transaction is defined as public debt because these bonds are sold to the public. Another example is the way debt affects the deficit; in the long-run, debt that is owed by the federal government reduces tax revenues and increases the deficit further.

The budget deficits run by the government around the world particularly since 2008 which tackle the effect of global economic crisis had accelerated the growth of government debt and accumulated the debt which had reached critical level. As there is a continuous growth of debt, creditors may become concerned about the government's initiative to repay it. Over time, these creditors will expect higher interest payments to provide a greater return for their increased perceived risk as it is widely known that higher interest costs dampen economic growth. As interest rates rise, it becomes more expensive for a country to refinance its existing debt. The management of debt by way of service payment is the sum of the principal payments and interest actually paid in foreign currency, especially as foreign currency tends to affect exchange rates.

There has been a strong interest in the behaviour of public debt, particularly since the impact of Asian financial crisis and the global financial crisis. During those periods Malaysia budgets deficits financed by increasing debts, i.e., issuing of bonds. The issue of Malaysia's government debt became significant in the public interest especially after the dramatic increase of government debt in the year onwards of 2009. The government gross debt has climbed up from 41.2% of GDP in 2007 to 52.8% in 2009 and further increased to 54.5% in 2015. The large increase in government debt, especially during the recent years, might be related to the Vision 2020 in which it envisioned to make Malaysia as a developed and high-income country by the year 2020. The main objective of this research is to review the Malaysian federal government's debt and budget deficit during the period of 1985–2018.

2. Budget deficits and government debt

External markets have been the major factor influencing Malaysia's economic growth and development since the early 1900s. There were two sources of growth, foreign capital and major trade partners' commodity markets. The Malaysian economy grew rapidly with real GDP posting average annual growth rates of 6% during the period of 1956–2018. In 2009, the Malaysian economy contracted by 1.6% due to the world financial crisis that swept the US economy in late 2008. In 2010, the Malaysian economy bounced back to 7.2% and declined to 4.5% in 2018. In general, the country has grown rapidly by international standards. Its GDP growth averaged close to 6% from 1971 to 2018 (**Figure 1**). Within three decades from the 1970s to the 1990s, Malaysia's economy experienced an annual GDP growth of 6.0 and close to a 3.7 growth in per capita income. External markets have been the major factor influencing for economic growth. The impressive growth of the economy had accelerated demand for labour and reduced unemployment level. Since 1997 as shown in **Figures 1** and **2**, the economy performance is much affected by external shocks. To tackle the economic mass, the government implemented budget deficits 4% of GDP constantly from 1998 to 2018. As shown in **Figure 2**, budget deficits declined from 1989 to 1997 but increased subsequently until today. Furthermore to stimulate further the economy, the interests reduced onward since 1998.

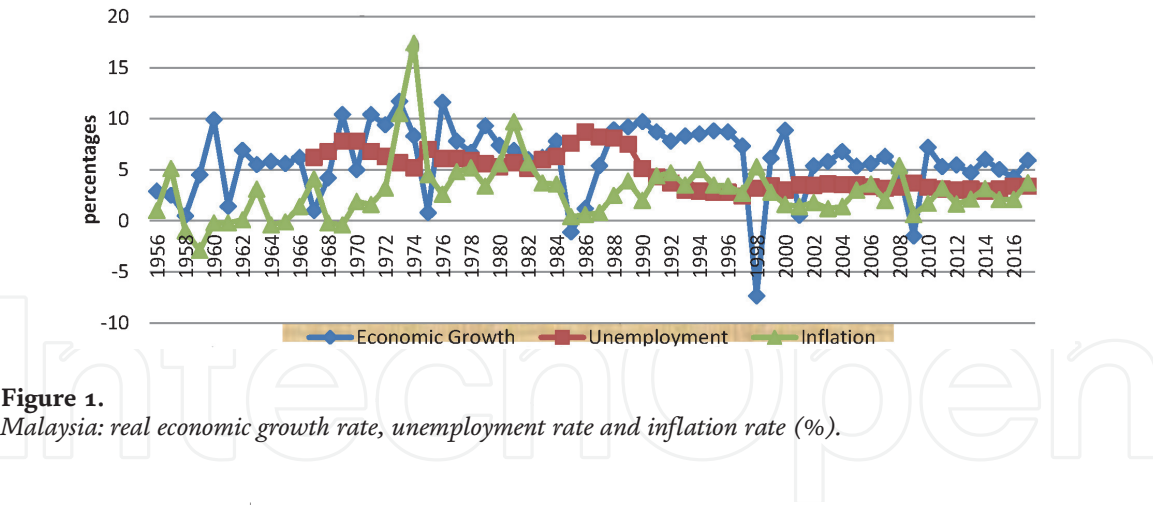


Figure 1.
Malaysia: real economic growth rate, unemployment rate and inflation rate (%).

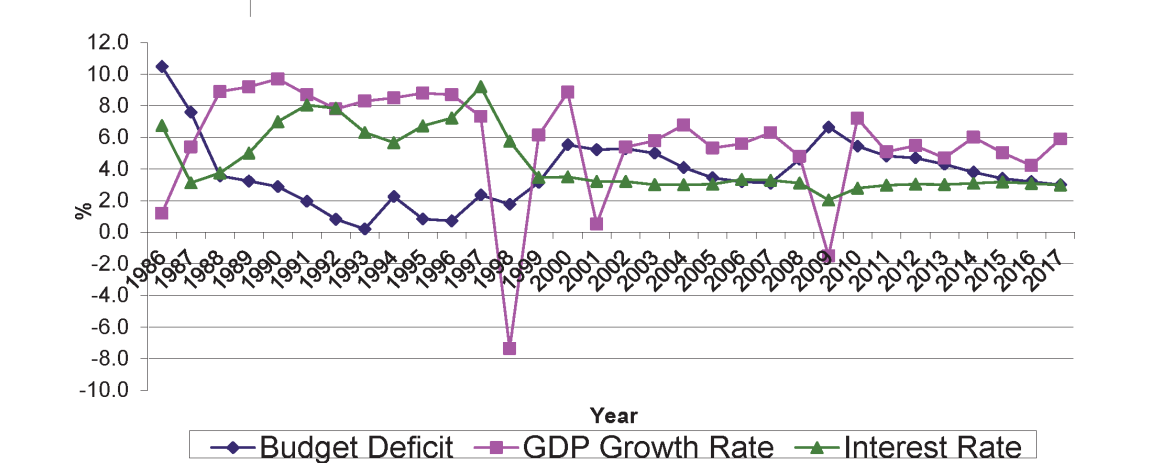


Figure 2.
Malaysia: budget deficits, economic growth dan interest rate (%).

However, both the traditional macroeconomic policies failed producing outstanding economic performance. The budget deficits implemented had increased the government debt thereafter.

In the 1990s, the Malaysian total outstanding government debt reached an all-time high of 80.7% and a record low of 31.8% in 1997. Malaysia's government debt to GDP averaged 50.2% from 1990 until 2018. Since the debt approaching to 55%, therefore, the government should control her spending before the debt affecting the government fiscal position. The government self-imposed debt ceiling has been raised multiple times from 40% in 2003 to 45% in 2008. In 2009 it rose to 55%, and currently the limit still stands at this figure. It seems that Malaysia federal government debt level has been increasing much faster than the GDP growth; the statutory borrowing ceiling has been raised by 15% of GDP within 6 years, 2009–2017. Malaysia has breached its own self-imposed debt limit. However, even though the ratio of debt to GDP approached the limit, the Ministry of Finance claims that the debt is still manageable. The high level of debt may limit the development and objective of Malaysia's economic transformation plan.

Uncertainties of the national debt service payment create discouragement, and ultimately, they form difficulties in the pursuit of economic reform [1]. The government spending must be paid by running the government in deficit and borrowing the money from the public or by raising today's taxes. However, if the government chooses to run in the budget deficit, the government must eventually raise their taxes to make interest payments in the future. In other words, the more spending made by the government, the higher the taxes will become; no matter if it is today or in the future.

In 2016 the World Bank downgraded GDP growth of Malaysia of 4.2% from the previous year, 2015, 4.4%. This is due to a weak global demand for manufactured exports and oil. When the demand for our crude oil is going down, the government revenue experiences a shortfall and fiscal deficit occurs. According to Foon [2], the Malaysian government will have a tough time lowering the deficit position caused by the shortfall in government revenue from crude oil. He added that the government set a limit for the budget deficit that year of 3.1%. But in the first half of 2016, the deficit rose to 5.6%.

Clearly, this is a very disturbing situation. What implications do large deficits have in store for our future as taxpayers? To determine the answers to the question, we must first determine whether or not federal borrowing drives up interest rates. If it does, we run a risk of crowding out private investment, thus leaving a smaller capital stock from which future tax collectors can draw to pay back the debt. There are many possible outcomes regarding the implication of budget deficit and federal government debt. Various economists predict that something detrimental will happen in the future based on the large deficits of the past, but a few also inform us not to worry so much about this matter.

2.1 Domestic loans

The federal government sector accounts are always in a state of deficit, except in 1960 and 1993–2018 (Figures 2 and 3). The deficit of the federal government was quite high in 1981, 1982 and 1986, where the deficit to GDP was 15.6, 16.7 and 10.5%, respectively. This deficit is due to the expansionary fiscal policy implemented from 1980 to 1987 to address the recession problem. In the early 1990s, the federal government deficit began to decline and has become excessive due to the government’s public policies reducing spending and relaxing its role in the economy. At the same time, the government has encouraged large private sector participation in economic growth.

The federal government deficit can be said to be funded entirely by debt whether domestic or foreign borrowing or both. The size of the federal government debt as a percentage of GDP has increased from 29% in 1965 to 44% in 1980, 83% in 1990 and 53% in 1994. The highest increase was recorded in 1986 by 103%, in 1987 by 104% and in 1988 by 98%. The high debt ratio is largely related to the heavy industrial development program which was embarked in the early 1980s. The financing of various development programs in 1980s entirely by foreign borrowing. Most foreign loans made during this period were from the Japanese government (project loan) and Japanese financial institutions (market loans).

The structure of foreign loans is divided into two, namely project loans and market loans. Domestic borrowings are as attractive as borrowing sources come

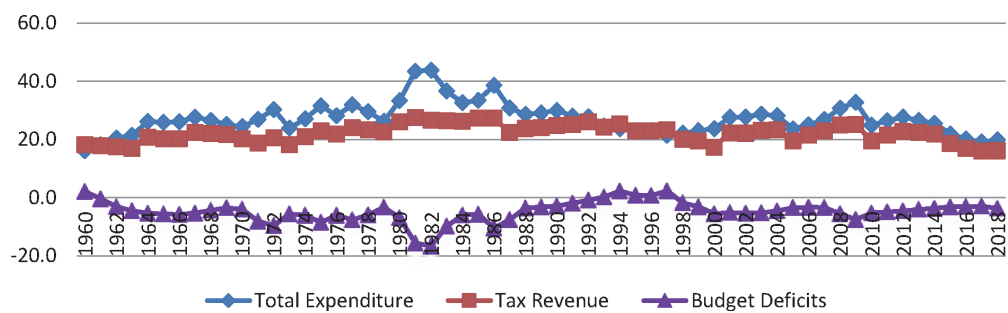


Figure 3. Malaysia: federal government budget and deficits (% of GDP).

from noninflationary sources. However, foreign loans have risen as interest rates are lower than those offered locally.

Domestic borrowing is the main source of funding the federal government budget deficits. More than 60% of the federal government debt was from domestic borrowing. In 1965, the total domestic debt to total debt amounted to 82% (RM2134 million), the amount decreased to 79% (RM18.6 billions) in 1980, 74% (RM70 billions) in 1990 before it rose to 82% (RM78 billion) in 1995 and 97% (RM704 billion) in 2018. In terms of percentages to GDP, the amount of domestic debt was more than 50% in average from 1965 to 2018. The total domestic debt to GDP in 1965 was 24% and has increased to 35% in 1980, 61% in 1990 before declining to 35% in 2000 and increased to 50% in 2018 (**Table 1**).

Domestic borrowings are made through the sale of treasury bills, investment certificates, government guarantees and other credit instruments. Short-term loans are usually treasury bills, while long-term borrowings are usually a government guarantee letter. The government issued treasury bills with maturities of 3 months, 6 months and 12 months with interest rates ranging from 6.4 to 7.9%. This short-term loan is somewhat useful because the government’s revenue is insufficient to meet the government obligations, i.e. the expenditure is more than the amount of revenue received. Generally, treasury bills are held by commercial banks and discount companies. This government debt papers are the main liquid assets in the banking systems. The central bank may influence the liquidity of these assets by buying or selling such bills through open market operation.

Government borrowing through by issuing treasury bills is around 6–23% of the total domestic borrowings. In the 1960s, the federal government debt in the form of treasury bills was more than 20%, dropped to 15% in the 1970s and about 6.8% from 1980 to 1995 and less than 10% from 1996 to 2018. In the future, borrowing

Year	Federal govt. debt		Domestic loan			External loan		
	Total	% of GDP	Subtotal	% total debt	% of GDP	Subtotal	% total debt	% of GDP
1965	2598	29	2134	82	24	464	18	5
1970	5028	40	4283	85	34	745	15	6
1975	11,387	51	8963	79	40	2424	22	10
1980	23,439	44	18,578	79	35	4861	21	9
1985	63,882	82	40,812	64	53	23,070	36	30
1990	94,713	83	69,987	74	61	24,726	26	22
1995	91,368	41	78,037	85	52	13,331	15	10
2000	12,560	37	10,680	85	35	1880	15	5
2005	22,870	44	19,870	87	35	3000	13	6
2010	408,178	53	390,724	99	38	13,786	10	9
2015	630,540	55	609,063	97	53	21,477	3	2
2016	648,475	53	624,822	96	51	23,653	4	2
2017	686,837	51	665,572	97	49	21,265	3	2
2018	725,241	52	704,101	97	50	21,140	3	2

Source: Ministry of Finance, Economic Report [3–11], various issue 2.

Table 1.
Malaysia: composition federal government borrowing (RM’ millions).

by issuing treasury bills will become imperative, as the policy of deregulation or consolidation public debt with the reduction of government intervention will result in surplus budget. The surplus or government saving can be brought forward for later use.

The main domestic government medium-term and long-term loans are Malaysia government securities (MGS). MGS are usually issued on maturities of 2–3, 4–5, 6–9, 10–11, 12–15 and over 15 years with interest rates ranging from 8 to 8.5%. In the 1990s the government issued MGS with a fairly short maturity period to meet the needs of investors, but since 1998 the issuance of MGS in general is in medium and long terms. The total amount for MGS issued from 1980 to 2018 ranges from 70 to 80%.

Most of the MGS was held by the Employees’ Provident Fund (EPF) Organisation, which holds more than 50%. In the early 1960s to 1970s, the MGS that held by EPF ranged from 60 to 70%. But in the late 1980s and early 1990s and in 2000s, the amount of holding dropped between 50 and 60%. The rest of the MGS were held by other financial institutions. In addition, investment certificates are also issued for additional funds. Generally, these investment certificates were issued to meet investors’ demands and for OMO purpose rather than for financing budget deficits.

MGSs have become a major instrument in raising fund for the government. Since 1997, the federal government heavily relies on MGS for budget deficit financing. Based on **Figure 4**, the new government debt papers issued are substantial. The gap between the gross and net public fund raised was getting bigger. This also means that part of the budget deficits was financed by creating or printing new currency notes. Also part of the debt papers was monetized; therefore, money supply and currency in circulation increased sharply since 1999 (**Figure 5**).

2.2 External debt

In the case of Malaysia, relatively, external debt is regarded are not critical except during the period 1982–1990. During this period the percentage of external

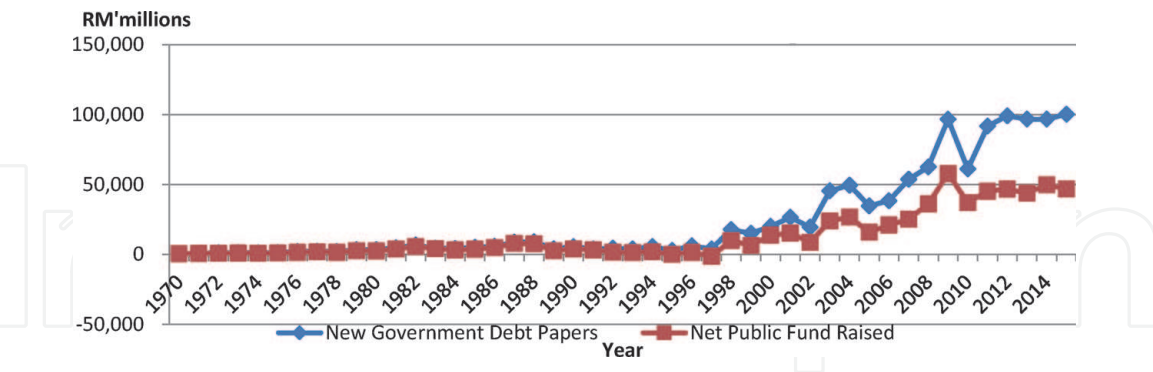


Figure 4.
Malaysia: new government debt papers issued and net fund raised (RM’ millions).

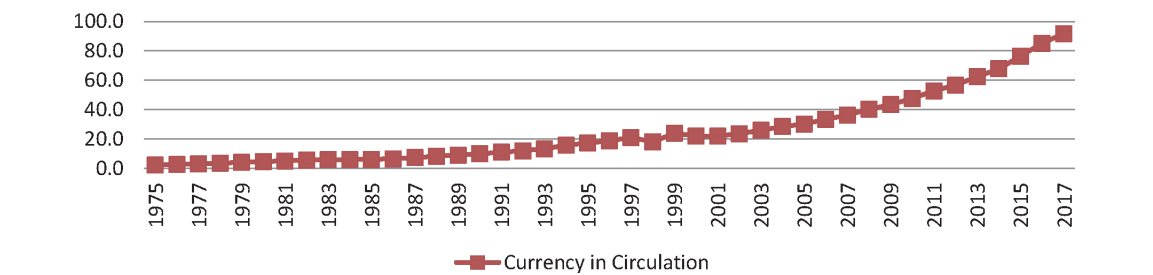


Figure 5.
Malaysia: currency in circulation (RM’ millions).

debt has exceeded 30% of GDP (**Table 2**). Before the 1980s, foreign debt was between 5 and 11% of GDP. External debt has increased significantly in the 1980s, as domestic savings were inadequate at that time to cover federal government spending. The main purpose of the external borrowing during the period is (i) to overcome the economic downturn in the early 1980s, (ii) to finance heavy industrial development that was launched in the early 1980s, and (iii) to finance various mega infrastructure projects. The ratio of external debt to GDP since 1997 is lingering from 5 to 9% of GDP. However, the debt ratio of the total federal government debt from 1997 to 2018 is about 20%. As mentioned above for financing budget deficits, the government relies on domestic capital market.

External debt is divided into two, namely market loans and project loans. Market loans are loans where the government borrows from foreign financial institutions or foreign governments or borrows from foreigners by issuing government bonds. While project loans are loans made to finance major infrastructure projects, which are financed either from the World Bank, Asian Development Bank or from the foreign government.

Both forms of external debt above are important in government spending. The importance of both loans is similar except for the period before 1980 and from 2000 to 2005. During the period the government borrowed in large amount from overseas in the form of market loans to cover the government spending from 1980 to 1990 and to overcome economic recession. The total market borrowing from the total external debt was high in 1986 which was 36 and 30% of GDP.

The main sources of federal government external borrowing were the United States, Japan, and the World Bank. In the 1980s, the government borrowed in huge amount from Japan. However, the United States remains a major source of borrowing, but the volume of loans from the country has declined. External debt from the United States was in the form of market loans, while market loans from Japan were less. The project loans were mostly financed by the Japanese government as well as the World Bank. Japan was a major contributor to Malaysia's external debt and most of the debt for financing development projects, i.e. infrastructure.

The increase in federal government borrowing either from domestic or external capital markets has led to the increment of the amount of interest payments of the debt. The amount of interest payments of domestic debt from 1970 to 1995 was on average about 74% of the total interest payment. Interest payment on external debt was much lower, and this indicated that the government favours borrowing from domestic money or capital market because the cost of borrowing is cheaper than the external debt.

The main critical issue of external borrowing is linked to the fluctuations of exchange rate, in which the fluctuation had cost of government loans, particularly in terms of principal and interest payments. Since the Plaza Accord of 1985, the appreciation of Japanese yen against USD had increased the federal government debt burden, i.e. loan payment to Japanese government. The total interest payment of debt has increased from RM262 million in 1970 to RM1444 million in 1980 and RM7125 million in 1995 and RM20 billion in 2018. The total interest payment on domestic debt in 1970 was RM223 million, has increased to RM1070 million in 1980 and about RM6049 million in 1995 and in 2018 amounted to RM18 billion (**Table 2**). Interest payments on external debt have increased from RM11 million in 1980 to RM32 million in 1987 before it declined to RM16 million in 1995 and in 2018 about RM2 billion.

3. Literature review

Budget deficits can be viewed as the sum of structural and cyclical components. The cyclical component reflects the response of receipts and expenditures of the

government to fluctuations in the business cycle, whereas the structural component is the result of discretionary fiscal policy [13]. De Leeuw and Holloway [14] stated that the structural component is an important indicator of the macroeconomic effects of fiscal policy. They argue that over the complete business cycle, the cyclical component has a tendency to negate its own effects; therefore, only the structural component is meaningful for long-run fiscal policy.

Eisner and Pieper [15] use an aggregate demand approach to determine the relationship between the federal deficit and the growth rate of GNP. They found that the coefficient on the deficit variable was positive and significant when the growth rate of GNP was regressed upon it. Kormendi [16] investigated the impact on consumption of government purchases, taxes, transfers, interest payments and the market value of government debt. His study was not limited to federal government activities as all his variables (where applicable) were the sum of the federal state and local governments. He found that the government purchases had a negative and significant impact on consumption. He also found that the government purchases were less than perfect substitutes for private consumption. Furthermore he discovered that the coefficient for the market value of government debt was negative and significant. This results a bit surprised as theory suggests that people view bonds as net wealth and would increase their consumption; therefore, yielding should be a positive sign.

Based on traditional view, Blinder and Solow [17] argue that a given level of government expenditures and a substitution of public debt for tax financing have a positive effect on aggregate demand. Their argument assumes that, through an increase in government bonds, there would be a perceived increase in the private sector wealth, resulting in an increase of current and future consumption at the expense of saving. Additionally, when private saving goes up by less than the debt issue, the real interest rate rises, and some form of crowding out of private investment will take place. Abderrezak [18] explains that, given the level of government expenditures, increases in government debt will stimulate consumption demand, which in turn provokes a rise in interest rates, and the latter will eventually crowd out some private investment expenditures. In other words, he suggested that even though the current deficits are expansionary, the anticipation of growing future deficits may well reduce economic activity in the future.

Most of the economists believe that current and expected government budget deficits will lead to higher interest rates. Penner [19] agreed on the conventional view that deficits/debts have a significant positive relationship with interest rates. According to the Ricardian equivalence theorem, higher future taxes, as implied by enlarged government debt, will cancel out the wealth effect that is credited by the conventional paradigm for increasing consumption at the expense of investment [18]. Blanchard [20] had analysed the relation between real interest rates, budget deficits and government debt. He argued that even if deficits are sustainable, they will still affect interest rates. Abderrezak also concludes that the short-term interest rate depends on the current level of debt but does not depend on the current level of deficits.

Blinder and Solow [17] describe how bond financed deficits increase competition for funds in credit markets and put upward pressure on interest rates. Accordingly, when the government issues new bonds to finance deficits, competition for funds increases interest rates to convince agents to hold more government bonds. That is, the price of bonds should decrease and interest rates should increase. The real interest rate is a common-sense idea because those lending funds are sensitive to the inflation rate expected over the period they lend the funds so that the return on the funds is sufficient to cover the deterioration in the value of money due to inflation [21]. The real interest rate is the nominal interest rate after subtracting expected inflation.

Hoelscher [22] examines the effects of the federal government borrowing on short-term interest rates in the case of the United States. His regressions test to see whether or not the level of federal borrowing is a statistically significant determinant of the 3-month treasury bill rate. He obtained very low t-statistics on the relevant variables and concluded that federal borrowing is not an important determinant of short-term interest rates. He also states that “to the extent that private expenditures are sensitive only to short-term rates, then Federal borrowing does not have financial crowding out effects”. Meanwhile, de Leeuw and Holloway [14] found slightly different results. Their study covered 1955:1 to 1983:3 and regressed the interest rate on the deficit and a cyclically adjusted federal debt variable. They found the coefficient of the deficit variable to be insignificant and the coefficient of the debt variable to be both significant and positive. Barth et al. [23] found the coefficient of the federal debt variable to be positive and significant; therefore, this result supports the view that federal debt raises the interest rate through its impact on money demand.

The other method that would influence money demand is the purchase of government securities on the open market by the central banks. This activities by the central bank will result not only in an increase in net public financial assets but also in an increase in the reserves of the commercial banks and depository institutions as well as the amount of cash held by the public [24, 25]. This implies an increase in the monetary base which results in an overall increase in the money supply. Deficits financed in this fashion are said to be monetized or money financed. Wood [26] asserts if an increase in new money creation is used to finance part or all of a budget deficit, and, if necessary, a quantum of money is withdrawn from the economy via bond sales undertaken by the central bank, and then inflation would not increase, and a fiscal stimulus could be delivered in order to lift overall economic activity. Deravi et al. [27] prove that there is a relationship between government debt and interest rates via the demand for money. This relationship is examined through the wealth effect of government debt on money demand. They found evidence on government debt affecting the demand for money positively, implying that federal government debt is net wealth. Meanwhile, Giannaros and Kolluri [28] stated that the government budget deficit is not a determinant of money supply growth or of inflation (directly or indirectly). Friedman and Schwartz [29] explained, when interest rates are initially excessive, these lower interest rates may increase aggregate demand. When aggregate demand expands at a rate so fast that production and imports cannot satisfy the demand, then inflation develops.

Abizadeh and Yousefi [30] state that the influence of the foreign sector may or may not have a material effect on the deficits/debt-interest rate relationship, that is the deficit and debt do not have a significant positive relationship with interest rates. There is a large debate about the relationship between the budget deficit reduction and exchange rates. Greenspan [31] argued that deficit reduction could lead to currency appreciation, whereas Krugman [32] stressed that deficit reduction would lead to currency depreciation. Based on the debate over the relationship between deficit reduction and exchange rates, currency appreciation arises because the theory is ambiguous. Deficit reduction has sometimes been associated with stronger exchange rates, and sometimes it has been associated with weaker exchange rates. This difference in association commonly depends on certain factors or effects which tend to increase or decrease the exchange rates, such as the condition of the country or economy. To sort out the ambiguity on the budget deficits and the exchange rate relationship, Hakkio [33] states that deficit reduction through tax increases tends to weaken the exchange rate of countries with good records on inflation and debt. Whereas deficit reduction through spending cuts tends to strengthen the exchange rate of countries with poor records on inflation and debt.

3.1 Econometric models

To examine the effects of the debt on macroeconomy, we introduced few models which are explained below.

3.1.1 Model 1: the federal government debt and interest rate

$$IR = f(LBD, LGD, LMB, INF, LT) \quad (1)$$

where:

IR = the interest rate.

LBD = the budget deficit.

LGD = the government federal debt.

LMB = the monetary base.

INF = the inflation rate.

LT = the federal tax receipt.

The coefficient of the deficit term will be tested for crowding out. If the coefficient is found to be positive and significant, then crowding out is the case. If the term is statistically insignificant from zero, then neither crowding out nor crowding in is the case, but if it is negative and significant, then crowding in is the case. The coefficient of the debt variable can be positive and significant if we assume that the larger is the stock of publicly held government debt, the smaller is the supply of loanable funds available. The coefficient of the monetary base variable is assumed to be negative because as the monetary base grows so does the money supply. The coefficient of the inflationary expectations variable is assumed to be negative as the interest rate lowered; people are able to borrow money, and the consumer has more money to spend, causing the economy to grow and inflation to increase.

3.1.2 Model 2: money demand model

Ms is the money supply and measured by M1; W is variable for wealth and measured by federal government debt (bonds). For simplicity, we rewrite Model 1, as shown below:

$$LM1 = f(LGDP, IR, LGD, INF) \quad (2)$$

where LM1 = M1 money supply and LGDP = GDP.

The money supply is assumed to be positively related to income or GDP and inversely related to the opportunity cost of money which is measured by the interest rate. The wealth term, W, is partly measured by privately held government debt. The coefficient of the wealth variable (publicly held government debt) could have different signs depending upon which theory of government debt is assumed. If the sign is positive, then government debt is being treated as net wealth by the public, and the Ricardian theorem is disproved. If the coefficient is zero, then government debt is not being treated as net wealth, and one of the assumptions of the Ricardian theorem is verified. The expected inflation term is included as an explanatory variable in the money demand equation. A negative coefficient for the price expectations variable is assumed because if the public expects a higher inflation rate which will result in some erosion of the purchasing power of money, then rational consumers will lower their demand for money holdings.

3.1.3 Model 3: investment and budget deficit

Crowding out is a negative consequence of budget deficits in which higher interest rates lead to less private investment. The increase in the interest rate reduces the quantity of private investment demanded (crowding out private investment). The higher interest rate increases the demand for and reduces the supply of ringgit in the foreign exchange market. Below are the potential variables and their hypothesised signs of the selected variables.

Thus, investment model can be written as

$$LI = f (LBD, IR, GDP) \quad (3)$$

where LI = private investment.

The coefficient of budget deficit is expected to be negative, as well as interest rate, while the coefficient of GDP is expected to be positive. As the budget deficit increases, private investment will decline, because the rise in government borrowing will “crowd out” some of the funds that would otherwise have gone to the private sector.

3.1.4 Model 4: inflation and budget deficit

If monetary policy is accommodative to a budget deficit, money supply continues to rise for a long time. Aggregate demand increases as a result of this deficit financing, causing output to increase above the natural level of output. When prices rise for energy, food, commodities and other goods and services, the entire economy is affected. Rising prices, known as inflation, impact the cost of living, the cost of doing business, borrowing money, mortgages, corporate and government bond yields and every other facet of the economy. Therefore, there is a negative relationship between inflation and consumption. Budget deficit and money supply both have positive relationship with inflation. Below are the potential variables and their hypothesised signs of the selected variables.

Hence, the inflation model can be figured as follows:

$$INF = F (BD, LM1, CON) \quad (4)$$

where CON = the consumption.

Federal government debt data is collected from the Economic Planning Unit (EPU). Data such as GDP, budget deficits, M1 money supply, M2 money supply, money base and federal tax collection were extracted from the Asian Development Bank (ADB), while the data of inflation, investment, federal government debt and real interest rate are obtained from the World Bank.

4. Findings

For estimation this paper applies vector error correction model (VECM). The VECM method is a useful approach and able to provide an analytical estimate of the relationship among variables over short-run and long-run period, besides provides an evaluation of interaction among the variables.

Unit root testing will be conducted to determine the time series data whether consist nonstationarity. Most of the economic theory suggests that an existence of long-run relationships exist among the nonstationary time series variables. In both ADF and PP tests, the null hypothesis of the presence of a unit root in the time

series is tested. The null hypothesis needs to be rejected either at the level form or at any level of differenced form for a variable to be stationary. The time series may, however, be stationary at the level, that is, $I(0)$ or at the first difference, that is, $I(1)$. The results will be summarised in **Tables 2** and **3**.

Table 2 shows the results of ADF unit root test that include all the variables used in this study. The null hypothesis of the unit root can only be rejected if the probability is statistically significant at 1, 5 and 10% significant level. ADF test above portrays that all series are stationary at first difference. Hence, the results demonstrate that the variables are integrated at order $I(1)$. This is supported by PP test that shows all the variables are at the stationary state, as can be seen below.

Table 3 shows the PP unit root test results. The PP test uses the model similar to ADF test. The null hypothesis of the unit root can only be rejected if the probability is statistically significant at 1, 5 and 10% significant level. Like the ADF test, the null hypothesis of the presence of a unit root in the time series against the alternative hypothesis states that there is no unit root in the time series, or in other words, the time series is stationary. The results above indicate that all series are integrated at order $I(1)$, which means all variables are stationary at first difference.

Therefore, the results of both ADF and PP unit root tests shown in **Tables 2** and **3** prove that the null hypotheses of the presence of a unit root in the time series are not rejected at the level, whereas test statistics of all the variables significantly reject the null hypotheses in favour of the alternative hypotheses of no unit root in the time series at the first difference. It can be inferred that all the time series variables are nonstationary at their level forms while they are stationary at their first difference forms.

The Johansen and Juselius [34] test and estimation strategy, which is maximum likelihood, makes it possible to estimate all cointegrating vectors when there are more than two variables. If there are three variables each with unit roots, there are at most two cointegrating vectors. Cointegration test will be used to determine the existence long-run relationship between the variables. JJ cointegration test is used in

Variables	Level		First difference		Order of integration
	Constant	Constant and trend	Constant	Constant and trend	
IR	-0.536653	8.841934	-0.077147***	-0.429776***	I(1)
LGD	-0.047514	0.715289	0.067136***	0.048809**	I(1)
LBD	1.093009	-1.230514	0.453952***	0.826004***	I(1)
LMB	0.336665	1.119646	0.111029***	0.155957***	I(1)
INF	1.899940	2.124994	0.144081***	0.794811***	I(1)
LT	0.218716	4.052012	0.098875***	0.161472***	I(1)
LM1	0.268771	4.094348	0.150441***	0.186857***	I(1)
LGDP	4.755439	6.600148	0.159194***	1.195720***	I(1)
LI	3.324182	7.170082	-0.072566***	0.056349***	I(1)
LCON	5.408854	0.739641	0.033803***	-1.488369***	I(1)

Notes: (i) ***, ** and * denote the rejection of null hypothesis at 1, 5 and 10% levels of significance, respectively.
(ii) MacKinnon [12] one-sided P-values.

Table 2.
Augmented dickey-fuller (ADF) test for unit root.

Variables	Level		First difference		Order of integration
	Constant	Constant and trend	Constant	Constant and trend	
IR	4.377255	9.596283	−0.077147***	−0.645455***	I(1)
LGD	−0.043946	0.718857	0.070704***	0.052377**	I(1)
LBD	1.216466	−1.107057	0.577409***	0.949461***	I(1)
LMB	1.335435	2.118416	1.109799***	1.154727***	I(1)
INF	0.812287	1.037341	−0.943572***	−0.292842***	I(1)
LT	1.987622	5.820918	1.867781***	1.930378***	I(1)
LM1	1.181116	5.006693	1.062786***	1.099202***	I(1)
LGDP	5.283645	7.128354	0.687400***	1.723926***	I(1)
LI	3.324182	7.170082	−0.072566***	0.056349***	I(1)
LCON	−0.113303	−0.041706	−0.897091***	0.094191***	I(1)

Notes: (i) ***, ** and * denote the rejection of null hypothesis at 1, 5 and 10% levels of significance, respectively.
(ii) MacKinnon [12] one-sided P-values.

Table 3.
Phillips-Perron (PP) test for unit root.

this study, mainly to seek whether the variables are bound by any relationships in the long-run. The result of JJ test for determining the existence of cointegration vectors will be presented in **Table 4** for two models of this study.

Based on the JJ cointegration tests above, the null hypothesis for all models has no cointegration vectors against the alternative hypothesis which indicated that one or more cointegrating vectors exist. Null hypothesis will be rejected if the analysis shows that there is cointegration among variables.

The results in **Table 4** confirm that cointegration exists for all models with regard to the federal government debt and budget deficits analysis. Model 1 exhibits that there are three cointegrating vectors among the variables in both trace statistics and Max-eigenvalue statistics tests. Meanwhile, Model 2 shows that trace statistics and Max-eigenvalue statistics are cointegrated at two cointegrating vectors among the variables. Models 3 and 4 both show that the test statistics and Max-eigenvalue statistics are cointegrated at two and one cointegrating vectors among the variables, respectively.

The trace test and the maximum eigenvalue test for all models reject the null hypothesis in favour of the alternative hypothesis if the critical value provided by JJ's table is exceeded by the test statistic found from the equation. Therefore, it can be inferred from Johansen-Juselius cointegration test results shown in **Table 4** that there exists at least one cointegrating vector between the variables that are certainly bound by a relationship in the long-run.

As Johansen-Juselius cointegration test results show the existence of long-run relationship of federal government debt and budget deficits; this implies that debt and deficit can be one of the effective instruments to explain the Malaysian economy in the long-term period. For example, each debt and deficit measure says something about public finances. Also, debt and deficit are subject to a binding fiscal rule or target. Debt and deficit encourage operations involving off-balance-sheet assets and liabilities. Overall, the Malaysian government should publish several measures of the debt and deficit in a form that clearly reveals their interrelationships.

Hypothesised no. of cointegrating equations (Ces).	Trace		Maximum eigenvalue	
	Test statistic	Critical value (5%)	Max-eigen statistic	Critical value (5%)
Model 1				
None	143.2828*	95.75366	51.52031*	40.07757
At most 1	91.76248*	69.81889	34.9527*	33.87687
At most 2	56.80978*	47.85613	27.83498*	27.58434
At most 3	28.9748	29.79707	14.2646	21.13162
Model 2				
None	100.1482*	69.81889	38.71173*	33.87687
At most 1	61.43642*	47.85613	33.53451*	27.58434
At most 2	27.90191	29.79707	17.96272	21.13162
At most 3	9.939193	15.49471	9.83002	14.2646
Model 3				
None	84.82411*	47.45613	49.37355*	27.58434
At most 1	35.44886*	29.79707	21.90268*	21.13162
At most 2	13.54618	15.49471	10.60204	14.2646
At most 3	2.944137	3.841466	2.944137	3.841466
Model 4				
None	39.89908*	47.45613	20.89962*	27.58434
At most 1	18.99946	29.79707	11.48449	21.13162
At most 2	7.514968	15.49471	7.069493	14.2646
At most 3	0.445475	3.841466	3.841466	3.841466
*The rejection of null hypothesis of the presence of no cointegrating equations ($r = 0$) between the variables at 5% significance level in favour of the alternative hypothesis that there exists at least one cointegrating equation between the variables.				
Notes: MacKinnon et al. [35] P-values.				

Table 4.
Johansen-Juselius (JJ) cointegration test results.

The test results made from Johansen-Juselius test clearly showed interest rate and money demand do have a long-run relationship in regard to debt and deficits. A study by Correia-Nunes and Stemitsiotis [36], over the long period, high real interest rates induced by large budget deficits have a negative impact on potential growth, shifting the economy to a low-level growth path and may therefore reduce future living standards. Meanwhile, Deravi et al. [27] proved that there is relationship between the wealth effect of government debt on money demand. In their study, they found that, over the long period, government debt is affecting the demand for money positively, implying that federal government debt is net wealth. Thus, the existence of cointegration relationships among the economic variables can be a good indication to the policymakers in their decision-making for the benefit of their countries.

5. Vector error correction model

The above Johansen-Juselius test informed that all four models have at least one cointegrating vectors which suggests the existence of error correction term (ECT)

in these models under the VECM analysis (**Table 5**). The absolute value of ECT indicates the speed of adjustment from the short-run to the long-run equilibrium. The sign of ECT is expected to be negative.

In Model 1, ECT shows a negative and significant sign indicating that the interest rate adjusts to bring about the long-run equilibrium by closing 71% of the gap. In this analysis, it shows that government debt, budget deficit, money supply,

Model 1: [IR LGD, LBD, LMB, INF, LT]						
Variables	Δ IR	Δ LGD	Δ LBD	Δ LMB	Δ INF	Δ LT
Constant	7.93*	0.06*	-3.54	0.17	0.67	0.15
	(2.02)	(1.00)	(-0.94)	(1.91)	(0.45)	(1.72)
ECT-1	-0.71*	-0.04*	-1.14*	-1.09	-1.62	-0.59
	(-0.51)	(-1.01)	(-0.76)	(-0.01)	(-0.16)	(-0.01)
R-squared	0.95	0.96	0.91	0.82	0.73	0.69
SE of regression	3.92	0.07	3.75	0.09	1.47	0.09
Model 2: [LM1 LGDP, IR, LGD, INF]						
Variables	Δ LM1	Δ LGDP	Δ IR	Δ LGD	Δ INF	
Constant	0.08*	3.11*	0.23	0.1*	2.47	
	(0.72)	(0.63)	(0.07)	(1.56)	(1.81)	
ECT-1	-0.09*	-2.96	-1.64	-1.74*	-1.15	
	(-0.13)	(-0.79)	(-1.15)	(-0.43)	(-2.67)	
R-squared	0.74	0.88	0.70	0.91	0.65	
SE of regression	0.11	4.90	3.43	0.06	1.36	
Model 3: [LI LBD, IR, LGDP]						
Variables	Δ LI	Δ LBD	Δ IR	Δ LGDP		
Constant	0.04*	0.19	-0.08	-1.11*		
	(0.04)	(0.22)	(-0.12)	(-0.13)		
ECT-1	-0.67*	-0.53	-1.99	-1.08		
	(0.35)	(1.16)	(0.97)	(0.48)		
R-squared	0.88	0.84	0.9	0.76		
SE of regression	0.81	0.87	0.67	0.79		
Model 4: [INF LBD, LM1, LCON]						
Variables	Δ INF	Δ LBD	Δ LM1	Δ LCON		
Constant	0.95*	3.88*	0.10	-1.44*		
	(0.92)	(1.5)	(1.46)	(-1.27)		
ECT-1	-0.14*	-0.05	-0.63*	-5.59		
	(-2.07)	(2.53)	(-0.71)	(-1.28)		
R-squared	0.69	0.77	0.61	0.8		
SE of regression	1.04	2.59	0.07	1.13		

*The significance levels 5%.
Notes: (i) IR, LM1, I and INF are held dependent variables. (ii) t values are in parentheses. (iii) ECT = error correction term.

Table 5.
Summary results of vector error correction model.

inflation, and tax revenue do have significant impact on interest rate whether in the short-run or long-run. Model 2 results illustrate the coefficient of ECT is negative and significant, indicating that the money demand adjusts to bring about the long-run equilibrium by closing 9% of the gap.

Based on the results of Model 3, the coefficient ECT shows that the investment will adjust to bring about the long-run equilibrium by closing 67% of the gap. The last model, which is Model 4, the negative and significant ECT tells the inflation will adjust to clear the disequilibrium to the long-run disequilibrium through 14% speed adjustment.

6. Discussion

The results of VECM suggest that there exists a short-run disequilibrium in all models and the error correction coefficient indicates the deviation of the adjusted percentage from equilibrium in the short-run. Therefore, VECM test testifies that there is a short-run and long-run relationship in all four models.

In view of the findings that the debt deficit exerts adverse impact on interest rate, it is imperative for the government to take account of policy responses that reduce deficit on its budget. The analysis depicts the budget deficit influencing the investment level in Malaysia. Government deficits crowd out private investments. In general fund for investment capital is scarce. Any government bonds issued to pay for a deficit are purchased with investment funds that might have otherwise gone towards private investment. If the government decides to raise taxes to finance a deficit, those additional taxes will further discourage private investment. Should the government decide to monetize the debt, the cost-of-living increases will also eat at savings and investment. According to Kato [37], a cut in future deficits must be followed by a decrease in public investment. Also Fatima et al. [38] stressed that there is the impact of government fiscal deficit on investment.

In addition, the VECM analysis exhibits that budget deficit has short-run and long-run relationship towards inflation in Malaysia. Solomon and De Wet [39] stated that due to the monetization of the budget deficit, significant inflationary effects are found for increases in the budget deficit. The budget deficit recorded for the remaining years was as a result of many factors that made the proposed expenditure to exceed the expected revenue. Inflation is one of the variables affected by budget deficit operation over the years in Malaysia. The government has continuously pursued an expansionary fiscal policy to improve economic growth and economic development. However, the major impact of the increase in budget deficit was felt in 1997, with high rate of inflation, which shows an evidence of a positive relationship between budget deficit and inflation in Malaysia, although other macroeconomic factors could have accounted for this. This scenario happened during the Asian financial crisis in the Malaysian market. Hondroyiannis and Papapetrou [40] show that in developing countries, there is evidence that there exists a positive relationship between budget deficit and inflation.

7. Conclusion

The VECM showed that the macroeconomic variables have an impact on dependent variables which are interest rate, money demand, investment and inflation, whether in the short-run and long-run as well. Based on VECM results, inflation plays a dominant role in determining the interest rate; GDP gives major impact on money demand; budget deficits effect the most on both investment and inflation level in Malaysia. This results in the economic impact of government debt and deficits on selected variables which leads one to accept the traditional view.

Although different researchers have used different statistical techniques, economic variables and time periods, no conclusive results have appeared to prove or disprove either the Ricardian theorem or the crowding out hypothesis. The tests in this study have demonstrated an evidence on crowding out. Although the money demand model was not as convincing in its rejection of the Ricardian theorem as was the interest rate model acceptance of crowding out, at least it threw some doubt on the validity of the assumption that people do not treat government bonds as net wealth.

Another notable issue is the impact of budget deficits on balance of payments. The past 15 years have witnessed an increasing concern over Malaysia's trade position as the country fell into a net debtor nation in which imports level approached the exports. If a debt creation leads to an increase domestic interest rate, then this results in a net inflow of foreign capital, and this will increase demand for the Malaysian ringgit (RM) and thus an appreciation of the RM, and this certainly will reduce exports and will put a stress on GDP growth. When the ringgit is appreciated, Malaysia's goods for export become more expensive to consumers in other countries, and at the same time, the goods for import from other countries will become less expensive for domestic consumers. This situation would compound an already bad balance of trade position for Malaysia if indeed the debt creation has this effect. Thus, an empirical investigation into this apparent dilemma is critical to the understanding of Malaysia's current and future trade positions.

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