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Full Length Research Paper

Does debts foster economic growth? The experience of Malaysia

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The study examines the effect of different types of debts on the economic growth in Malaysia during the sample period 1970 - 2006. Using cointegration test, the findings suggest that all components of debts have a negative effect on long-run economic growth. In addition, the Granger causality test reveals the existence of a short-run causality linkage between all debt measures and economic growth in the short-run. The policy conclusion is that an increase in foreign debt level adversely influences economic performance, whereas the decline in the rate of economic growth weakens the ability of the country to service its debt.

Key words: Debts, economic growth, debt overhang, cointegration, causality.

INTRODUCTION

An important economic issue facing policymakers during the last two decades of the twentieth century has been the effects of national debt on economic growth. There are at least two reasons why a rising burden of debt may cause concern. Firstly, if there is no debt neutrality or Ricardian equivalence[1], the substitution of (government) debts and future taxation of labour income for current taxation of labour income will result in redistributions of lifetime resources among heterogeneous consumers that increase aggregate consumption. This may lead either to the displacement of private investment or to a raise in the deficit on the current account of the balance of payment. This situation is defined as financial crowding out (Diamond, 1965; Barro, 1989; Elmendorf and Mankiw, 1998).

Another reason concerns with deficits stems from the arguments that government deficits eventually are monetised and therefore lead to inflation. According to Elmendorf and Mankiw (1998), a country with a large debt is likely to face high interest rates and the monetary authority may be pressured to try to reduce those rates through expansionary policy. This strategy is believed to be able to reduce interest rates in the short run, but in the long run will leave real interest rates roughly unchanged and inflation and nominal interest rates higher[2].

There have been explorations of the role of various specific debts in the development process. Yet an emprical literature reveals few recent analytical insights about alternative debt financing, which includes external debt, long-term debt, multilateral debt, private non-

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[1] The Ricardian argument is based on the insight that lower taxes and a budget deficit require higher taxes in the future. Thus, the issuing of government debt to finance a tax cut represents not a reduction in the tax burden but a postponement of it. However, government debt might irrelevant to this Ricardian equivalence as it represents a redistribution of resources across different generations of taxpayers. When the government cuts taxes and issues government debt today, the government budget constraint requires a tax increase in the future, but the tax increase might fall on taxpayers who are not yet living.

[2] However, Lin (2000) argued that an increase in government debt may not increase the real interest rate with the real interest rate being greater than the growth. In addition, an introduction of government debt will increase the growth rate per capita output if the growth rate is greater than the real interest rate. Conversely, it will decrease the growth rate if the growth rate is less than the real interest rate.

guaranteed debt, public and publicly guaranteed debt (PPG), public and publicly guaranteed debt service, short-term debt and total debt service nonrecourse lending to private borrowers. To our best knowledge, the existing studies offer little solid guidance for distinguishing between these types of financing modes with respect to host country's economic performance, for identifying the optimal financing modes for international firms investing in developing countries, which are the countries where the potential impact of debts is greatest.

It is important for a study to look at the role of different components of debts on the economic growth as each debt contributes to different effects on the economic growth. The debates over the effects of different debts to economic growth are fascinating as many studies provide different outcomes. It is not obvious whether a country is developing incentives and establishing safeguards that are most effective in attracting alternative forms of debts. Moreover, examining different types of debts is crucial to capture the risk or uncertainty lenders face about the borrowers' preferences. The present paper therefore, aims to examine the impact of different types of debts on the economic growth in Malaysia during the sample period 1970 - 2006.

Over the years, Malaysia has been the successful country implementing and undertaking prudent debt management strategies such as minimising risk exposure against global shocks, managing exchange rate fluctuations and against shifts in investor sentiments. These prudential strategies are aimed to encourage the diversification of external debts by the public and private sectors. In view of this, Malaysia's total foreign debt decreased to RM179.4 billion (USD50.3 billion) in 2006 (RM197.7 billion or USD51.8 billion in 2005), equivalent to 34.1% of GNP. The capacity of Malaysia to service the foreign debt has also improved and enhanced. As at end 2006, the total external debt accounted for only 26.9% of the exports of goods and services (end 2005: 32.4%). In addition to this, the country's vulnerability to a reversal in short-term foreign debt has also decreased as short-term debt now accounts for only 7.8% of gross national product (end 2005: 10%), 14.2% of reserves (end 2005: 17.7%) and 6.2% of the exports of goods and services (end 2005: 7.7%). The short-term debt accounted for 23% of total external debt (Central Bank of Malaysia, 2006: 51). The effective external debt management strategies are crucial in safeguarding financial and monetary stability. A comprehensive debt monitoring system enables early indication of possible risks resulting from the country's overall foreign debt exposure of both the public and private sectors.

In order to achieve our objectives, a broad categories of debts – long-term debt, short-term debt, external debt, multilateral debt, private non-guaranteed debt, public and publicly guaranteed debt, public and publicly guaranteed debt service and total debt service, are distinguished and included in this study. Specifically, the study is aimed to investigate the long-run relationships and short-run causal effects between different types of debts and economic growth in Malaysia.

SPECIFIC TYPES OF DEBTS: BENEFITS VERSUS RISKS

Economic theory suggests that foreign debts exert positive effect to the economic growth. First, according to Lin and Sosin (2001), the benefits that a country may have from borrowing from foreign funds (external debts) include purchasing advanced equipment and technology and investing in the essential projects private firms are unwilling to support such as infrastructures. With better technology and improved infrastructure, the debtor country can raise the efficiency of the production process and perhaps reach self-sustainable economic growth.

Second, foreign debts may permit an increase in a country's current capital stock and stimulate current economic growth, while debt repayment may decrease the future capital stock and reduce future economic growth (Lin and Sosin, 2001). Furthermore, the growth of external debts in the 1990s seems to have accompanied with higher incomes, stronger GDP growth, and greater openness to trade in borrowing countries (Dadush et al., 2000). Third, in the face of adverse economic shocks, countries may borrow to smooth consumption. This is possible as global financial integration have enlarged their access to international capital markets.

Nevertheless, engaging in foreign debts involved risks. The risks to specific types of foreign debts operate via, at least, three major channels. The first risk is foreign borrowing may trigger conditions that encourage residents to engage in capital flight. External borrowing can directly lead capital flight by providing the resources necessary to effect flight (Cuddington, 1987; Henry, 1996; Chipalkatti and Rishi, 2001). For example, Cuddington (1987) shows that more capital flight occurred contemporaneously with increased debt inflows in Mexico and Uruguay, hence attesting to a strong liquidity effect in these countries. Lessard (1987, p. 99) reveals that debt disbursements "signal a raise in the likelihood of a fiscal crisis" and thus lead to capital flight. Moreover, the provision of external debt to a country gives upward pressure on its exchange rate, thereby encouraging residents to dollarize their assets before an expected devaluation. Chipalkatti and Rishi (2001) show that there is a direct relationship between debt and capital flight, where the flows directly fuel one another by providing capital for each other. They find that a percent increase in real capital flight is significantly associated with a 0.06% increase in net real debt disbursements[3].

[3] A number of studies reveal that the causality runs from capital flight to foreign borrowing. Capital outflows may lead a country into external indebtedness where foreign debt replaces the funds lost on account of capital flight. Boyce and Zarsky (1988) notes that foreign creditors may be willing to fill the vacuum incurred by capital flight if they perceive a comparative

The second risk is that foreign borrowing can significantly reduce domestic investment. According to Borensztein (1990); Karagol (2002); Pattillo et al. (2004) and Serieux and Samy (2001), the debt overhang hypothesis indicates that a heavy debt burden may act as an implicit tax on the resources generated by a country, and therefore reduce the size of domestic and foreign investments as well as their quality, and create negative incentives for policy reforms. Borenzstein (1990) further distinguishes two channels in which foreign debt may influence domestic investment, that is, "debt overhang"[4] and "credit rationing" channels. Applying a simulation technique, he shows that those two non-mutually exclusive effects are crucial in explaining the sharp decline in investment in the 1980s for heavily indebted countries.

The third risk is the large short-term external liabilities[5] of the countries involved as a fundamental source of financial fragility[6]. For example, Eichengreen and Mody (1999) show that risk spreads on emerging market syndicated loans and bonds are higher for countries with a higher short-term debt to reserves ratio while Detragiache (1996) demonstrates a strong and robust correlation relationship between the occurrence of external debt crises and short-term debt. Moreover, a number of studies find that the ratio of short-term debt to reserves helps predict huge reversals of capital flows and countries with excessive short-term external liability are more vulnerable to crises (Cole and Kehoe, 1996, 2000; Detragiache, 1996; Rodrik and Velasco, 2000)[7].

A cost-benefit analysis on various types of foreign debts from the perspectives of recipient countries should consider the following elements:

External debt

The relationship between external debt and economic growth is not straight forward[8]. Foreign debt crisis in the 1980s left people with an impression that external debt retards economic growth. However, in the 1970s, the borrowing countries of external debt enjoyed a larger capital stock and did not experience slower growth immediately. These relationships between external debt and growth are largely unexplained. Arguments suggesting that foreign indebtedness promotes growth usually involve a complementary role that foreign aid plays to domestic savings and thus to resource mobilization, capital accumulation, and industrialization (Chowdhury, 2001).

On the other hand, external debt can bring negative impacts to the economic growth as well through several contributors such as the interest payment of the debt and the debt overhang situation. The rate of debt accumulation and increase in debt servicing are highlighted as major factors affecting the growth rate of output, (Siddiqui and Malik, 2001). Lin and Sosin (2001) argue that it is the interest payment of the debt that retards the economic growth. The authors mentioned that in order to pay the principle and interest, more future tax revenues must be raised or the given tax revenue must be diverted from other productive uses, which may hurt economic growth. IMF (2004) adds that greater reliance on foreign-currency debt is associated with a higher frequency of debt crises. Relatively large shares of foreign-currency debt and depreciations can abruptly render a country insolvent.

Long-term debt

Several economists have suggested the importance of the effect of long-term debt to economic growth[9]. Lin and Sosin (2001) conclude that long-term debt repayment may decrease the future capital stock and reduce future economic growth. Thus the whole cycle of the debt from borrowing to repaying must be considered when studying the relationship between debt and economic growth.

According to Alfaro and Kanczuk (2009), governments usually have to pay a higher premium on long-term bonds, a premium that may reflect uncertainties about governments' ability (including issues of taxation and inflation) but also willingness to repay. A similar argument has been made by IMF (2004), which argued that emerging market and developing countries are relatively difficult to issue long-term debt in their own currencies compared with advanced countries.

In other words, the inability of the emerging market countries in issuing long-term local-currency bonds on the domestic market seem to result from deeper problems, such as lack of monetary and fiscal policy credibility, and related worries about the possibility of

advantage in risk and return. In this context, Lessard and Willamson (1987, p. 217) suggest that disparities in taxation, interest rate ceilings and risk pooling may cause to systematic differences in risk-adjusted returns to resident and non-resident capital.

[4] The debt overhang hypothesis states that the external debt burden provides a disincentive to domestic investment in developing countries, and hence reduces the rate of economic growth since any additional foreign exchange earnings would have to be turned over to foreign investors (Borenzstein, 1990).

[5] Short-term debt is commonly defined on a residual maturity basis, that is, it includes debt with original maturity of less than one year as well as amortization coming due within the year.

[6] From a theoretical point of view, the link between external illiquidity and financial crises is usually modeled through models of coordination failures among creditors. In these models, if creditors roll over maturing debts, the debtors are better off continuing to service their debt, and the decision to continue lending is rational.

[7] On the other hand, Frankel and Rose (1996) find no evidence of a liquidity effect on currency crisis, but if the sample period is extended to include more recent crisis episodes, liquidity variables become significant. Similar findings are also provided by Berg and Pattillo (1999).

[8] External debt is defined as the amount owed to lenders outside the country and denominated in dollars or other strong currency accepted in international capital markets (Beim, 2002).

[9] Long-term debt is defined as a debt that has an original or extended maturity of more than one year.

inflation or outright default.

Short-term debt

Short- term debt owed by developing countries to foreign banks rose from $176 billion to $454 billion between 1990 and 1997. This rapid build up of short-term debt was a key factor in the financial crises that hit Mexico in 1994 - 1995, East Asia in 1997 - 1998, and Russia and Brazil in 1998 - 1999. Dadush et al. (2000) has provided evidence on the negative relationship between short-term debt and economic growth. It is found that the increase in short-term debt was due to several reasons. During the period of 1990 - 1996, Asian banks and financial institutions were borrowing heavily and thereby rapidly building up considerable short-term debt while at the same time, fuelling a speculative asset boom in Asia and elsewhere. Domestic policy changes especially accelerated financial deregulation, and capital account liberalization without stronger prudential regulations[10].

The increase in short-term loan has created many disadvantages to the holder. According to IMF (2004), greater reliance on short-term debt is associated with a higher frequency of debt crises. Short-term debt (or debt indexed to short-term domestic interest rates) is associated with vulnerability to sudden changes in market sentiment and worsening perceptions of the country's creditworthiness. These can quickly feed into higher interest costs, which often lead to vicious circles. Alfaro and Kanczuk (2009) add that a country's exposure to sharp increases in interest rates may have additional negative consequences to the economic growth as governments may need to increase taxes in order to service the debt.

Dadush et al. (2000) also finds that short-term loans are the most likely withdrawn during difficult times as compared to the different types of private capital flows. The reason why short-term debt is being pulled out first can be best explained by the fact that the cost of pulling out is minimal for lenders of short- term debt, whereas liquidating foreign direct investment may involve selling plant and machinery, and selling stocks or bonds during a crisis usually involves a loss to the sellers. Other than this, the authors also state the disadvantage of the reversibility of short-term debt is that it predisposes borrowers to "liquidity runs".

The higher the level of short-term debt relative to a borrowing country's international reserves, the greater is the risk of such runs, although they increase the likelihood that lenders' worst fears will be realized and the chance of being repaid declines rapidly once a run has started.

[10] For example, that of Thailand's BIBF (Bangkok International Borrowing Facility), tax incentives to attract short-term flows contributed to the shortening of maturities and there was excessive borrowing by banks and financial institutions.

Total debt service

Kutty (1990) pools time series and cross-sectional data from the World Bank and IMF to perform a logistic regression on the probability of developing country loan defaults. Explanatory variables include the debt service ratio, rate of growth of imports and exports, rate of growth of gross domestic product (GDP), net resource transfer, amortisation of debt, ratio of external debt to international reserves, interest on private loans and inflation. He finds that a country's ability to service its debt depends largely on its economic performance over a long period of time.

Moghadam and Samavati (1991) use a probit model to explain debt rescheduling of the least developed countries, between 1973 and 1981. Interestingly, they find debt service to GDP, one of the leading indicators of creditworthiness, to be insignificant and instead, variables such as international reserves and stock of debt outstanding have high explanatory power.

Multilateral debt

Multilateral debt is an increasing part of the overall debt problem of developing countries, comprising 30% of the total long-term debt stock of Heavily Indebted Poor Countries (HIPCs) in 1994[11]. Bokkerink and Hees (1998) were among the few studies, which investigated at the relationship between multilateral debt and economic growth. They concluded that multilateral creditors received half of these countries' debt repayments. This debt is said to be a major impediment to social and economic development. It also has indirect negative consequences since the preferred creditor status of the International Financial Institutions (IFIs) means that multilateral debt is serviced prior to other debt. Consequently, arrears to bilateral creditors have been accumulating. In addition, aid resources intended for social development and poverty alleviation are being diverted to service the multilateral debt.

A similar argument has been made by Mistry (1996), which supported the view that multilateral debt service payments have caused serious crowding-out effects on public and private investment resulting in growth and export earnings capacity being compromised. The author cited an example that multilateral debt service payments presently exceed, by a large multiple, the expenditures that African countries are able to make for human capital maintenance and development (e.g. on health, education and basic nutrition), for social safety nets or for ecological protection. Therefore, it can legitimately be counter-argued that a room still exists for many of these severely-indebted low- income countries to increase social and other priority expenditures by reducing unproductive expenditures such as defense, internal security and

[11] Multilateral debt service is the repayment of principal and interest to the World Bank, regional development banks, and other multilateral agencies.

foreign representation to improve their human capital maintenance and development. Therefore, poor countries need both debt reduction and aid in order to escape from the cycle of poverty and indebtedness in their countries.

As these studies suggest, the analysis of the impact of different sorts of debt series is already present in the theoretical literature, especially developed countries. However, in the developing countries such as Malaysia, empirical field are scarcer. As a matter of fact, the present study focuses on whether the different types of debt series provide any effect on the economic growth in Malaysia for the period of 1970 - 2006.

DATA AND METHODOLOGY

Data

The sources of the data from this study is obtained from IMF International Financial Statistics tables, published by International Monetary Fund and World Development Indicator 2008 CD-ROM by World Bank spanning from 1970 - 2006 to capture the relationship between debt and economic growth for Malaysia.
For estimation, the model is specified as:

$$GDP_t = \alpha + \beta_j X_{t,j} + \delta_k X_{t,k} + \varepsilon_t , \quad (1)$$

Where:
GDP = Per capita real GDP growth rate (%)
Xj = A set of j conditioning variables, which includes:
X1 = Inflation is measured based on annual changes in CPI (INF, in %).
X2 = Government budget deficit to GDP ratio (DEF), measured as the government budget account balances (expressed as a percentage of GDP).
X3 = Indicator of external competitiveness, measured as trade-to-GDP ratio (TRADE). This measure is the sum of exports and imports to nominal GDP.
Xk = A set of k variables measuring debt burden, which includes:
X4 = External debt, total (% of gross national income, GNI)
X5 = Long-term debt (% of GNI)
X6 = Multilateral debt service (% of GNI)
X7 = Private non-guaranteed debt (% of GNI)
X_8 = Public and publicly guaranteed (PPG) debt (% of GNI)
X9 = Public and publicly guaranteed debt service (% of GNI)
X10 = Short-term debt (% of GNI)
X11 = Total debt service (% of GNI)

Meanwhile, α is the constant term, β_j's are the coefficients of the first three conditioning variables, δ_k's are the coefficients of eight variables measuring the debt burden finally and ε is the random error term. The impact of debt burden is captured by including various indicators, $X_4, X_5, ..., X_{11}$. The coefficients may be either positive or negative.

The set of conditioning variables include inflation, government deficit and openness. The effect of inflation is expected to be negative as it is a kind of tax that pays for the deficit by taking real purchasing power away from those who hold money and fixed claims on money (Beim, 2002). The impact of government deficit is expected to be negative if deficit crowds-out public saving and resource inflow encourages corruption and resource outflow. Whereas, the impact of openness is expected to be positive as rise in trade flows relative to GDP represents improved competitiveness and productivity of the economy.

Unit root tests

To examine the effect of various debts on economic growth in Malaysia while avoiding any spurious regressions, we follow the following three steps. We start by examining the time series properties in the variables under study by using two unit root tests, namely the Augmented Dickey-Fuller (ADF) test and the Kwiatkowski, Phillips, Schmidt and Shin (KPSS) test.
The equation for the ADF test with a constant and trend is stated as follows:

$$\Delta Y_t = \beta_1 + \beta_2 t + \gamma Y_{t-1} + \alpha \ \Delta Y_{t-1} + \varepsilon_t , \quad (2)$$

where Y_t = is our variable of interest,is the differencing operator, in which $\Delta y_t = y_t - y_{t-1}$, *t* is the time trend and ε is the white noise residual of zero mean and constant variance. β_1, β_2 ,γ and α are parameters to be estimated. Both of the null and alternative hypotheses in unit root tests are:

$H_0 : \gamma = 0$ (*Yt* has a unit root, or *Yt is* non-stationary)

$H_0 : \gamma < 0$ (*Yt* is stationary)

In contrast, KPSS test differs from the ADF and other unit root tests, in the sense that the hypotheses are reversed. Specifically, the null hypothesis maintains that the series being tested is stationary and the alternative hypothesis specifies that the series is non-stationary. The context of the unobserved component model is as follow:

$$y_t = d_t + \mu t + \nu_t ,$$

$$\mu_t = \mu_{t-1} + \varepsilon_t ,$$

Where y_t, $t = 1, 2, 3, \ldots T$, are observed data, d_t is a deterministic component, ν_t satisfies the strong mixing conditions of Phillips and Perron (1988) with long run variance $\sigma_\upsilon^2 \subset i.i.d.(0, \sigma_\varepsilon^2)$, and the initial value μ_0 is treated as fixed and serves the role of the intercept. Therefore, the null hypothesis and the alternative hypothesis are as below:

$H_0 : \sigma^2 = 0$ (y_t is stationary)

$H_0 : \sigma^2 \neq 0$ (y_t is non-stationary)

The KPSS test is constructed using the residual $\{\nu\}_{t=1}^{T}$ from the regression of y_t on d_t. In KPSS, Barassi (2005) focuses on the two cases: (i) $d_t = \mu$, a constant; (ii) $d_t = \mu + \tau(t)$ a constant plus a time trend. The KPSS test rejects H1 in favor of H0 for large values of the statistic:

$$\hat{\eta} = \frac{T^{-2}\sum_{t=1}^{T}\left(\sum_{i=1}^{t}\hat{v}_i\right)^2}{\hat{\sigma}_v^2}, \qquad (3)$$

Where $\hat{\sigma}_v^2$ is a consistent of σ_v^2 (Kwiatkowski et al., 1992, p. 164). In the constant case, the statistic is identified as $\hat{\eta}_\mu$ while in the linear trend case it will be $\hat{\eta}_\tau$. Representation for the limit null distribution of the test statistic in the two cases and the relative critical values can be found in Kwiatkowski et al. (1992, p. 164-167).

Cointegration test

After prompting by the existence of unit roots in the variables, we proceed to the investigation of a long-run cointegrating relation among variables at the second step of estimation employing multivariate cointegration technique developed by Johansen and Juselius (1990).

The concept of cointegration was introduced by Granger (1981) and then extended and formalised by Engle and Granger (1987). There are two directions of cointegration analysis. First, tests based on the residuals obtained from the cointegrating equation by using ADF (or DF) unit root test. If the residual series is stationary at I(0), then there exists a long-run relationship between two series. This type of cointegration technique is known as Engle-Granger (1987) bivariate cointegration test. Second, tests based on the system of equations by using vector auto-regression (VAR) model, as suggested by Johansen and Juselius (1990).

In this paper, Johansen and Juselius (1990) technique is first employed over the EG approach in identifying the number of cointegrating vector for the system because the former has some advantages. First, JJ procedure treated all variables as potentially endogenous and this avoids the problem of endogeneity-exogeneity in the estimation. Second, it is capable of determining the number of cointegrating vectors for any non-stationary series with the same order of integration. Third, the model is introduced based on the well-defined procedures that allow the use of the vector error-correction model (VECM) in determining the short-run causality relationship between the variables[12].

Johansen and Juselius (1990) framework involves the identification of rank of the $(m \times m)$ matrix in the specification given by Equation (4):

$$\Delta Z_t = \delta + \sum_{i=1}^{k-1}\Gamma_i \Delta Z_{t-i} + \Pi \Delta Z_{t-k} + \varepsilon_t \qquad (4)$$

Where, Z_t is a column vector of the *m* variables, Γ and Π represent coefficient matrices, Δ is a difference operator, *k* denotes the optimal lag length, and δ is a constant. If Π has zero rank, no stationary linear combination can be identified. In other words, the variables in Z_t are non-cointegrated. If the rank *r* of Π is greater than zero, however, there will exist *r* possible stationary linear combinations and Π may be decomposed into two matrices α and β, (each $m \times r$) such that $\Pi = \alpha\beta'$. In this representation β contains the coefficients of the *r* distinct cointegrating vectors that render $\beta' Z_t$ stationary, even though Z_t is itself non-stationary, and a contains the speed-of-adjustment coefficients for the equation.

Johansen and Juselius (1990) have developed two types of test statistics in examining the long-run relationship between variables, namely maximum eigenvalue and trace statistics. The trace statistic tests the null hypothesis of *r* cointegrating relations against the alternative of k cointegrating relations, where *k* is the number of endogenous variables, for $r = 0,1,\ldots,k-1$. The alternative of *k* cointegrating relations corresponds to the case where none of the series has a unit root and a stationary vector auto-regression (VAR) may be specified in terms of the levels of all of the variables (Johansen and Juselius, 1990). The null hypothesis of the trace statistic for *r* cointegrating relations is expressed as follows:

$$LR_{tr}(r \mid k) = -T\sum_{i=t+1}^{k}\log(1-\lambda_i) \qquad (5)$$

Where λ_i is the *i*-th largest eigenvalue of the Π matrix in Equation (4).

The maximum eigenvalue statistic tests the null hypothesis of *r* cointegrating relations against the alternative of $r+1$ cointegrating relations. This test statistic is computed as:

$$LR_{\max}(r \mid r+1) = -T\log(1-\lambda_{r+1}) = LR_{tr}(r \mid k) - LR_{tr}(r+1 \mid k) \qquad (6)$$

For $r = 0,1,\ldots,k-1$

It is important to note that the trace and the maximum eigenvalue statistics may produce conflicting results. For such cases, it is recommended to examine the estimated cointegrating vector based on the choice on the interpretability of the cointegrating relations (see Johansen and Juselius (1990) for an example).

Granger causality test

Granted the long-run relationship, we apply the error -correction model to examine the short-run causal relationship by using multivariate Granger causality at the final step. Equation (4) can be formed into a vector error-correction model (VECM) in order to capture both short- and long -run effects of the vector. Defining Z_t as the vector of the potentially endogenous variables, we can model Z_t as an unrestricted vector auto-regression (VAR) model with lag-length up to 3:[13]

[12] We have intentionally left out some technical specifications related to the modeling of the study. Those who are econometrically inclined can consult a number of references, especially Engel and Granger (1987), Granger (1988), and Kulendran and Wilson (2000), which have provided comprehensive surveys and discussions of the cointegration and Granger causality frameworks.

[13] The maximum lag length up to 3 is suggested as the frequency of the data is annual and there are 37 observations in the study.

$$Z_t = A_1 Z_{t-1} + A_2 Z_{t-2} + A_3 Z_{t-3} + U_t \quad where\ U_t \sim IN(0,\sigma), \tag{5}$$

Where Z_t is (5 x 1) vector consists of GDP, DEF, INF, TRADE and DEBTi. Each of the A_i is (5 x 5) matrix of parameters. The 5-VAR model as shown in Equation (5) will be used if there is no long run relationship to be found in the multivariate cointegration test. However, if there exists a cointegration relationship, then the following vector error correction model (VECM) will be used to investigate the long- and short -run causality between variables.

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + \Pi Z_{t-3} + U_t, \tag{6}$$

Where ΔZ_t = [*GDP, DEF, INF, TRADE* and *DEBTi*]', $\Gamma_1 = -(I - A_1), \Gamma_2 = -(I - A_1 - A_2)$ and $\Pi = -(I - A_1 - A_2 - A_3)$. Γ_i measures the short-run impacts of the changes in Z_t. The (5 x 5) matrix of Π ($= \alpha\beta'$) contains both peed of adjustment to disequilibrium (α) and the long-run information (β) such that the term $\beta' Z_{t-3}$ embedded in Equation (6) represents the (*n-1*) cointegrating vector in the model. Accordingly, we can re-write Equation (6) as follows:

$$\begin{bmatrix} \Delta GDP_t \\ \Delta DEF_t \\ \Delta INF_t \\ \Delta TRADE_t \\ \Delta DEBT_{i,t} \end{bmatrix} = \Gamma_1 \begin{bmatrix} \Delta GDP_{t-1} \\ \Delta DEF_{t-1} \\ \Delta INF_{t-1} \\ \Delta TRADE_{t-1} \\ \Delta DEBT_{i,t-1} \end{bmatrix} + \Gamma_2 \begin{bmatrix} \Delta GDP_{t-2} \\ \Delta DEF_{t-2} \\ \Delta INF_{t-2} \\ \Delta TRADE_{t-2} \\ \Delta DEBT_{i,t-2} \end{bmatrix} + \begin{bmatrix} \alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14} \\ \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} \\ \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} \end{bmatrix} \times \begin{bmatrix} \beta_{11} & \beta_{21} & \beta_{31} & \beta_{41} \\ \beta_{12} & \beta_{22} & \beta_{32} & \beta_{42} \\ \beta_{13} & \beta_{23} & \beta_{33} & \beta_{43} \\ \beta_{14} & \beta_{24} & \beta_{34} & \beta_{44} \end{bmatrix} \times \begin{bmatrix} GDP_{t-3} \\ DEF_{t-3} \\ INF_{t-3} \\ TRADE_{t-3} \\ \Delta DEBT_{i,t-3} \end{bmatrix} \tag{7}$$

There are two levels involved in the estimation of error-correction model (ECM) . Firstly, we examine the unique long-run relationship according to the theory that represents the economic relationship underlying the long-run model among growth rate of GDP per capita (*GDP*), government deficit (*DEF*), inflation (*INF*), openness (*TRADE*) and various type of debts (DEBTi). Secondly, we estimate the short-run model within the VECM to investigate the short run causal relationship. The short run causal relationship is important since we can discern the behaviour of each variable in the estimated system in response to the residual from the cointegrating equation (defined as error-correction term - ECT). The ECT reflects the speed of adjustment of each variable in response to a deviation from the equilibrium relationship. Since the objective of the study is to examine the causal relationship between economic growth and various debts, the two equations are derived from Equation (7) as follows:

$$\Delta GDP_t = \beta_1 ECT_{t-1} + \sum_{j=1}^{k} \pi_j \Delta GDP_{t-j} + \sum_{j=1}^{k} \tau_j \Delta DEBT_{i,t-} \tag{8}$$

$$\Delta DEBT_{i,t} = \beta_2 ECT_{t-1} + \sum_{j=1}^{k} \varphi_j \Delta GDP_{t-j} + \sum_{j=1}^{k} \sigma_j \Delta DEBT_{i,t-j} \tag{9}$$

Where ECT_{t-1} is the one-year lagged error correction term, Y_t is the vector comprising *DEF, INF* and *TRADE*, and u_{1t} and u_{2t} are white noise error terms. In these two equations, the series econmic growth and various debts are cointegrated when at least one of the coefficients β_1 or β_2 is not equal zero. In this case, two variables will display long-run relationship. If $\beta_1 \neq 0$ and $\beta_2 = 0$, it is concluded that debt Granger causes GDP in the long run. On the other hand, if $\beta_2 \neq 0$ and $\beta_1 = 0$, GDP Granger causes debt. If both β_1 and β_2 are nonzero, the conclusion then is that there exists a bi-directional causality between economic growth and debt.

The short-run causal relationship between growth and various debt are signified by the coefficients τ_j 's and ϕ' s. If τ_j 's are not all zero, changes in various debt will lead economic growth in the short-run. If ϕ_i 's are not all zero, changes in growth will lead various debt in the short-run. The short-run as well as long-run dynamic causality relationships between growth and various debts can be detected by forming hypotheses and testing them on the estimated coefficients in the Equations (8) and (9). These causal relationships can be examined using standard *F*-tests on the estimated coefficients of the error-correction model to examine the lead-lag and feedback relationships between various debt and economic growth.

RESULTS AND INTERPRETATION

Descriptive statistics of the variables used

The descriptive statistics are summarized in Table 1. The range of real GDP growth rate in the sample is rather wide, going from -13.95% a year to over 21.94%. The average growth rate is 10.15%, showing the rapid growth that Malaysia enjoyed during this period.

Some debt series such as private nonguaranteed debt, public and publicly guaranteed debt service, and total debt service) exhibit a lower variability (standard deviation) than real GDP growth. On the other hand, several debts series like short term debt, external debt, long term debt and multilateral debt service exhibit a great fluctuation of variability. But from this table it is clear that these debt series exhibit substantial differences among each other.

What Table 1 suggests is that Malaysia has heavily dependent on few debt series, especially short-term debt and multilateral debt service. Of course, the direction of the causality cannot be deduced from this preliminary statistics on the relationship between different debt series and economic growth. Only an econometric analysis may tell us whether there is any effect from these debt series to growth.

Unit root and co integration tests

The results of Augmented Dickey-Fuller (ADF) test and Kwiatkowski, Phillips, Schmidt and Shin (KPSS) tests are

Table 1. Descriptive statistics of the variables used.

	RGDP growth rate (%)	External debt	Long term debt	Multilateral debt service	Private nonguaranteed debt	Public and publicly guaranteed debt	Public and publicly guaranteed debt service	Short term debt	Total debt service
Mean	10.147	41.20	34.44	50.30	9.18	25.25	4.72	115.69	7.32
Median	11.341	41.06	31.96	40.04	7.16	22.09	3.60	112.39	7.28
Standard deviation	12.746	18.74	16.32	23.06	6.13	13.66	3.47	65.99	4.32
Kurtosis	3.910	-0.62	-0.37	-0.10	0.09	1.01	1.95	-0.66	0.93
Skewness	0.144	0.23	0.47	1.05	0.91	1.19	1.47	0.24	0.92
Minimum	-13.946	12.04	10.55	25.57	1.20	9.00	1.09	17.42	1.40
Maximum	21.942	82.95	72.67	107.96	23.12	61.71	14.55	244.50	18.28

Table 2. Results of unit root tests.

Variable	ADF		KPSS	
	Level	First Difference	Level	First difference
	Constant with trend	Constant without trend	Constant with trend	Constant without trend
GDP	- 2.8604(2)	- 8.8229(1)**	0.1371(10)**	0.0581(2)
INF	- 1.8719(5)	- 5.7843(1)**	0.1240(11)**	0.0657(2)
DEF	- 3.1229(1)	- 6.0271(1)**	0.1477(3)**	0.0916(2)
TRADE	- 2.4099(1)	- 4.9345(1)**	0.2024(5)**	0.2275(3)
External debt	- 2.4270(1)	- 4.1817(1)**	0.1368(3)**	0.1027(3)
Long term debt	- 2.4274(1)	- 4.1458(1)**	0.1339(3)**	0.0719(3)
Multilateral debt service	- 1.0116(1)	- 4.1533(1)**	0.1896(3)**	0.2853(3)
Private nonguaranteed debt	- 2.6211(1)	- 3.5587(1)**	0.1896(3)**	0.0650(3)
Public and publicly guaranteed debt	- 2.0584(1)	- 3.4703(1)**	0.1220(2)**	0.1165(3)
Public and publicly guaranteed debt service	- 1.7625(1)	- 4.7596(1)**	0.1546(3)**	0.0822(3)
Short term debt	- 3.1562(1)	- 4.9434(1)**	0.1355(3)**	0.0786(2)
Total debt service	- 1.7359(1)	- 4.0517(1)**	0.1604(3)**	0.0931(3)

Notes: The asterisks *, **, *** denote significant at 10, 5 and 1% levels, respectively. Number in parentheses is the number of lags. Lag lengths for the ADF unit root test are based on Akaike's information criterion. The bandwidth for the KPSS unit root test is based on the Newey-West estimator using the AR-Spectral-OLS. Unit root tests include a constant and a linear time trend. The null hypothesis under ADF tests is the presence of a unit root, and null hypothesis for KPSS tests is the presence of stationary.

reported in Table 2[14]. These tests indicate that all variables are not-stationary at the level form but stationary after first differencing, that is, they are I(1). This is a necessary testing in order to examine the cointegration of the variables.

Since all the series tested are integrated of the same order, that is I(1), the Johansen-Juselius co integration methodology is therefore employed to investigate the long run relationship between economic growth, inflation, government deficit, trade and the various debts in Malaysia within a VEC model. The results are shown in Table 3. According to the trace and maximum eigenvalue test statistics depicted in Table 3 for the separate models including various debts, the number of co integrating vectors are confirmed as one, since for both the test statistics, the null hypothesis of $r = 0$ is rejected but $r = 1$ cannot be rejected by the 95% critical values. These statistics tend to reveal that these five variables are co integrated, that is, have common trends. In other words, all these five variables are bound together by long-run equilibrium relationship(s). As far as results of cointegrating vector normalized on economic growth is concerned,

[14] The optimal number of lag is determined by using Schwarz Information Criterion (SIC) while in KPSS test, the optimal number of lag is determined by Newey-West Bandwidth.

Table 3. The results of co integration test for various debts in Malaysia.

Variable	Trace statistics					Maximum Eigenvalue statistics				
	r = 0	r 1	r 2	r 3	r 4	r = 0	r 1	r 2	r 3	r 4
External debt	74.06**	38.16	17.33	5.95	1.66	35.90**	20.83	11.37	4.29	1.66
Long term debt	72.69**	35.93	15.99	5.66	1.56	36.76**	19.93	10.33	4.09	1.56
Multilateral debt service	104.93**	55.47	26.40	8.45	3.13	49.45**	29.06	17.95	5.32	3.13
Private non-guaranteed debt	92.41**	51.84	29.74	14.42	3.50	40.57**	22.09	15.32	10.92	3.50
Public and Publicly (PPG) guaranteed debt	101.53**	61.98	29.49	13.06	3.14	38.55**	30.16	16.43	9.91	3.14
Public and publicly guaranteed debt service	71.68**	31.28	15.49	4.27	0.74	40.40**	15.79	11.21	3.53	0.74
Short term debt	82.51**	39.63	19.38	5.91	1.57	42.88**	20.24	13.46	4.34	1.57
Total debt	77.86**	30.50	15.80	4.37	0.95	47.36**	14.92	11.20	3.41	0.95

Note: The asterisks *, **, *** denote significant at 10, 5 and 1% levels, respectively. Lag lengths for the co integration test are based on Akaike's information criterion.

Table 4. Estimated normalizing co integrating vector in Malaysia.

Various debts	Variable				
	GDP	DEF	INF	TRADE	DEBT
External debt	-1.000	0.12** (2.39)	- 3.10 (-1.26)	0.11*** (3.36)	-0.67** (-2.51)
Long term debt	-1.000	- 0.29** (-2.36)	- 3.84*** (-2.99)	0.11** (2.26)	-0.91*** (-4.56)
Multilateral debt service	-1.000	- 0.30 (-0.96)	- 3.54*** (-4.23)	1.49** (2.31)	- 0.53* (-1.86)
Private nonguaranteed debt	-1.000	- 0.47 (-0.97)	- 5.12*** (-3.67)	1.13 (1.46)	- 2.15*** (-3.67)
Public and publicly guaranteed debt	-1.000	-0.52** (-2.06)	- 2.33*** (-4.91)	1.62*** (4.31)	- 1.32* (-1.92)
Public and publicly guaranteed debt service	-1.000	1.86 (0.26)	-2.97*** (-4.09)	0.34*** (5.64)	-2.91*** (-5.31)
Short term debt	-1.000	1.68*** (2.98)	-2.49** (-2.36)	0.82** (2.36)	-1.64** (-2.67)
Total debt service	-1.000	-1.20*** (-3.16)	-4.13* (-1.90)	0.26*** (6.21)	-3.13*** (-4.36)

Notes: t-statistics are shown in parentheses. The asterisks *, **, *** denote significant at 10, 5 and 1% levels, respectively.

as shown in Table 4, the estimated coefficients for all variables in various debt models are reasonable in terms of both sign and magnitude. For example, the coefficients of inflation and government deficits are found to be affecting economic growth significantly and negatively. This indicates that in Malaysia process of economic development is adversely dependent on the degree of government fiscal position as well as level of inflation. In contrast, the coefficient of trade openness to economic growth is positive and significant in t-statistics, implying that trade openness tends to spur economic growth of Malaysia (Krugman and Livas, 1996).

Looking at various debt variables, in all models, the estimated coefficient of debts on economic growth is

negative and statistically significant at 10% significance level or better, and the estimates range from -0.53 to -3.13. In five out of the eight models studied, the estimates are greater than unity, which suggest a fairly large response of various debt variables to changes in economic growth of Malaysia. Our findings corroborate the results of Siddiqui and Malik (2001), Lin and Sosin (2001) , IMF (2004), and Alfaro and Kanczuk (2009). These studies argued that interest payment of the debt is the main factor in retarding the economic growth. They showed that in order to pay the principle and interest, more future tax revenues must be raised or the given tax revenue must be diverted from other productive uses which may hurt economic growth. Besides, Mistry (1996) reveals that multilateral debt service payments have caused serious crowding- out effects on public and private investment. This in turn results in growth and export earnings capacity being compromised. Indeed, IMF (2004) adds that greater reliance on foreign-currency debt is associated with a higher frequency of debt crises[15].

Granger causality tests

As this study has established a long run relationship between debts and economic growth for all models, causality relationship must exist in at least one direction (Engle and Granger, 1987). Therefore, Granger causality tests within the vector error-correction model (VECM) are used in order to examine the causal relationship between various debts and economic growth. The direction of dynamic is explored by performing multivariate Granger causality tests for the VECM, to capture the temporal short run relationship among the variables[16].The causality relationships between various debts and economic growth are reported in Table 5. The results from Wald test statistics, the null hypothesis that debt does not Granger because economic growth has been rejected in favour of debt- led growth hypothesis for multilateral debt service, public and publicly guaranteed debt, and public and publicly guaranteed debt service. In the same way, there is enough evidence to support growth-driven debt hypothesis for external debt and short term debt. Besides, there is bidirectional relationship between debt and economic growth for long term debt and total debt. The findings suggest that any changes in this various type of debts will give significant impacts on the changes of GDP.

Turning to the coefficient of the error correction term (ECT) for various debts, we note that it has the negative sign and statistically significant at 10% significance level or better. This suggests that in the long run the relationship runs from various debts and other determinants (such as inflation, budget deficit and openness level) to economic growth, and that change in the economic growth is a function of disequilibrium in the cointegrating relationship. The magnitude of the ECT for various debts is ranged from -0.1095 to -0.5829, which indicating that adjustment towards the long run equilibrium is about 10.95 - 58.29% per annum. In other words, this suggests that any deviation from the long run equilibrium is adjusted or corrected moderately in the following year.

Conclusions and Policy Implications

The study aims to investigate the role of different debts on the economic growth in Malaysia from 1970 - 2006. Using Johansen-Juselius cointegration tests, the results show that there exists a long run relationship between GDP and all types of debt in Malaysia. It is found that all debts contribute negatively and significantly to the economic growth. Furthermore, the results from VECM reveal that there is a unidirectional short run causal effect running from multilateral debt service, public and publicly guaranteed debt and public and publicly guaranteed debt service to economic growth. Meanwhile there is evidence to support growth-driven debt hypothesis for external debt and short term debt. Moreover, there is bidirectional relationship between long term debt and economic growth, and between total debt and economic growth.

Based on the findings, all types of debts exhibited negative long-run relationship with the economic growth. Therefore, it can be safely asserted that policy makers should not heavily depend on foreign debts as debts have adverse impacts on economic growth. Debt over-hang theories reveal that large foreign debt leads to a negative impact on domestic investment. The debtor country cannot fully benefit from a raise in production as a large portion of the production channels to creditor countries to pay the debt payment. Moreover, crowding-out effects may occur from resources being used by foreign debt instead productive investment. Finally, due to the Ponzi scheme, which suggests that failing to pay off foreign debt causes to the need for extra debt or borrowing and raising interest payments, the amount of total debt can spiral out of control.

Malaysian policy makers should ensure that projects financed by foreign debts must contribute to foreign exchange earnings such that payments to overseas creditors in terms of interest and principal can be made. In light with this, the policy makers should borrow from overseas only when the investments or projects to be financed are anticipated to be both productive as well as able to generate foreign exchange through incremental raise in exports. Instead, a crucial lesson that Malaysia should learn as the country continues to reformulate its economic policy after devastating crises is that the government must play a role in monitoring its private

[15] For example, Chowdhury (1994) argues that the greater the level of a country's debt level, the greater is the country's leverage, the more limited are the foreign sources of credit. This in turn causes a higher number of incidences of financial distress and liquidation, which adversely affect economic growth indirectly through crowding-out effect of domestic investment.

[16] The optimal number of lag for VECM is determined by using Akaike Information Criterion (AIC).

Table 5. Results of granger causality between debt and economic growth in Malaysia.

	Debt-led GDP	ECT (t-statistics)	Lag	GDP-driven debt	ECT (t-statistics)	Lag
External debt	1.2869	-0.3914** (-2.8037)	2	7.1410**	-0.2263*** (-3.9312)	2
Long term debt	6.6396**	-0.2156* (-2.1916)	1	6.5438**	-0.2929* (-2.2743)	1
Multilateral debt service	4.4296*	-0.1442* (-2.0898)	1	1.1069	-0.1095** (-2.4575)	1
Private nonguaranteed debt	1.5091	-0.4192** (-2.8935)	2	3.8313	-0.2353*** (-3.9838)	2
Public and publicly guaranteed debt	5.1395**	-0.4178* (-2.4789)	2	1.0196	-0.2333*** (-3.7583)	2
Public and publicly guaranteed debt service	6.4812**	-0.1418* (-2.0585)	3	0.3250	-0.3194** (-2.7017)	3
Short term debt	0.0636	-0.2972* (-2.1468)	1	4.6271**	-0.5829** (-2.5535)	1
Total debt service	3.2780*	-0.2265* (-2.1188)	1	6.1853**	-0.3264*** (-3.3599)	1

Note: The asterisks *, **, *** denote significant at 10, 5 and 1% levels, respectively.
Lag lengths for the Granger causality test are based on Akaike's information criterion.

foreign borrowing as well as to put more concern on their fiscal and monetary policy.

As a small and developing country, Malaysia which is burdened with moderate high foreign debts should develop a sound financial plan to ensure that the debt accumulated today do not become a burden to the future generations. Malaysian government is advised to use fiscal and monetary policy in an efficient way to reduce the dependant on foreign debt. The effect of debt restructuring is to create a buffer action, that is, during the buffer period the government can take action to stabilize their political and economic condition.

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