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MODELING THE DETERMINANTS OF PRIVATE DOMESTIC INVESTMENT IN MALAYSIA

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ABSTRACT

MODELING THE DETERMINANTS OF PRIVATE DOMESTIC INVESTMENT IN MALAYSIA

Motivated by the concern of persistent decline in private domestic investment in Malaysia since the 1997 crisis, this paper empirically investigates the determinants for Malaysia's private domestic investment from 1975-2009. Using the Johansen cointegration techniques, the results indicate a long-run relationship between private domestic investment, economic output, domestic credit, interest rate, government spending and openness of the economy. Availability of credit supply and a competitive interest rate stimulate Malaysia's private domestic investment. However, government spending tends to 'crowd-out' them. In the short-run, private domestic investment decisions in Malaysia are determined by economic output, domestic credit, interest rate, government spending and openness of the economy. Investment responds fastest to changes of economic output. Government spending and openness of the economy leave significant positive impact. Credit supply has weak negative impact on investment decisions, implying some short-term credit constraints.

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KEYWORDS: Domestic Investment, Malaysia, Cointegration

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1. INTRODUCTION

Investment is the core of an economy. It plays an important role in the economic growth of a country, especially for developing countries. For Malaysia, investment is also one of her main catalysts to generate economic growth; both domestic and foreign. Thus, any fluctuations in the investment trend will have a significant impact on the whole economy.

It is now more than a decade since the Asian financial crisis. The Malaysian economy has recovered and grew, but it has not returned to its pre-crisis level. The real GDP was growing at an average rate of 4.6% from 2004 till 2009. However, this growth rate was lower than average rate of 8.1% from 1990-1997. Since the crisis, Malaysia has become a more export-dependent economy as her gross investment has declined significantly. Most of the decline came from the private sector; private investment as a percentage of GDP dropped from a high of 43.6% in 1998 to 20.4 % in 2009 and is still sluggish today. This decline has caused grave concern among the policy makers.

Public investment, on the other hand has been increased as a part of the package to revive the economy. However, it is not clear whether this enormous burden placed on fiscal policy is sustainable till the long-run. The Malaysian government has been running on a persistent budget deficit. It is clear that that the government needs to improve its finances while implementing measures to spur investment flows. It is risky for a small economy such as Malaysia to depend on external demand. A domestically driven-growth economy would be more appropriate and thus the right combination of policies is important.

In order to contribute to the discussion of what determines the gross investment in Malaysia, the objective of this paper is to identify the variables that have influenced investment, specifically private domestic investment. Our primary interest is to look into the right combination of government strategies for Malaysia's private domestic investment, in particular monetary policy, fiscal policy as well as openness policy.

The rest of the paper is organized as follows: Section II deals with the theories of investment and relevant empirical literature. Section III illustrates the model, data and methodology. Section IV presents the empirical findings and finally Section V concludes.

2. REVIEW OF LITERATURE

The theoretical literatures on private investment theories are quite rich and diverse. There is no clear-cut theory of investment determinants for each study. The major investment strands are the Keynesian accelerator theory, Jorgenson neoclassical theory, Tobin's Q theory and the neoliberal investment theories. The Keynesian accelerator theory of investment states investment as a linear proportion to changes in output. Capital costs play no role. Jorgenson (1971) and others later accommodated the missing element in the neoclassical approach whereby the optimal capital stock is proportional to output and the cost of capital (which depends on the price of capital goods, interest rate, depreciation rate and tax structure). As for the Tobin's Q theory of investment, investment behavior is explained in terms of the portfolio balance. The ratio of the market value of a firm's stock to the replacement cost is the driving force for investment.

In the neoliberal approach, financial deepening and high interest rates are important to stimulate growth. According to this view, investment is positively related to the real interest rate in contrast to the neoclassical theory. This is because high interest rates increase savings through financial intermediaries and thereby raises investible funds. This is a phenomenon that McKinnon (1973) calls as the 'conduit effect'. Based the Jorgenson neoclassical theory, a firm can borrow unlimited funds to finance investment in a perfect financial market. However in reality, due to the presence of imperfect financial markets (asymmetric information and agency problems), there are limits on a firm's access to external financing. In countries whereby financial markets are generally repressed, credit policy affects investment directly through the availability of credit supply rather than through the indirect interest rate channel. A large body of empirical work involving developing countries has provided evidence that changes in the volume of bank credit has positive impact on private investment[1]. One factor that is relevant to credit policy is external debt. High external debt of a country may signal the poor viability and sustainability of current macroeconomic policies in the long-run, and thus negatively affect the investors' expectations. On the other hand, a country can also have large debt for a good reason – good credit rating and hence more credit availability which allows higher level of investment (see Acosta and Loza 2005).

The more recent investment theories brought in the element of uncertainty to explain investment behavior. The theoretical predictions are different, but most of the papers predict a negative relationship. Different forms of uncertainty can be used such as economic instability and sociopolitical instability (see Pindyck 1991, Serven 2003 and Campos and Nugent 2003). For developing countries, economic uncertainty can be measured in terms of volatility of output growth, inflation, real exchange rate and terms of trade. In the case for Malaysia's investment trend, the element of uncertainty is not a significant factor.

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[1] See Blejer and Khan (1984), Oshikoya (1994), Tun Wai and Wong (1982) Guimaraes and Unteroberdoerster 2006 and Ang 2009. Except for Oshikoya (1994), all the above-mentioned studies involve Malaysia.

Public investment also plays an important role in investments decision. Their relationship can be either positive or negative, depending on the nature of public investment. When the public sector emphasizes positive externalities such as investments in infrastructure and public goods provision, public and private investment can complement each other. This is called the 'crowding in' effect. On the other hand, when the public investment competes for physical and financial resources, the result is 'crowding out' effect. Public investment may also crowd out private investment when additional public investment requires higher borrowings and higher tax burden. Studies involving developing countries usually accommodates public investment expenditure including Malaysia (see Guimaraes and Unteroberdoerster 2006 and Ang 2009).

For small open countries, a variable usually included is trade liberalization. Here, an ambiguous effect can be expected. If an economy is highly integrated to the world, it is expected to attract investments to the tradable sectors in order to increase productivity as well as competitiveness (Balasubramany et al. 1996). However, sudden exposure to external competition may also affect certain sectors and thus affecting capital flows (Serven 2002). A related factor here would be the real exchange rate. The expected effect of real exchange rate on investment is also ambiguous. Depreciation of the currency raises the cost of imported capital goods, and then adversely affects private investment. On the other hand, depreciation helps to raise the profitability of the tradable sector and stimulate investment in that sector (Lizondo and Montiel 1989 and Jongwanich and Kohpaiboon 2008).

Human capital development is a factor that has received little attention in the investment literature. Recent endogenous growth models have shown that human capital accumulation can be an important source for long-term growth. Human capital accumulation brings knowledge spillovers and creating positive externalities in an economy, thereby stimulating investment in private physical capital (Lucas, 1988). Institutional factors such as political and social factors are also not so popular in explaining investment behavior. Countries with limited civil and political freedom are likely to face low levels of private investment. However, investors in Malaysia do not face this problem.

Based on the explanation above, a number of explanatory variables can be considered to determine private investment behavior in Malaysia. Not all the variables discussed above will be included in our model as data on some variables do not exist or inadequate and not relevant to Malaysia.

3. MODEL, DATA AND METHODOLOGY

In this paper, the private domestic equation is specified as follows:

$$DINV_t = \beta_0 + \beta_1 GDP_t + \beta_2 CRE_t + \beta_3 TBI_t + \beta_4 G_t + \beta_5 OPEN_t + \beta_6 TREN_t + \mu \quad (1)$$

where *DINV* represents real private domestic investment. It is obtained by taking gross fixed capital formation in the private sector minus foreign direct investment[2]. To express in real terms, DINV is deflated by the gross domestic product (GDP) deflator. GDP is real output and CRE is measured by changes in domestic credit to the private sector. In this study, cost of investment is measured by 12 months Treasury bill[3]. G is real government spending and OPEN refers to the openess of an economy. The latter is measured by the ratio of GDP to the sum of exports and imports. To our knowledge, there are no previous studies on Malaysia's investment which have considered the openness variable, which is a possible factor in determining investment behavior. Given a small domestic economy, Malaysia needs to remain open with liberal trade and investment policies. Today, her total trade is about 200% of the GDP. The GDP, CRE and the G variables are deflated by the GDP deflator. The last variable *TREN*, is a time trend used to catch other secular changes.

Equation (1) above can be viewed as a long-run investment equation, where the vector = (β_0, β_1, β_2, β_3, β_4, β_5, β_6) are the long-run parameters and *u* is the error term. Natural logarithms are taken on all the variables for the usual statistical reasons before analysis. Annual data covering the period 1975 to 2009 are used in the analysis. As for the data, they are obtained from domestic sources such as the Economics reports and various issues of Monthly Statistical Bulletin of Bank Negara Malaysia[4].

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2. In Malaysia, like many other countries, data on private investment are obtained directly from the national account statistics. As for the FDI data, they are taken from the balance of payment accounts, which are estimated by the BNM using capital flow data from commercial bank records, supplemented by data on reinvested earnings of foreign-invested firms.
3. According to Miao (2008), lending rate of a bank is usually to meet the short- and medium-term financing needs of the private sector. For countries without information on the lending rate, Treasury bill is used. Data on Malaysia's average lending rate from the Bank Negara starts only in 1978.
4. No doubt there are other possible explanatory variables could be included in the private investment equation (1). For instance, labor productivity and exchange rate. As pointed by Wakeford (2004), one of the most appropriate measures for labor productivity in economics is marginal productivity. However, such data is not readily available for Malaysia. We attempted testing average labor productivity, but insignificant. Another possible variable for Malaysia is the exchange rate. Devaluation is favorable to the exportable sector of the economy, and via the multiplier effect leads to economic growth. Devaluation would also be favorable for acquisition of local assets by foreign companies at a lower price. Nonetheless, exchange rate is not tested in our regression as we are looking into domestic private investment. The same reason FDI is not included as one of the independent variables, unlike many other empirical studies on Malaysia. Moreover, adding more independent variables would only reduce the degree of freedom.

To estimate the regression, the Ordinary least Squares (OLS) technique is used. As a priori analysis, the stationarity of each time series in Equation (1) needs to be tested to avoid spurious regression. A time series is said to be integrated of order *d* if it requires to be differenced *d* times to achieve stationarity. If a variable is integrated of order 1 or higher, it is said to be non-stationary. If all the variables are found to be stationary, they are cointegrated or share a long-run equilibrium relation. This means that the variables in Equation (1) cannot deviate arbitrarily away from each other as they are tied by the long-run model parameters, conventionally termed as the cointegration vector.

The Augmented Dicky-fuller (ADF) and Philips Perron (PP) unit root tests will be applied to decide the order of integration. Then, to test for cointegration, we apply the Johansen (1988) and the Johansen and Juselius (1990) approach. This method is said to be more powerful than other cointegration tests including the two-step Engle and Granger (1987) method (Gonzala, 1994). Moreover, treating all variables as potentially endogenous using a vector autoregressive specification, the Johansen and Juselius (1990) approach is capable of identifying the number of cointegration vectors. In order to understand better the investment behavior, we are also looking into the short-run dynamics between investment and its determinants. Given cointegration in Equation (1), the short-run dynamics of investment is presented in an error correction modeling (ECM) as:

$$\Delta DINV_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta GDP_{t-i} + \sum_{i=1}^{p} \alpha_{2i} \Delta CRE_{t-i} + \sum_{i=1}^{p} \alpha_{3i} \Delta TBI_{t-i} + \sum_{i=1}^{p} \alpha_{4i} \Delta G_{t-i} + \sum_{i=1}^{p} \alpha_{5i} \Delta OPEN_{t-i} + \lambda \mu_{t-1} + \varepsilon_t \quad (2)$$

where Δ is the first difference operator and μ_{t-1} is the one period lagged error correction term obtained from Equation (1). Equation (2) has combined the short-run response of domestic investment to its determinants through the first-differenced terms and its adjustment to the long-run relation as captured by the lagged–one period error cointegration term. The dynamic adjustments of other variables can be expressed in the same manner.

4. EMPIRICAL FINDINGS

4.1. UNIT ROOT TEST RESULTS

As a preliminary analysis of the data, we first subject each time series to ADF and PP tests. Table 1 presents the results. As shown in Table 1, the results show that both ADF and PP tests fail to reject unit root null hypothesis for all the variables at level. However, they are stationary in the 1st difference, i.e. *I*(1). Having found a same integration level for all variables, we can now proceed to the cointegration test.

4.2. COINTEGRATION RESULTS

Table 2(a) and Table 2(b) show the Johansen cointegration test results based on the Trace Statistics and Maximum Eigenvalue Statistics respectively. Both results show evidence of cointegration among the variables.

At the 5% critical value, the trace test statistics shows three cointegration relations while the maximum eigenvalue test statistics suggests only two relations. However, both of the tests suggest two relations at 1% critical value. According to Johansen and Juselius (1990), the cointegration result suggested by maximum eigenvalue test is more robust and it is more powerful than the trace test. Therefore, we conclude that there are two cointegration vectors in this analysis. This means that Malaysia's domestic investment and its determinants of output, domestic credit supply, interest rate, government spending and openness of the economy are moving together in the long-run. As the variables are cointegrated and the interest of this study is to examine the changes of Malaysia's domestic investment to output, domestic credit, interest rate, government spending and openness of the economy, we will normalize the cointegrating vectors by private domestic investment. Table 3(a) presents the normalized cointegrating vector for long-run relationship.

In general, the coefficients sign for the estimated variables are consistent with the economic theory, even though not all are statistically significant. Since all variables are estimated in natural log, the estimated coefficients of each parameter can be interpreted as a long-run elasticity. The estimated elasticity shows that the variables of domestic credit, interest rate and government spending are statistically significant. All variables have the expected signs and magnitude greater than one implying that Malaysia's private domestic investors do respond strongly to the changes the availability of domestic credit, interest rate and government spending. This is particularly for the long-run estimate of government spending.

As explained earlier in the theoretical part, government or public investment has an ambiguous a priori effect on private investment. We found evidence of crowding-out effect in the long-run (an increase of 1% reduces the investment by nearly 5%). But, this effect vanishes in the short-run. Many plausible reasons that could account for the long-run crowding-out effect. First, it suggests competition for certain scarce resources

such as skilled labor and raw materials between the private and public sectors or the additional spending have worsened the government's budget deficit. Further, budget deficit has always been a major concern for Malaysia. Second reason is that the Malaysian government has been allocating funds for operating spending to woo foreign investors, rather than for development spending[5]. Crowding-in effect at times may also not kick-in because of an unfavorable investment environment. In Malaysia, one common complaint among the private investors (both domestic and private) is the cumbersome bureaucratic procedures have affected their investment cost and returns. In the World Bank (2010) Ease of Doing Business Report, Malaysia was ranked 23rd globally. The rankings show Malaysia was behind neighboring countries of Singapore and Thailand.

The estimated elasticity of both domestic credit and interest rate are also greater than one, indicating that financial factors are important determinants to encourage private domestic investment in Malaysia. Specifically, a 1% increase in bank credit leads to a 2.31% rise in our private domestic investment. This relatively large impact of bank credit on private investment is consistent with the empirical findings of previous studies on developing countries such as by Shafik (1992), Jongwanich and Kohpaiboon (2008) and Ang (2009). The interest rate has an even larger impact on the domestic investment trend whereby the elasticity of investment with respect to interest rate is 2.6071[6]. This is even higher than the long–run elasticity of investment with respect to bank credit (2.3148).

As for the short-run estimation, Table 3b shows the short-run dynamics of the investment model. The error correction term has the expected negative terms and highly significant. The negative sign of the error correction term indicates that domestic investment may deviate from its long-run equilibrium temporarily, but it will adjust towards equilibrium in the long-run within around one and a half year. As part of the specification search, we have done several diagnostic tests to check for any mis-pecification in the model. They include tests for serial correlation, heteroskedasticity and normality in the residuals. Moreover, the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) tests are performed to check for structural stability. The diagnostic tests statistics do not indicate any serial correlation, heteroscedasticity, non-normality in the residuals or mis-specification.

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5. Ang (2009) found an insignificant crowding-in effect between private (exclude FDI) and public investment. However, he found a significant effect once FDI is included. This could be an indication that Malaysia's public investment is in favor of inward foreign investment. Guimaraes and Unteroberdoerster (2006) found a crowding-out effect of non-public infrastructure investment on private investment. But, it is a crowding-in effect if the Malaysian government invest in public infrastructure.
6. Ang (2009) examined the determinants of Malaysia's private investment from 1960 to 2005. The user cost of capital was calculated based on the Jorgenson (1969) formulation. In the domestic private investment and private investment (include FDI) models, the long-run coefficient for interest rate in the investment equation was found to be -1.14 and -1.30 respectively. This provides some support to our empirical specification which is using a different proxy for interest rate.

All the short-run coefficients are statistically significant. Even though long-term domestic private investment is not cointegrated with real output, it responded strongly in the short-run. In the short-run, a 1% increase in real output promotes a 1.3% growth in the investment. In the short-run, firms usually operate below capacity and a higher GDP helps to facilitate investment expansion, even though the accelerator effect vanishes in the long-run[7].

In the short-run, it was found that both domestic credit and interest rates are significant. Unlike in the long-run, credit availabilities do not encourage investment undertakings in the short-run. This may be due to certain credit constraints that have discouraged the local private investors in their investment activities. A common complaint among investors, both local and foreign alike is they need to go through troublesome and lengthy procedures in accessing credit facilities. Fortunately, the long-run positive effect of credit availability on the domestic investment (2.3148) still outweighs the short-run negative effect (-0.02)[8]. The interest rate has a smaller short term coefficient of 0.18. The high statistical significance of both bank credit and interest rates reflects clearly the importance of monetary variables to promote domestic private investment in Malaysia. The banking sector has a predominant role in providing sources of finance to firms in priority sectors such as manufacturing, construction and business services. From the policy perspective, it is essential to pay attention more to these sectors that can drive/drag the economy. Ibrahim (2005) studied different effects of Malaysia's monetary policy on sectors in the economy. He found that construction, manufacturing, housing and other investment-related sectors are comparatively more interest-rate sensitive. By knowing the magnitudes and timing of various sectors to monetary changes, it helps policy-makers in the planning of appropriate stabilization policies. Such as, during a tightened monetary phase, assistance given to interest-rate sensitive sectors helps to alleviate the different effects of monetary policy. Consequently, this eases the coordination of both monetary and fiscal policies to face any imminent economic crisis.

In contrast to the long-run evidence, we found a crowding-in effect coming from public investment. Unfortunately, the long term crowding-out effect far prevails over the short term crowding-in effect (4.89% v 0.46%). This means public sector investment is still rather unsuccessful in revitalizing private investment till the long-run. There is still much to be done by the Malaysian government to promote a more conducive private investment climate. No doubt, the Malaysia's economy still needs foreign investors to develop, but we need to focus more on our own investors. Another significant short-term

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7. We are using a deflated Gross Domestic Product (GDP) for the real output variable. Growth of GDP has not been used as it does not have the same integration level with the other variables.
8. Wai and Wong (1982) examined the determinants of private investment for 5 developing countries, including Malaysia. They found domestic credit may at times adversely affect private investment when there are some cutbacks of credit to the private sector. This can happen if the government needed a larger amount of fund originally allocated by the monetary authorities, such as to maintain economic stability. This happened in Malaysia whereby the government cut a significant of lending to the private sector between 1998-1999.Ang (2009) suggested the cut in the lending was partly responsible for the sharp contraction in Malaysia private investment at that time.

coefficient is openness of the economy. Openness of an economy can be measured in terms of trade and finance. In our model, openness of the economy is measured in terms of trade openness. Economic openness exposes a country to international ups and downs, but the negative impact can be minimized by appropriate macroeconomic policy. Our regression shows that openness of the Malaysian economy has a short-term favorable effect on domestic private investment (predominantly in the 1990s). A percentage increase in the ratio of trade to GDP (i.e. openness) encourages private investment by 0.55% at the 10 percent level. This favorable effect, however did not last until long-run. This indicates that openness of Malaysia's economy has not been driving her private domestic investment initiatives, at least in the long-run[9]. A plausible reason is that Malaysia's economic base is less robust compared to her neighbors such as Singapore in order to reap the benefits of economic openness. A solid domestic economic base is a must in order to cushion any negative effects of economic openness. Further, a strong base helps to reinforce the synergies between external and domestic forces.

5. CONCLUSIONS AND POLICY IMPLICATIONS

Being a small developing country, Malaysia's economy needs to be relatively open. With the right growth-oriented policies, including openness of the economy, prudent macroeconomic policies and structural reforms in key area, the economy can grow and develop. This study has employed the Johansen cointegration approach to examine the long-run and short-run relationship between Malaysia's private domestic investment and real output, credit availability, interest rate, public investment and openness of the economy. The Johansen cointegration test showed that the variables are bound together in the long-run. The error correction term is fairly fast and is restored after one year plus.

The estimated results based on annual data for the period 1980-2009 indicate that domestic credit, interest rate and public investment are important in explaining domestic private investment in the long-run for Malaysia. Both domestic credit and the interest rate have the expected signs and are highly significant. However, we found a displacement (crowding-out) effect coming from the government investment decisions. In the short-run, private domestic investment is affected by each of the explanatory variables, i.e. real output, credit availability, interest rate, public investment and openness of the economy. Real output has the strongest positive impact on investment, followed by openness of the economy and public investment. Interest rate and domestic credit have weak negative impact, especially the latter.

9. There are studies on contribution of economic openness to the economy development such as by Edward (1993) and Harrison (1996). On the whole, the studies found a positive correlation between trade openness and economy development, especially for developing countries like Asia. However, complementary factors to the trade openness are important to realize any potential gains into actual gains. We need a solid domestic economy base - that has productive structure, adequate facilities, human capital and an efficient government to steer the economy from stagnation.

From the policy perspective, the evidence we obtained suggest strongly the significant role of bank credit and interest rate to domestic private investment. Credit availability as well as the cost of borrowing are important for Malaysia's private domestic investors, particularly the small-medium enterprises (SME) which rely heavily on bank financing. Policies that reduce costs of financial intermediation such as tax policies and cumbersome procedures need to be promoted in order to facilitate access to credit. Secondly, government expenditure needs to be effectively utilized which is best able to generate high income multiplier for the country. It is essential for the government to continue prioritize public projects, especially investment in infrastructure and human capital which have the potential to complement and further boost private investment. The efficiency of resource used by the public sector in investment is another area the Malaysian government needs to stress on. Private sector initiatives should not be hampered by over-regulation. Most important of all is the investors' confidence. The confidence can be enhanced by greater certainty, transparency and consistency in the government policies. Economic openness also helps to accelerate private investment, but any reforms in the liberalization programs should be undertaken based on local experiences. Careless liberalization programs only make the economy vulnerable to external shocks. Overall, our findings suggest that improvement in the regulatory framework of Malaysia's financial institutions, government investment and further liberalization of the economy helps to revive domestic investment. This vindicates the government efforts in the 10th Malaysia Plan to focus on an internally-driven-economy as well as being externally-aware.

6. REFERENCES

Acosta, P. and Loza, A., 2005, A Short and Long Run Determinants of Private Investment in Argentina. *Journal of Applied Economics*, Vol.VIII, No.2, pp. 389-406.

Ang, J.B. 2009, Determinants of Private Investment in Malaysia: What Causes the Postcrisis Slumps. *Contemporary Economic Policy*, pp.1-14.

Balasubramanyam, V., Mohammed Salisu, and David Sapsford 1996, Foreign direct Investment and Growth in EP and IS countries. *Economic Journal* 106, pp. 92-105.

Blejer, M.I., and M.S. Khan, 1984, Government Policy and Private Investment in Developing Countries. *International Monetary Fund Staff Paper*, 31, pp.379-403.

Campos, N. and Nugent, J.,2003, Aggregate Investment and Political Instability: an Econometric Investigation. *Economica*, 70, pp.533-49.

Edward, S., 1993, Openness, Trade Liberalization and Growth in Developing Countries. *Journal of Economic Literature*, 31(2), pp.1358-93.

Engle, R.F. and Granger, C.W.J.,1987, Cointegration and error correction: Representation, Estimation, and Testing. *Econometrica*, 55(2), pp.251-76.

Gonzalo, J.,1994, Five Alternative Methods of Estimating Long-Run Equilibrium Relationship. *Journal of Econometrics* 60(1-2), pp. 202-33.

Guimaraes, R. and Unteroberdoerster, O.,2006, What's Driving Private Investment in Malaysia? Aggregate Trends and Firm-Level Evidence. *IMF Working Paper*, August, pp. 1-16.

Harrison, A.,1996, Openness and Growth: A time-series analysis, cross-country analysis for developing countries. *Journal of Development Economics*, 48, pp. 419-47.

Ibrahim, H.,2005, Sectoral effects of Monetary Policy: Evidence from Malaysia. Asian Economic Journal, vol. 19, no.1, pp.83-102.

International Monetary Fund (various issues) *International Financial Statistics (quarterly),* Washington, D.C.

Johansen, S.,1988, Statistical Analysis of Cointegration Vectors. *Journal of Economic Dynamics and Control*, 12, pp. 231-254.

Johansen, S. and Juselius, K.,1990, Maximum likelihood estimation and inference on cointegration with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, 52, pp. 169-210.

Jongwanich, J., and A.Kohpaiboon, 2008, Private Investment: Trends and Determinants in Thailand. *World Development*, 36, pp.1709-24.

Lizondo, J.S. and Montiel, P., 1989, Contradictory Devaluation in Developing Countries: An analytical overview. *IMF Staff Papers*, 26, pp. 182-227

Lucas, R.,1988, On the mechanics of Economic Development. *Journal of Monetary Economics*, 22, pp.3-42.

Malaysia, Bank Negara Malaysia (various issues) *Monthly Statistical Bulletin,* Kuala Lumpur.

_____ Ministry of Finance (various issues) *Economic Report*.

Miao, W., 2008, Foreign Direct Investment and Domestic Investment In the Host Country: Evidence from Panel Study. *Applied Economics*, pp.1-11

Oshikoya, T.W., 1994, Macroeconomic determinants of Domestic Private Investment in Africa. *Economic Development and Cultural Change*, 42, pp. 573-96.

Pindyck, R.,1991, Irreversibility, Uncertainty and Investment. *Journal of Economic Literature*, 29(3), pp. 1110-52

Serven, L., 2002, Real Exchange Rate, Uncertainty and Private Investment in Developing Countries. *Domestic Finance Working Paper* 2823, World Bank, Washington D.C.

_____2003, Real Exchange Rate, Uncertainty and Private Investment in LDCs. *Review of Economics and Statistics*, 85(1), pp. 212-18

Shafik, N.,1992, "Modeling Private investment in Egypt" *Journal of Development Economics*, 39, pp. 263-77.

Wai, T.U. and Wong, C.H., 1982, Determinants of Private Investment in Developing Countries *Journal of Development Studies*, 19(1), pp.19-36.

Wakeford, J., 2004, Productivity-Wage Relationship in South Africa: An Empirical Investigation. *Development Southern Africa,* 21(1), pp. *109-132*

TABLE 1: UNIT ROOT TESTS

	ADF		PP	
	In Levels	In First Differences	In Levels	In First Differences
DINV	-2.0505	-4.0627***	-1.7443	-3.9328***
GDP	-1.1621	-4.3329***	-1.4272	-4.3548***
CRE	-1.4647	-3.6445 **	-0.6468	-2.8183*
TBIL	-1.3358	-4.574***	-1.4585	-4.2882***
G	0.078	-6.739***	0.7021	-8.3054***
OPEN	-1.5418	-3.526 **	-1.5264	-3.405**

Notes: For series that contain a trend (whether deterministic or stochastic), both intercept and trend will be included. Whereas for series that do not show a trend, only the intercept is included. To determine the lag, the Akaike info criterion (AIC) is used in both tests. * Significant at 10% based on MacKinnon's (1991) critical values; ** significant at 5%; *** significant at 1%.

TABLE 2(a) : JOHANSEN COINTEGRATION RANK TEST (BASED ON TRACE STATISTICS)

Trace Statistics	5% critical value	1% critical value	No. of CE(s)
157.1965	95.7537	104.9615	None
93.97672	69.8189	77.81884	At most 1
50.72353	47.856	54.68150	At most 2
27.16471	29.7971	35.45817	At most 3
10.77857	15.4947	19.93711	At most 4
4.066919	3.8415	6.634897	At most 5

TABLE 2(b) : JOHANSEN COINTEGRATION RANK TEST (BASED ON MAXIMUM EIGENVALUE STATISTICS)

Max-Eigen Statistic	5% critical value	1% critical value	No. of CE(s)
63.21974	40.0778	45.86900	None
43.25319	33.8769	39.37013	At most 1
23.55882	27.5843	32.71527	At most 2
16.38615	21.1316	25.86121	At most 3
6.711648	14.2646	18.52001	At most 4
4.066919	3.8415	6.634897	At most 5

Note: The VAR lag order has been set to 3 which is sufficient to render the error terms serially uncorrelated. The symbol * indicates rejection of the null hypothesis of no cointegration at the 1% level of significance. For critical values, see Osterwald-Lenum (1992).

TABLE 3(a): NORMALIZED COINTEGRATING VECTOR

Variables	$DINV_t$	GDP_t	CRE_t	TBI_t	G_t	$OPEN_t$	Constant
Coefficients	1.000	1.4805	2.3148	-2.6071	-4.8921	2.0973	8.2234
		(0.6446)	(4.3152)	(4.3550)	(-2.6088)	(1.0519)	

Note: Number in parentheses show the t-ratios

TABLE 3(b): SHORT-RUN COEFFICENTS –VECM

DEPENDENT VARIABLE: $\Delta DINV_t$

Variables	ECT_{t-1}	ΔGDP_t	ΔCRE_t	ΔTBI_{t-1}	ΔG_t	$\Delta OPEN_{t-1,-2}$	Constant
Coefficients	-1.519***	1.338***	-0.02***	-0.1806***	0.464**	0.5507*	-0.0333

Adjusted R^2 = 0.9184	
LM1, F(1,14) = 0.1085 (p=0.7475)	JBNχ^2(2)=0.9014, p=0.6372
LM2, F(2,13)=0.8254 (p=0.4635)	ARCH:F(1,29)=0.0005 (p=0.9822)
RESET, F(1,12)=0.0174(p=0.8971)	

Note: The asterisks ***, ** and * denotes statistically significant at 1, 5 and 10% level respectively. The optimal lag order 3 was based on the Akaike Information Criterion (AIC).

LM	Breusch Godfrey serial correlation LM test;
RESET	Ramsey test for functional form mis-specification;
JBN	Jarque-Bera test of the normality of residuals;
ARCH	Engle's autogressive conditional heteroscedasticity test.