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A RE-EXAMINATION OF THE ROLE OF FOREIGN DIRECT INVESTMENT AND EXPORTS IN MALAYSIA'S ECONOMIC GROWTH: A TIME SERIES ANALYSIS, 1970-2006

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ABSTRACT

The main objective of this study was to re-examine the role of foreign direct investment (FDI) and exports in Malaysia's economic growth over the period of 1970 to 2006. The Johansen and Juselius (1990) cointegration test was used to investigate the presence of a long-run equilibrium relationship between economic growth and its determinants. Besides, the vector error-correction model (VECM) and the Granger (1969) causality test were used to examine the short-and long-run causality direction between the relevant variables. The empirical results revealed that economic growth and its determinants were cointegrated. The Dynamic OLS results suggested that FDI and exports were positively related to economic growth. In addition, the Granger causality results strongly supported bilateral causality between economic growth and its determinants. This indicated that FDI and exports contribute to Malaysia's economic growth. In fact, high economic growth will also cause FDI and export-orientated industries to grow rapidly.

Keywords**:** *Causality; Cointegration; Export-led growth; FDI-led growth.*
JEL Classification Code: C32, F21, F43.

ABSTRAK

Tujuan utama kajian ini dijalankan untuk mengkaji semula peranan pelaburan langsung asing (PLA) dan eksport ke atas pertumbuhan ekonomi Malaysia bagi tempoh 1970 hingga 2006. Kaedah kointegrasi Johansen dan Juselius (1990) telah digunakan untuk menguji kewujudan hubungan jangka panjang ini. Selain itu, Model Vektor Pembetulan Ralat (VECM) dan juga ujian sebab-akibat Granger (1969) telah digunakan untuk menguji hubungan arah sebab-akibat jangka pendek dan jangka panjang. Keputusan *empirikal kajian ini mendapati wujudnya hubungan jangka panjang antara pertumbuhan ekonomi dengan penentu-penentunya di Malaysia. Keputusan OLS Dinamik (Dynamic OLS) pula membuktikan PLA dan eksport adalah berhubungan positif dengan pertumbuhan ekonomi. Tambahan pula, ujian sebab-akibat menyokong wujudnya hubungan dua hala antara pertumbuhan ekonomi dengan penentu-penentunya. Ini menunjukkan bahawa PLA and eksport merupakan pemacu utama pertumbuhan ekonomi Malaysia. Malah pertumbuhan ekonomi yang pesat akan membawa kepada pertumbuhan PLA dan juga industri yang berorientasikan eksport.*

Kata Kunci*: *Sebab-akibat; kointegrasi; eksport-pacuan pertumbuhan; PLA-pacuan pertumbuhan.
Klasifikasi Kod JEL: C32, F21, F43.

INTRODUCTION

Over the last few decades, foreign direct investment (FDI) and exports played a vital role in Malaysia's economic development and industrialisation process (Athukorala & Menon, 1995; Al-Yousif, 1999). Since achieving independence in 1957, Malaysia had practised a liberal policy toward foreign capital inflows (FCI). The main objective of this policy was to attract the influx of more foreign capital in order to foster the growth of business and employment opportunities in Malaysia. This inflow of foreign capital together with the implementation of a series of industrialisation programmes[1] had fostered Malaysia's economic transformation from an agricultural based-economy to more diversified and export-oriented industrial economy. Empirical studies on the relationship between FDI and economic growth had been a perennial issue in economics research. In addition, substantial empirical studies had examined the linkages between FDI and economic growth in both developed and developing economies such as Malaysia.

Reviewing the empirical studies on FDI and economic growth in Malaysia, four potential gaps had been detected. Firstly, the contribution of FDI to the recipient country's economic growth is inconclusive. On one hand, Athukorala and Menon (1995), and Baharumshah and Thanoon (2006) concluded that FDI played an important role in Malaysian economic growth and development. They found that FDI is positively related to economic growth. On the other hand, Phang (1998) indicated that the inflow of FDI into Malaysia has a negative impact on its balance of payments and FDI appears to have benefited the economy less than originally perceived. In addition, Choong, Yusop, and Soo (2004) found that FDI and economic growth are negatively related in the case of Malaysia.

Secondly, the existing studies (Zaidi, Karim, & Mokhtar, 2003; Choong *et al.,* 2004) examined the relationship between economic growth and FDI using a bivariate framework. Rana and Dowling (1988) pointed out that foreign capital inflows and exports are two important determinants that explained economic performance, and the regression results would be biased when any of these two variables were omitted. Moreover, both cointegration and causality tests would yield biased or inconsistent results if the relevant variables were omitted (Miller, 1991). Zaidi *et al.* (2003), for example, found that FDI and economic growth for Malaysia are cointegrated but the Granger causality test tended to show a neutrality causal result between the two variables.[2] Apart from this, Choong *et al.* (2004) showed that in the bivariate framework, FDI and economic growth are not cointegrated even at the 10% significance level.

Thirdly, Kaminsky and Reinhart (1998), and Choong and Lim (2007) claimed that FDI inflows is stable over time even when an economic crisis strikes the relevant nation because the long-term capital inflows are usually less volatile compared to short-term capital inflows. Such an assumption is patently implausible because Malaysia has experienced some major shocks by the macroeconomic policies and also economic environments (e.g. Asian financial crisis in 1997, Ringgit Peg regime in 1998), thereby the notion of stable FDI and economic growth is highly questionable.

Fourthly, to the best of our knowledge, none of a study on FDI and economic growth in Malaysia had considered the choice of deterministic components (i.e. constant and trend) wisely when applying the Johansen-Juselius cointegration test. Hansen and Juselius (1995) had emphasised that the choice of deterministic components of a model has important implications for the asymptotic distribution of the test statistics. Moreover, different specifications of the deterministic components may yield different cointegration results.

Therefore, it is of paramount importance for this study to re-investigate the relationship between FDI and economic growth in Malaysia through the multivariate framework. With respect to the shortcomings as outlined above, this study used the Johansen and Juselius (1990) multivariate cointegration approach in association with a modified version of the Pantula principle (Hjelm & Johansson,

2005) to examine the presence of long-run equilibrium relationships. Furthermore, this study also addressed the issue of finite annual data (37 observations from 1970 to 2006) by deploying the Cheung and Lai (1993) response surface procedure to derive the critical values for a small sample. Next, the Granger causality test was implemented to ascertain the causality direction, and finally the CUSUM and CUSUM of Squares tests statistics were applied to examine the stability of the growth function.

The remainder of this paper is organised as follows. The next section will briefly review the empirical literature. Section 3 will delineate the model specification, data, and econometric techniques used in this study. The empirical result for this study is found in Section 4. Finally, Section 5 concludes the paper with some policy recommendations.

REVIEW OF EMPIRICAL LITERATURE

Owing to its relevance to policy formulation, there are voluminous amounts of empirical studies on FDI, hence it is implausible to review all the studies here. The aim of this paper is to review some relevant studies on the relationship between FDI and economic growth. Some existing studies on testing the relationship between foreign capital and economic growth are briefly reviewed below.

Chenery and Strout (1966) showed that foreign capital in terms of loans, grants, and private investment play a vital role in bridging the saving-investment gap and help to accelerate economic growth in both developing and undeveloped economies. They concluded that foreign capital is a vital pre-requisite for economic growth. Using the simultaneous equation approach, Rana and Dowling (1988) examined the effect of FCI on economic growth of nine developing Asian countries. They found that FCI contributed significantly to the development of these countries. Moreover, FCI in terms of aid had also been used to finance local projects which were unnecessarily capital intensive by nature. Using data from 11 Asian economies and 7 economies from Latin America, Gruben and Mcleod (1998) declared that there is bilateral causality direction between FDI and economic growth. Furthermore, their findings revealed that a change in portfolio equity inflows is positively related to change in gross domestic product (GDP). Following this, they concluded that foreign capital inflows may confer some significant benefit to a recipient country's economic growth. In a recent paper, Sahoo and Mathiyazhagan (2003) used the Johansen-Juselius cointegration test to examine the long-run relationship between FDI, exports, and economic growth in India. They found that all the variables were cointegrated and that both regressors were positively related to economic growth. Thus, they concluded that FDI is a source for economic growth in India.

In contrast, Singer (1950) claimed that host countries may receive fewer benefits from the inflow of FDIs and that such inflows will eventually lower the host country's growth rate because of the price distortions and the misallocation of resources problem. Rahman (1968) suggested that foreign capital inflows and domestic savings are negatively related. This implied that foreign capital cannot substitute domestic savings in financing local investment. Therefore, foreign capital inflow may not lead to economic growth, but instead cause the host country to be more dependent on foreign capital. Griffin and Enos (1970) similarly noted that there is no charity sentiment in foreign aid. In general, it is the powerful economies, and those seeking power, which provide assistance to the relatively low-powered economies with the intention of exploiting the host country's natural resources. Thus, they stated that not all foreign aid is helpful and not all foreign aid actually assists. Following this, they concluded that the FCI does not encourage economic growth but would be detrimental to the host economy by lowering of the domestic savings rate· Griffin (1970) employed the Harrod-Domar model to empirically analyse why FCI in the form of aid does not accelerate economic growth. He found that foreign aid is negatively related to the domestic savings rate because high amounts of foreign aid will lower the domestic savings rate and eventually undermine the local economy. This is not surprising as Leontief (1958) documented that substantial FCI will lead to the marginal capital productivity and a decline in real interest rates thus reducing the incentive to save. In addition, FCI may also reduce public savings through its weakening of taxation systems in host countries. Bowles (1987) used a bivariate Granger causality test to examine the causality direction between foreign aid and domestic savings of 20 less developed countries (LDCs). The author concluded that the causal relationship between foreign aid and domestic savings is not conclusive as in half of the 20 countries surveyed, the time series data did not infer the existence of any causal relationship between foreign aid and domestic savings. Finally, De Mello (1999) claimed that in an open economy, FDI might be detrimental to economic growth if it is a substitute for domestic savings, since FDI inflows exacerbate balance of payments problems via foreign exchange remittance.

As far as Malaysia is concerned, there are ample studies on the linkages between foreign capital and economic growth. Beaumont (1990) stated that FDI is likely to be an engine to economic growth in Malaysia.

The author claimed FDI inflows may enhance capital formation and employment opportunities, promote export growth and the transfer of technology, and bring more advanced managerial skills thus increasing efficiency and productivity. Tan (1997) utilised the cost-benefit analysis to examine the implication of FDI inflows. He found that the positive benefits of FDI were far greater than the negative effects on the Malaysian economy. Zaidi *et al.* (2003) used the Johansen (1988) cointegration test to examine the presence of a long-run relationship between FDI and economic growth of developing and developed economies for the period of 1970 to 2000. For the case of Malaysia, the results showed that FDI and economic growth were cointegrated, but the long-run causality direction was from economic growth to FDI rather than in the reverse direction. Moreover, they failed to find any causal relationship in the short run. Choong *et al.* (2004) showed that FDI and economic growth for Malaysia was not initially cointegrated in the bivariate model, and cointegration was only discernible with the inclusion of the financial development indicator. The normalised cointegrating vector indicates that in the long-run, FDI and economic growth are negatively related and they claimed that this is due to the poor development of the financial sector in Malaysia. Thus, they suggested that the financial sector should be further developed to exploit the benefits of FDI (Al-Yousif, 2002; Choong, Yusop, & Soo, 2005). Using the OLS estimation procedure, Wong and Jomo (2005) found that FCI and economic growth were positively related while it had a negative effect on the domestic savings rate. Recently, Choong and Lim (2007) employed the relatively new bounds testing procedure for cointegration (Pesaran, Shin, & Smith, 2001) to examine the long-run linkages between FDI and market size in China and Malaysia over the period of 1970 to 2001. Their results showed that the variables are cointegrated and the FDI inflows have a positive effect on the Malaysian economy. In contrast, they found that increases in the Chinese market size will reduce the FDI inflows to Malaysia and concluded that China was the strongest competitor to Malaysia in attracting FDI.

MODEL SPECIFICATION, ECONOMETRIC TECHNIQUES AND DATA

Model Specification

In order to examine the relationship between FDI and economic growth in Malaysia, we utilised the Sahoo and Mathiyazhagan (2005) specification, which was derived from Barro, Mankiw, and Sala-I-Martin, (1995). The growth function can be expressed as equation (1).

$$\ln RGNP_t = \beta_0 + \beta_1 \ln RFDI_t + \beta_2 \ln REX_t + \varepsilon_t \quad (1)$$

where ln is denoted as the natural logarithm, RGNP is the real gross national product (GNP), RFDI is the real foreign direct investment, and REX is the real export of goods and services. The residuals ε_t are assumed to be spherically distributed and white noise. According to macroeconomic theory, an estimate of β_1 can be positive or negative. However, an estimate of β_2 is expected to be positive. In the following sub-section, we will discuss the Johansen-Juselius cointegration test, Dynamic OLS estimator for long-run coefficients, and Granger causality test.

Cointegration Analysis

This study uses the Johansen's multivariate cointegration approach (Johansen, 1988; Johansen & Juselius, 1990) to examine the existence of a long-run relationship between economic growth and its determinants. Gonzalo (1994) declared that Johansen's procedure performs better than other cointegration tests even when the error distribution is non-normal and the lag structure in the error-correction model (ECM) is mis-specified. To implement the Johansen cointegration approach, the following vector error-correction model (VECM) was estimated.

$$\Delta Z_t = \Phi D_t + \Pi Z_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta Z_{t-i} + \mu_t \quad (2)$$

where $\Delta Z_t = Z_t - Z_{t-1}$ (the first difference of the variables), Z_t is a vector of endogenous variables ($\ln RGNP_t$, $\ln RFDI_t$ and $\ln REX_t$) while D_t is the deterministic vector (constant and trend, etc.), and Φ is a matrix of parameters D_t . The matrix Π contains information about the long-run relationship between the Z_t variables in the vector. If all the variables in Z_t are integrated in the order one, the cointegrating rank, r, is given by the rank of $\Pi = \alpha\beta'$ where α is the matrix of parameters denoting the speed of convergence to the long-run equilibrium and β is the matrix of parameters of the cointegrating vector.

To determine the numbers of cointegrating rank, Johansen-Juselius (JJ) developed two likelihood ratio (LR) test statistics, namely the trace test (λ_{trace}) and the maximum eigenvalues test (λ_{max}).

The trace test is given by:

$$\lambda_{trace} = -T \sum_{i=r+1}^{n} \ln\left(1 - \lambda_i\right) \quad (3)$$

The maximum eigenvalues test is given by:

$$\lambda_{\max} = -T1n(1 - \lambda_{r+1}) \quad (4)$$

where λ_i are the eigenvalues ($\lambda_1 \geq \lambda_2 ... \geq \lambda_k$ and T represents the number of observations. The null hypothesis of no cointegrating relation is rejected if the computed likelihood ratio statistics value is greater than the critical values. The JJ approach is sensitive to the deterministic term (i.e. constant and trend) specified into the model because different specification of the deterministic term may yield different cointegration results. Following Hjelm and Johansson (2005), we used the modified Pantula principle to choose an appropriate specification of the deterministic term. The procedure for modified Pantula principle is that if the standard Pantula principle choose Models 2, 4, or 5, we accept the cointegration result[3]. In contrast, if Model 3 is chosen, we estimate the VECM including a restricted deterministic trend (i.e. Model 4). Then, we compute a LR test for the significance of the parameter in the restricted deterministic trend. If the null hypothesis of no deterministic trend is rejected, select Model 4, otherwise Model 3 is preferred.

Stock and Watson (1993) Dynamic OLS

If the variables are cointegrated, computational of the long-run coefficients are required and the Dynamic OLS approach is uses to estimate the long-run coefficients. Masih and Masih (1996) documented that Dynamic OLS is a parametric approach to estimate long-run equilibrium systems which may involve variables integrated of different orders, but are still cointegrated. They also indicated that the procedure advocated is similar to recent estimators as proposed by Phillips and Loretan (1991) and Saikkonen (1991), but that the Stock and Watson (1993) procedure is more practically convenient to implement and estimate. The Dynamic OLS procedure is carried out by using the following equation.

$$\begin{aligned} \ln RGNP_t = {} & \alpha_0 + \alpha_1 \ln RFDI + \alpha_2 \ln REX + \sum_{i=1}^{q} \phi_i \Delta \ln RFDI_{t+i} \\ & + \sum_{j=0}^{p} \varphi_j \Delta \ln RFDI_{t-j} + \sum_{m=1}^{q} \delta_m \Delta \ln REX_{t+m} \\ & + \sum_{n=0}^{p} \lambda_n \Delta \ln REX_{t-n} + \varepsilon_t \end{aligned} \quad (5)$$

where α_1 and α_2 are the long-run parameters, p is the maximum lags length, q is the maximum leads length, and ε_t represents the disturbance terms. The optimum leads and lags length of the first differences $I(1)$ regressors, are determined by AIC due to its performance in finite sample study (Lütkepohl, 1991; Liew, 2004). The Dynamic OLS procedure incorporates the leads and lags of the first differences $I(1)$ regressors, thus eliminates the potential simultaneity bias and small sample bias resulting from the correlation between error terms and the $I(1)$ variables (Caporale & Chui, 1999; Masih & Masih, 2000). Moreover, Newey-West procedure is used to correct the standard errors for hypothesis testing[4].

Granger Causality Test

In this section, we turn to discuss the Granger causality test. If the variables are cointegrated, we can proceed with the ECM to capture the short-and long-run causal effects. According to Granger Representation Theorem, if the variables are cointegrated, there must be Granger causality in at least one direction to indicate a long-run equilibrium relationship. Thus, Granger (1969) causality test would be employed to ascertain the causality direction between economic growth and its determinants, FDI, and exports through the ECM. The testing equation is presented as follows:

$$\begin{bmatrix} \Delta \ln RGNP_t \\ \Delta \ln RFDI_t \\ \Delta \ln REX_t \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \end{bmatrix} + \begin{bmatrix} A_{11,1} & A_{12,1} & A_{13,1} \\ A_{21,1} & A_{22,1} & A_{23,1} \\ A_{31,1} & A_{32,1} & A_{33,1} \end{bmatrix} \times \begin{bmatrix} \Delta \ln RGNP_{t-1} \\ \Delta \ln RFDI_{t-1} \\ \Delta \ln REX_{t-1} \end{bmatrix} + \cdots + \begin{bmatrix} A_{11,k} & A_{12,k} & A_{13,k} \\ A_{21,k} & A_{22,k} & A_{23,k} \\ A_{31,k} & A_{32,k} & A_{33,k} \end{bmatrix}$$
$$\times \begin{bmatrix} \Delta \ln RGNP_{t-k} \\ \Delta \ln RFDI_{t-k} \\ \Delta \ln REX_{t-k} \end{bmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \end{bmatrix} \left[EC_{t-1} \right] + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix} \tag{6}$$

where k is the optimal lag orders and determined by AIC. Following Tang and Lean (2007), the assumption of uniform lag length was released and the ECM was conducted using the Autoregressive Distributed Lag (ARDL) framework.

Next, the one period lagged error-correction term EC_{t-1} is normally used to examine the long-run causality direction and the convergence rate into the long-run equilibrium. To examine the short-run causality, we used the χ^2 – statistics. From equation (6), $A_{12,k} \neq 0 \forall_k$ implies that there is causality from FDI to economic growth; while $A_{21,k} \neq 0 \forall_k$ implies that economic growth Granger causes FDI. Similarly, $A_{13,k} \neq 0 \forall_k$ and $A_{31,k} \neq 0 \forall_k$ can be interpreted in the same way with regard to exports and economic growth.

Data Sources

Annual data from 1970 to 2006 was used in this study due to the unavailability of other scales of data. The Consumer Price Index (CPI, 2000 = 100) was used to obtain the real term. The data used in this study was collected from the *International Financial Statistics* (IFS), Asian Development Bank *Key Indicators*, and Bank Negara Malaysia *Monthly Statistical Bulletin*.

In the time series literature, if the variables are non-stationary or $I(1)$ process, the regression result will be spurious (Granger & Newbold, 1974; Phillips, 1986). Moreover, Stock and Watson (1989) indicated that when a model includes non-stationary variables, the usual test statistics (t, F, and Adjusted R-squared) may not be valid because it does not contain the standard distribution. Therefore, it is important to establish the order of integration. To ascertain the order of integration we began by applying the Kwiatkowski, Phillips, Schmidt, and Shin (1992)–(KPSS) stationarity test. The advantage of using the KPSS test is that it is able to distinguish a unit root and a near unit root process (Campbell & Perron, 1991; DeJong, Nankervis, Savin, & Whiteman, 1992). Table 1 presents the results of the KPSS stationarity test.

Table 1: The Results of KPSS Stationarity Test

Variables	Test statistics	
	η_μ	η_τ
Level:		
$1n\ RGNP_t$	0.732**	0.061
$1n\ RFDI_t$	0.712**	0.078
$1n\ REX_t$	0.724**	0.080
First difference:		
$\Delta \ln RGNP_t$	0.095	0.057
$\Delta \ln RFDI_t$	0.049	0.047
$\Delta \ln REX_t$	0.080	0.094

Note: The asterisks *, ** and *** denotes the significance at 1%, 5% and 10% levels respectively. The η statistics refer to the KPSS test the stationarity null hypothesis against the alternative hypothesis of a unit root. The subscripts μ and τ indicates the models that allow for drift terms and both a drift and deterministic trend respectively. The following asymptotic critical values are obtained from Kwiatkowski *et al.* (1992, p. 166).

Significance Level:	Level:	Trend:
1%	0.739	0.216
5%	0.463	0.146
10%	0.437	0.119

The KPSS test results revealed that all the examined series were integrated of order one, *I*(1). These results were consistent with the notion that most macroeconomic variables are non-stationary at level, but become stationary after first differencing (Nelson & Plosser, 1982). With these findings, we could proceed with the Johansen-Juselius cointegration test to examine the presence of a long-run equilibrium relationship.

EMPIRICAL RESULTS

Given that the KPSS unit root test results (see Table 1) indicated that all the estimated variables are same order of integration, *I*(1), we carried out the JJ cointegration test. As a common practice in JJ cointegration test, we have to decide the optimal lag structure for the VAR system. With the assistance from AIC, we found that a one year lag in the VAR system is the best. This finding is consistent with the usual empirical study practices which indicate that the maximum lag order for annual data analysis should not exceed three years (Enders, 2004). Then, we performed the JJ cointegration test with Model 2, 3, and 4. The modified Pantula principle was used to choose one of the three models. The results of standard Pantula principle suggested that Model 2 was the appropriate model hence we accepted the model without further testing with the LR statistic. The JJ cointegration result for Model 2 is presented in Table 2 Panel, A where r indicates the number of cointegrating vectors. The estimation result revealed that both the trace (λ_{trace}) and maximum eigenvalues (λ_{max}) statistics consistently rejected the null hypothesis of no cointegrating relation at the 5% significance level[5]. Thus, it can be concluded that the variables were cointegrated. In other words, FDI and exports are moving in tandem with economic growth to achieve steady-state equilibrium in the long-run, although they may deviate in the short run.

Since the variables were cointegrated and the interest of this study was to evaluate the response of economic growth to FDI and exports, the long-run coefficients were estimated using the Dynamic OLS procedure. The estimation results are presented in Table 2, Panel B.

Table 2: The Results of Cointegration Analysis

Panel A: Johansen-Juselius Cointegration Test			
Hypothesis			
H_0	H_1	Tests Statistics	Adjusted 5 per cent critical values
λ_{trace}			
$r = 0$	$r \geq 1$	79.845*	44.322
$r \leq 1$	$r \geq 2$	23.318	26.548
$r \leq 2$	$r \geq 3$	9.564	13.997
λ_{max}			
$r = 0$	$r = 1$	57.527*	28.972
$r \leq 1$	$r = 2$	12.754	21.829
$r \leq 2$	$r = 3$	9.654	14.016

Panel B: Dynamic OLS Cointegrating Vectors			
$\ln RGNP_t$	$\ln RFDI_t$	$\ln REX_t$	*Constant*
–1.000	0.111*	0.559*	4.608*

Note: The asterisk *, ** and *** denotes statistically significant at 1, 5, and 10% levels. The above Johansen's test 5% critical values were adjusted through Cheung and Lai (1993) procedure. The standard errors for Dynamic OLS were corrected by Newey and West (1987) procedure. A battery of diagnostic tests was conducted and the results shows that the estimates Dynamic OLS model are comply with the classical assumption.

The result in Table 2 Panel B shows that FDI and exports were positively related to economic growth in the long run and statistically significant at the 1% level. These findings were in accord with other studies that FDI and exports are the vehicles to economic growth (Baharumshah & Thanoon, 2006). Furthermore, the positive sign of FDI may shed some light that the Malaysian financial sector had successfully transmitted the benefits of FDI to economic growth, thus financial sector development in Malaysia is not as poor as Al-Yousif (2002) and Choong *et al.* (2004, 2005) mentioned. A plausible explanation is that these studies did not specify the deterministic terms (i.e. constant and trend) wisely and tended to choose Model 3 to test for cointegration, thus their results may be biased.

Turning to the Granger causality test, the presence of cointegration may not imply causation, thus we carried out the Granger causality test with ECM to determine the short-and long-run causality. The establishment of causality direction is essential to envisage useful policy implications for the Malaysian economy. The causality results are reported in Table 3.

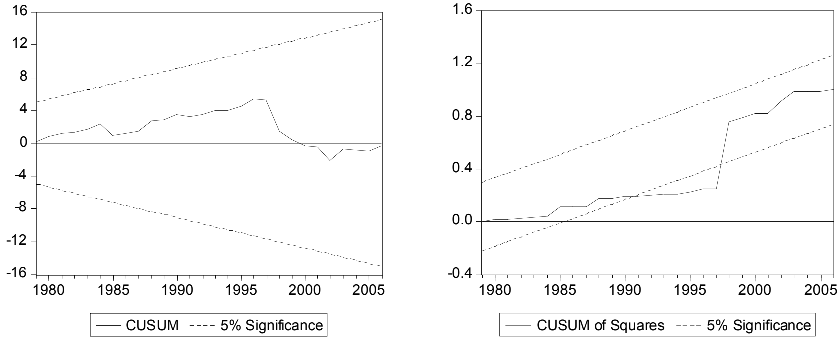
Table 3: The Results of Granger Causality Test on VECM

Dependent Variables	Independent Variables			
	$\sum \Delta \ln RGNP_t$	$\sum \Delta \ln RFDI_t$	$\sum \Delta \ln REX_t$	EC_{t-1}
	χ^2 – Statistics			t-statistic
$\Delta \ln RGNP_t$	–	7.055**	10.062*	–2.361**
$\Delta \ln RFDI_t$	18.068*	–	11.768**	–5.400*
$\Delta \ln REX_t$	16.071*	7.729	–	–1.876***

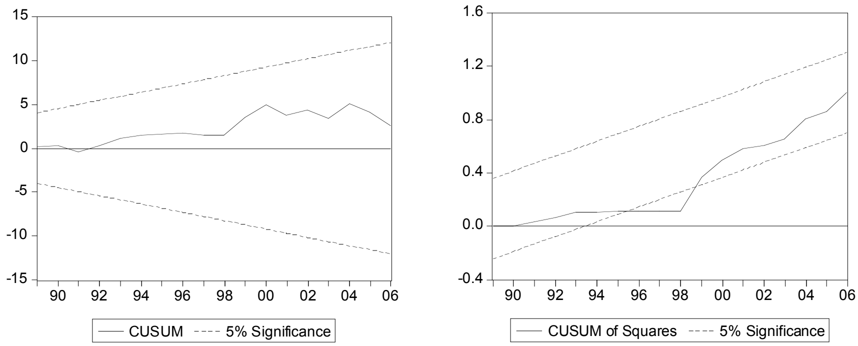
Note: The EC_{t-1} is the error-correction term. The asterisks *, ** and *** denotes statistically significant at 1, 5 and 10% levels.

The results in Table 3 clearly show that the one period lagged error-correction term, EC_{t-1} had a negative sign and statistically significant at the 10% level for all equations. These implied that the variables were not overshooting and thus the long-run equilibrium is attainable. Furthermore, the significance of the error-correction term infered that in the long-run, the estimated variables (i.e. economic growth, FDI, and exports) had Granger caused each other. Meanwhile, in the short run we found that there is a bilateral causal relationship between economic growth and its determinants. This revealed that both the influx of FDI and exports were prominent resources for economic growth in Malaysia. Moreover, the empirical evidence collected from this study showed that export growth Granger caused FDI. However, there is no reverse causality between these two variables. This result suggested that FDI inflow into the Malaysian economy does not lead to more exports, probably due to the high volume of raw materials imported by multinational corporations (Narayan, Lai, & Cheah, 1997).

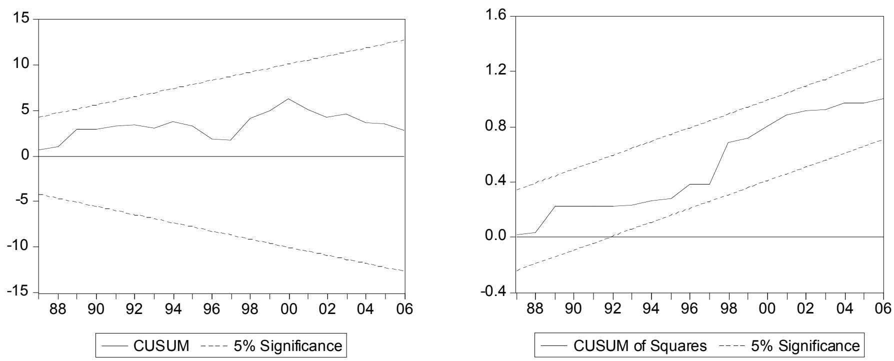
As noted in the objective of this study, the stability of the parameter is of concern. Thus, the CUSUM and CUSUM of Squares tests were conducted on ECM to investigate the stability of the estimated parameters. Figure 1 illustrates the plots of CUSUM and CUSUM of Squares statistics. Unfortunately, the result for CUSUM and CUSUM of Squares statistics were contradictory. On one hand, the CUSUM test indicated that the models were stable over time. On the other hand, the CUSUM of Squares test showed that there was a structural



(a) Economic Growth



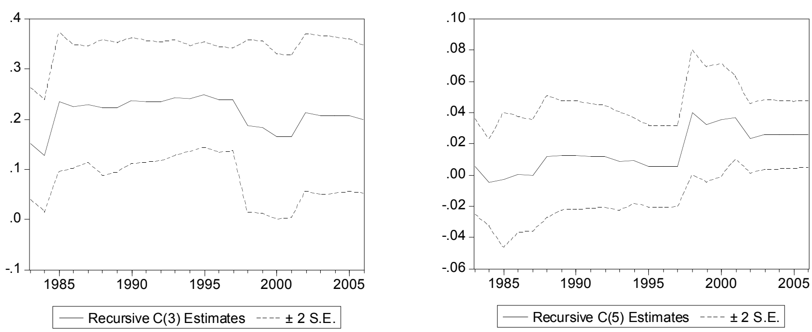
(b) Foreign Direct Investment



(c) Exports

Figure 1: The plots of CUSUM and CUSUM of squares tests

break during the 1997 to 1998 period, which was attributable to the Asian financial crisis that began in mid-1997. Therefore, we adopted the recursive regression procedure to affirm the stability of parameters by examining the fluctuation of FDI and export coefficients over time. The recursive regression results in Figure 2 indicated that the estimated coefficients seem to be not stable, particularly during the period from 1997 to 2002. This evidence was in harmony with the findings of the CUSUM of Squares statistics. Therefore, it can be concluded that the relationship between economic growth, FDI, and exports are not stable throughout the period of analysis. This empirical evidence was consistent with our prior expectations, but contrary to Choong and Lim (2007) who noted that the relationship between FDI and economic growth in Malaysia is stable over time, even when an economic crisis strikes a country. A plausible explanation for this can be found in Baharumshah, Thanoon and Rashid (2003) who noted that the sharp devaluation of Asian currencies had triggered a massive outflow of foreign capital in the latter half of 1997. This exodus of foreign capital jolted the Malaysian economy and is the probable cause for the instability detected. Moreover, the introduction of the Ringgit Peg regime in September 1998 yielded similar outcomes.



(a) Exports (b) FDI

Figure 2: Recursive regression coefficients movements

Note: The above coefficients movements were derived from the ECM equation of $\Delta \ln RGNP_t$.

CONCLUSION

The intention of this paper was to re-examine the relationship between FDI, exports, and economic growth in Malaysia over the period of 1970 to 2006. This study utilised the JJ multivariate cointegration approach to examine the presence of a long-run equilibrium relationship between economic growth and its determinants. The results of the JJ cointegration test revealed that economic growth and its determinants, FDI, and exports are cointegrated. In addition, the Dynamic OLS results suggested that FDI and exports are positively related to economic growth in the long run. These implied that higher FDI inflows and/or exports would increase Malaysia's economic growth in the long run. In view of policy implication, the Granger causality test on ECM suggested that both the FDI-led growth and the export-led growth hypotheses existed in Malaysia in both the short- and long-run. Therefore, it can be concluded that FDI and exports are two important components that may continuously foster Malaysia's economic growth. Unlike previous studies, the CUSUM of Squares test and recursive regression results showed that the effects of FDI and exports on economic growth were unstable, particularly after the onset of the Asian financial crisis.

The findings of this study may have some policy implications. Firstly, it supports the Eighth (2001-2005) and the Ninth (2006-2010) Malaysia Plan strategies that encourage the inflow of more quality foreign capital and rapid expansion of export-orientated business. However, inelasticity of FDI (0.11) to economic growth is indicative of the fact that the Malaysian economy may be too dependent on FDI inflows. Such dependence is especially threatening to the Malaysian economy during periods of massive capital outflows, as was the case during the Asian Financial crisis. In this context, the Malaysian authorities need to be more selective when approving foreign capital inflows since not all foreign capital is beneficial to economic growth (Griffin, 1970).

Secondly, the export elasticity (0.59) had a positive sign as expected. This implied that the exports can be used to influence Malaysian economic performance. In this regard, it is recommended that the Malaysian authorities should encourage the domestic manufacturing sector to further expand their export-oriented activities.

Thirdly, the analysis evidence from this study suggested that even though the effects of FDI and exports on economic growth are positive, policy initiatives to ensure the stability of both FDI and exports are important for long-run sustainability of Malaysian economy, because the effects of FDI and exports were unstable particularly after the onset of the Asian financial crisis.

END NOTES

1. The series of industrialisation strategy included import-substituting industrialisation policy in the 1960s, export-

orientated industrialisation policy in the 1970s via the Investment Incentives Act 1968 and the Industrial Master Plans (IMP) of the 1980s and 1990s.

2. According to Granger Representation Theorem, if the variables are cointegrated there must be Granger causality in at least one direction to hold the long run equilibrium relationship.

3. Reader may refer to Eview User Guide for more detail explanation on each model.

4. According to Agbola and Damoense (2005), although the OLS estimated coefficients of the cointegrating regression are consistent, the tests may have invalid statistical inferences (*t*-statistics and *F*-statistics cannot be used because the error terms are not normally distributed). Thus, we need to incorporate the leads and lags of the first differences regressors together with the Newey-West robust standard errors in the equation to yield a valid statistical inference.

5. The critical values have been corrected with the response surface procedure proposed by Cheung and Lai (1993).

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