

THE LINKAGES AMONG ECONOMIC GROWTH, FOREIGN DIRECT INVESTMENT, CAPITAL FORMATION AND TRADE OPENNESS: INVESTIGATION BASED ON VECM

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ABSTRAK

Kebanyakan kajian mengenai hubung kait ekonomi di Malaysia biasanya melibatkan dua pembolehubah iaitu pertumbuhan ekonomi (KDNK) dan pelaburan langsung asing (FDI). Kajian ini menyelidik hubung kait antara pertumbuhan ekonomi, FDI, keterbukaan perdagangan dan pembentukan modal di Malaysia bagi anggaran jangka pendek dan jangka panjang. Data yang digunakan adalah dari suku tahun pertama 2000 sehingga suku tahun keempat 2011. Ujian 'unit root', kointegrasi Johansen, Granger dan Vektor Pembetulan Ralat Model (VECM) telah digunakan untuk menganalisis hubungan dinamik antara semua pembolehubah. Keputusan menunjukkan kewujudan hubungan jangka panjang antara semua pembolehubah. Manakala bagi hubungan jangka pendek, hasil kajian menunjukkan terdapat hubungan dua arah sebab akibat antara FDI dan pembentukan modal. Selain itu, wujud hubungan satu arah sebab akibat antara pertumbuhan ekonomi, FDI, dan keterbukaan perdagangan serta di antara pembentukan modal dan pertumbuhan ekonomi.

Kata kunci: Pertumbuhan ekonomi, FDI, Keterbukaan perdagangan, Pembentukan modal kasar, VECM

ABSTRACT

In most studies on economic linkages in Malaysia the two variables commonly used are economic growth (GDP) and foreign direct investment (FDI). This paper investigate the linkages among the economic growth, FDI, trade openness and capital formation in Malaysia for short and long run estimation. The data used cover the period from first quarter of 2000 till the fourth quarter of 2011. The unit root, Johansen Cointegration, Granger Causality tests and Vector Error Correction Model (VECM) were used to analyse the dynamic relationships between all variables investigated. The results show the presence of a long-run relationship between all variables. Whereas in the short-term basis, the findings revealed bi-directional causality between FDI and capital formation, whilst there is unidirectional causality between economic growth, FDI, and trade openness and also between capital formation and economic growth.

Keywords: Economic growth, FDI, Trade openness, Gross capital formation, VECM

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1. INTRODUCTION

Malaysia has adopted a relatively open market-oriented economy. Whilst achieving the middle-income nation status, it is also among one of the most developed countries in the ASEAN region. According to World Investment Report 2010 (United Nation 2010), in 2007, the economy of Malaysia was the 3rd largest in South East Asia and 28th largest in the world in term of purchasing power parity (PPP). Between 1957 and 2005 real GDP grew by an average of 6.5 per cent per year. Like most other countries, Malaysia's economic policies were shaped by various events in the nation's history since independence. The Malaysian Government is continuing the efforts to accelerate the growth of its economy with the goal of transforming Malaysia into a high-income, developed nation by the year 2020. Therefore this study is essential to examine the relationship between main indicators that connected to each other in ensuring sustainability of economic growth.

Generally, the linkage between economic growth, FDI, trade openness and capital formation tends to be positive. This assertion is supported based on various studies and researches. Balasubramanyam et al. (1996), analysed 46 developing countries data over 1970-1985, found that the trade openness is essential for acquiring positive growth effect of FDI. They also found FDI does not enhance economic growth in developing countries, but it does in the developed countries. The idea that FDI leads economic growth is supported by Borensztein et al. (1998), and Obwona (2001). While De Mello (1997) had concluded that positive contribution of FDI to economic growth depend on technological conditions in the host countries.

Open economies normally have greater market opportunities and will face greater competition from businesses based in other countries. Edward (1992) reveals that a country with higher degree of economic openness could grow faster by absorbing new technologies at a faster pace than a country with lower degree of openness. Commonly, the higher the capital formation of an economy, the faster an economy can grow. Increasing an economy's capital stock also increases its capacity for production, which means an economy can produce more goods and services. This can give a positive effect to country's economic growth (Adhikary, 2011).

The previous studies did not only focus on the impact of all variables but the researchers also questioned on the causality between variables. Zhang (2001) concluded that there was a long run relationship between the FDI and GDP for 5 countries in East Asia and Latin America, in which the economic growth was enhanced by FDI. On the other hand, Choe (2003), found there was a bi-directional causality between FDI and GDP for 80 developed countries as evidence from the data available for the period of 1971 - 1995.

The results of the findings by the researchers showed that there is no consistency pertaining the relationship between all four variables. As such, the aim of this study is to find out empirically the causality between economic growth, FDI, trade openness and capital formation for developing countries, particularly in Malaysia. Hence, there are three main objectives, (i) to identify the pattern of economic growth, FDI, trade openness and capital formation time series data, (ii) to determine the long term equilibrium relationship between all variables, and (iii) to examine the causal relationships between all variables.

2. LITERATURE REVIEW

The relationship between economic growth, FDI, trade openness and capital formation supposedly, in theory at least, tends to be positive. Based on the results of several studies, reasons to support this assertion can be made. Using panel cointegration and causality techniques, Tang et al. (2008) examined China's quarterly time series data for the period 1998-2003. The result indicated that there is unidirectional causal effect between FDI, domestic investment (DI) and economic growth.

Moreover, using VAR model and VECM, Herzer et al. (2008) tested for cointegration to determine the effect of FDI on economic growth in 28 developing countries using 1970-2003 data. The result showed weak evidence that FDI had neither a long-run nor short-run relationship with economic growth and that there is no long-run causality between FDI and GDP for developing countries. Their findings reveal that impact of FDI on GDP depends on the level of income per capita, education, financial market development in host country and degree of trade openness.

Another vivid example from the previous studies is a research undertaken by Liargovas and Skandalis (2011), where the authors' main intention is to examine the importance of trade openness in attracting FDI. Employing data from 36 developing countries for the period of 1990-2008, the authors analysed all selected variables using direct causality test. The variables are FDI inflows, exchange rate stability, nominal GDP, GDP per capita, political risk, and trade openness. The results of the test indicate that trade openness contribute positively to the inflows of FDI in developing economies. Besides that, they also revealed some other factors that have positive influence on the FDI which include political stability, exchange rate and market size.

There is also a study, which focused entirely on the linkage between FDI, trade openness, capital formation and economic growth in Bangladesh. The author applied cointegration, VECM, Granger causality, impulse response, and variance decomposition to the annual time series data from 1986 to 2008. He found a strong long-run equilibrium relationship between economic growth and all variables under study with unidirectional causal flows. FDI and capital formation have significant positive effects to changes in real GDP. Trade openness unleashes negative but diminishing influence on GDP growth rate (Adhikary, 2011).

In an approach similar to the previous study, Hosein et al. (2009) also applied cointegration, VECM and Granger causality for the 1970-2006 annual data. The authors focused on the causal relationship between FDI, DI and economic growth for the Egyptian, Moroccan and Tunisian countries. The association between variable differ for different countries. FDI affects negatively to DI and GDP in the short-run and positively in the long-run. There is unidirectional causality between FDI and GDP in Egypt and Morocco and bi-directional causality between FDI and GDP in Tunisia.

To examine the FDI, export, trade openness, and economic growth for Pakistan and Turkey time series data from 1975-2004, Klasra (2009) applied the autoregressive distributed lags (ARDL) model and causality test. He measured trade openness as a ratio of total trade to GDP. Finally he found that there is a short-run bidirectional

causal relationship between trade openness and export for Pakistan and FDI and export link for Turkey. The growth-driven exports hypothesis is proven when there is a long run relationship result for Turkey and openness-growth nexus in Pakistan.

Furthermore, Chandran and Krishnan (2008), examined the short and long run dynamics of FDI over manufacturing growth in Malaysia using data from 1970 to 2003. They also analyzed using bounds test and autoregressive distributed lag approach. The result showed FDI elasticity in the short run and long run are significant. For the long run, it can be concluded that every 1 per cent increase in FDI will contribute to 0.115 per cent increase in manufacturing value added output in Malaysia.

Shan (2002) used vector autoregressive method to research the relationship between China's FDI and economic growth. He concluded that economic growth and FDI has bilateral causal relationship and the impact of the economic growth on FDI is greater than the impact of FDI on economic growth. Basu (2004) applied cointegration and error correction model to research on the relationship between India's FDI and economic growth. The result showed there is a long-run equilibrium between FDI and GDP.

It can be concluded that there is no consensus on the linkage between economic growth, FDI, trade openness and capital formation with its theoretical relationship although many researchers documented positive association between all variables. Chakrabarti (2001), proposed that the reason for the wide differences in these studies could be attributed to the researchers' own perception, the sample selection, the methodologies and analytical tools applied in their studies.

3. DATA DESCRIPTION AND METHODOLOGY

Data used in this research are collected from Department of Statistics Malaysia. There are four economic variables used in this study which are GDP values, FDI flows, trade openness and capital formation covering the period from 1st quarter 2000 to 4th quarter 2011. All data used are at current prices and actual values. Trade openness can be defined as the ratio of the total export and import to GDP, ie. $TO = (\text{Export} + \text{Import}) / \text{GDP}$ (Yanikkaya, 2003 and Gries et al., 2009).

3.1 Trend Analysis

The objectives of analysing time series data are to identify and to describe the underlying structure and phenomenon as depicted by the sequence of observations in the series and to determine the most suitable mathematical model to fit the data series which subsequently use the model to generate forecast values (Lazim, 2011). In order to investigate the pattern and the behaviour of the data, three main components of time series were studied; the trend, seasonal and irregular components.

3.2 Unit Root Test

The second test applied in this study is a unit root test or test for non-stationarity in the data at level and in difference. A series is said to be stationary if it fluctuates randomly around some fixed values, generally either around the mean value of the series or it could also be some other constant values or even zero value (Lazim, 2011).

For this study two test procedures were applied. They are Augmented Dickey Fuller (ADF) and Kwiatkowski, Phillips, Schmidt and Shin (KPSS).

3.2.1 Augmented Dickey Fuller Test

ADF test is recommended by Engle and Granger (1987) because of its stable critical values, that is having same critical values for large as well as for small sample size and it has good observed power properties.

The ADF test is performed by estimating the following model;

$$\Delta y_t = \phi y_{t-1} + \sum_{j=1}^J \phi_j \Delta y_{t-j} + \varepsilon_t \quad (1)$$

In this test hypotheses used are:

$H_0 : \phi = 0$ (y_t contain a unit root, in which case y_t is non-stationary)

$H_1 : \phi < 0$ (y_t does not contain a unit root, in which case y_t is stationary)

In the ADF test, the null hypothesis is unit root and, hence, will then attempt to reject this hypothesis. But it may be very difficult to reject a unit root when ϕ is close to one. This will lead to the low power for the test.

3.2.2 Kwiatkowski, Phillips, Schmidt and Shin Test

The KPSS test differ from the ADF test in the sense that the series (y_t) is assumed to be stationary under the null hypothesis. It used Lagrange Multiplier (LM) test for testing trend and/or level stationary.

The test statistic is defined to be;

$$LM = \sum_{t=1}^T \frac{S_t^2}{\hat{\sigma}_\varepsilon^2} \quad (2)$$

The hypotheses tested:

H_0 : Do not contain a unit root, the data is stationary

H_1 : Contain a unit root, the data is not stationary

The null hypothesis is rejected when the observed LM statistics is greater than the KPSS critical values (right one-sided test).

3.3 Cointegration Test

Cointegration Test is used to examine whether there exists a long-run equilibrium relationship among variables. Two or more variables move together, although they are non-stationary, on the rationale that there exists a long run linear relationship between them. Though in the short run they can deviate from each other, but they returned to an equilibrium state in the long run, and the residuals are stationary.

For this study, Johansen's (1988) procedure is applied, which is based on VAR model. Johansen's methodology takes its starting point in the VAR of order p given by:

$$y_t = \mu + \beta_1 Y_{t-1} + \dots + \beta_p Y_{t-p} + \varepsilon_t \quad (3)$$

where y_t is an $nx1$ vector of variables that are integrated of order one, $I(1)$ and ε_t is an $nx1$ vector of innovations. The VAR model can be rewrite as

$$\Delta y_t = \mu + \Pi y_{t-1} + \sum_{i=1}^{p-1} \tau_i \Delta y_{t-i} + \varepsilon_t \quad (4)$$

where

$$\Pi = \sum_{i=1}^p \beta_i - I \quad \text{and} \quad \tau_i = -\sum_{j=i+1}^p \beta_j \quad (5)$$

The equilibrium properties of (5) are characterised by the rank of Π . If all elements of y_t are stationary, Π is a full rank nxn matrix. If the elements of y_t are $I(1)$ but not cointegrated, Π is rank zero and a VAR model in first differences is appropriate. If the elements of y_t are $I(1)$ and cointegrated with rank $(\Pi) = r < n$, Π can be decomposed into nxr full column rank matrices α and γ where $\Pi = \alpha\gamma'$. This implies that there are $r < n$ stationary linear combinations y_t , such that $\varepsilon_t = \gamma'y_t \sim I(0)$. The matrix of adjustment coefficients, α , measures how strongly deviations from the long run equilibrium, ε_t , feed back onto the system. Estimation is typically performed using Johansen's reduced rank estimation technique, i.e., the long likelihood is maximised subject to the constraint that Π can be decomposed into two nxr full column rank matrices α and γ such that $\Pi = \alpha\gamma'$.

The cointegrating rank, r , can be tested using the trace test (λ_{trace}) and maximum eigenvalue test (λ_{max}). The λ_{trace} statistic can be computed as below:

$$\lambda_{trace} = -T \sum_{i=r+1}^n \ln(1 - \hat{\lambda}_i) \quad (6)$$

where λ_i is the i^{th} largest eigenvalue of matrix Π and T is the number of observations. In the trace test, the null hypothesis is that the number of distinct cointegrating vector(s) is less than or equal to the number of cointegration relations (r).

The λ_{max} statistic examines the null hypothesis of exactly r cointegrating relations against the alternative of $r+1$ cointegrating relations with the test statistics:

$$\lambda_{max} = -T \ln(1 - \hat{\lambda}_{r+1}) \quad (7)$$

where λ_{r+1} is the $(r+1)^{th}$ largest squared eigenvalue. The null hypothesis is $r=0$ is tested against the alternative of $r=r+1$ cointegrating vectors.

For Johansen-Juselius procedure, λ_{trace} and λ_{max} tests are conducted. For any difference between these tests, the final selection lies with the discretion of the researchers in view of their trade off for bias, efficiency and sample size.

3.4 Vector Error Correction Model (VECM)

VECM is a restricted form of VAR design which uses cointegrated nonstationary variables. VECM specification restricts the long run behaviour of the endogenous variables to converge to their cointegrating relationships while allowing for short-run dynamics. If the variables, X_t and Y_t , are found to be cointegrated, an error will occur which is linked to the equation. This will give the implication that changes in dependent variable is a function of the imbalance in cointegration relation, which is represented by the error correction term and by other explanatory variables (Engle & Granger, 1987).

Naturally, if X_t and Y_t have similar stochastic trend, current variables in Y_t (endogenous variable) is in part, the result of Y_t moving in line with trend value of X_t (exogenous variable). Through error correction term (ECT), VECM allows the discovery of Granger Causality relation (Granger, 1968).

The VECM model is specified as:

$$\Delta GDP_t = \beta_1 + \sum_{i=1}^n \beta_2 \Delta GDP_{t-i} + \sum_{i=1}^n \beta_3 \Delta FDI_{t-i} + \sum_{i=1}^n \beta_4 \Delta TO_{t-i} + \sum_{i=1}^n \beta_5 \Delta GCF_{t-i} + \lambda ECT_{t-i} + \varepsilon_t \quad (8)$$

The variables are cointegrated if the parameter (λ) of the ECT is negative and statistically significant in terms of its associated t-value. This indicates unidirectional long-run causal flows from changes in FDI, capital formation and trade openness to real GDP changes as well as long-run convergence. For changes in FDI, capital formation and trade openness, Granger cause the changes in economic growth rates when β_3 's, β_4 's and β_5 's are significant in terms of the F- test (Bahmani & Payesteh, 1993). In case of λ being positive and statistically significant, still there exists a long-run causality but with a divergence. Akaike information criterion (AIC) is used to determine the structural lag.

3.5 Granger Causality Test

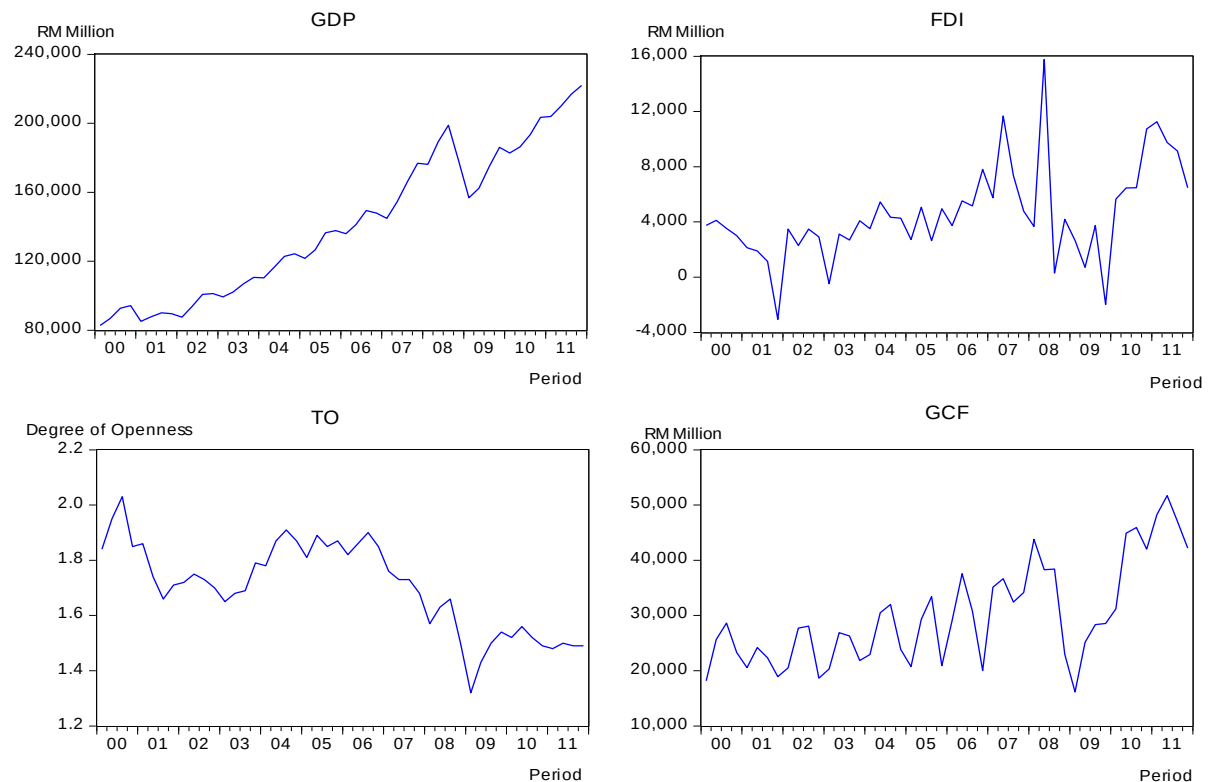
Granger (1986), Hendry (1986), and Engle and Granger (1987), Johansen (1988) and Johansen and Juselius (1990) were among the pioneers who had contributed to the Granger Causality test. According to Granger (1981) if cointegration exists in time series data sets, ECT obtained from the regression must be taken into consideration in the causality test. This is to avoid the miss-specification problem.

The Granger Causality test is performed in order to estimate the directional relationship between the variables. The time series X_t is a Granger cause of the time series Y_t if X_t is useful in forecasting Y_t . In the case of both variables causing each other is known as a feedback system. The causality between dependent and independent variables can be examined by conducting Wald test.

4. ANALYSIS AND FINDINGS

4.1 Trend Analysis

Figure 1: Economic Growth (GDP), FDI, Trade Openness (TO) and Capital Formation (GCF)



At the initial stage, data exploration and identification were performed with the aim of characterising the trend, seasonality and irregularity so as to describe their salient features. Economic growth (GDP), FDI and capital formation (GCF) showed an upward trend which is contrary to trade openness (TO) which showed a downward trend. The sub-prime mortgage financial crisis in the United States of America (USA) gives significant impact to the Malaysia's economy in the late 2008. Fortunately, the effect is only for a short-term and Malaysian economy has since recovered starting from second quarter 2009 onward. For seasonality test, the result showed a strong seasonal effect in economic growth, trade openness and capital formation data. Therefore, the data used in this study had been deseasonalised.

4.2 Unit Root Test

Two stationary tests are used in this study to further confirm the outcome of the investigation, that is the ADF test and the KPSS test. Both tests were conducted on the economic growth, FDI, trade openness and capital formation data series. The result of both ADF and KPSS tests (Table 1) reveal that the series are non-stationary in level. On the other hand, all four variables are found to be stationary in their first differences. This indicates that all four variables are integrated of order one, $I(1)$. Since the economic growth, FDI, trade openness and capital formation are

integrated in the same order of integration, $I(1)$, test for cointegration using Johansen test can be performed.

Table 1: Unit Root Test Results

VARIABLE	ADF Test		KPSS Test		
	At level (p-value)	At first difference (p-value)	At level (LM value)	At first difference (LM value)	KPSS critical values
FDI	0.1371	<0.001*	0.4670*	0.0995	0.4630
GDP	0.9932	<0.001*	0.8975*	0.3578	0.4630
GCF	0.8348	<0.001*	0.6683*	0.0212	0.4630
TO	0.6082	<0.001*	0.5872*	0.0945	0.4630

* Significance level at 5%.

4.3 Johansen Cointegration Test

Johansen Cointegration test was used to test the existence of equilibrium relationship between variables in a long-run. Two statistics were used to determine the cointegration rank, which are λ_{trace} and λ_{max} . In this study Johansen Cointegration test was used at four different lags (*lag 1*, *lag 2*, *lag 3*, and *lag 4*) and the results of analysis are reported in Table 2. The overall results consistently suggested to reject the null hypothesis of no cointegration vector ($r=0$) at 5% significance level on all lags tested. However, the results fail to reject the null hypothesis of existence at least one cointegration vector ($r=1$) for the series in the system. Thus, it is possible to say that there is a long run equilibrium relationship between economic growth, FDI, trade openness and capital formation series. This further suggests that the given variables are not independent of each other in the long run.

Cointegration between variables cannot indicate the direction of Granger causality relationship, therefore VECM will be applied in the next step.

Table 2: Johansen Cointegration Test Results

Null Hypothesis	λ_{trace}	5%	λ_{max}	5%
Lag length = 1				
$r = 0$	58.3324*	47.8561	38.1073*	27.5843
$r < 1$	20.2252	29.7971	15.4605	21.1316
$r < 2$	4.7647	15.4947	4.6434	14.2646
$r < 3$	0.1214	3.8415	0.1214	3.8415
Lag length = 2				
$r = 0$	45.6963	47.8561	28.3693*	27.5843
$r < 1$	17.3269	29.7971	14.6475	21.1316
$r < 2$	2.6795	15.4947	2.5234	14.2646
$r < 3$	0.1561	3.8415	0.1561	3.8415
Lag length = 3				
$r = 0$	54.0419*	47.8561	25.2922	27.5843
$r < 1$	28.7497	29.7971	18.1896	21.1316
$r < 2$	10.5601	15.4947	10.3228	14.2646
$r < 3$	0.2373	3.8415	0.2373	3.8415
Lag length = 4				
$r = 0$	59.9570*	47.8561	31.1303*	27.5843
$r < 1$	28.8267	29.7971	23.5636*	21.1316
$r < 2$	5.2632	15.4947	5.2618	14.2646
$r < 3$	0.0014	3.8415	0.0014	3.8415

* Significance level at 5%.

Note: r indicates the number of cointegrating vectors.

4.4 VECM and Granger Causality Test

As stated in the methodology, VECM only applies to cointegrated series. If the ECT is significant, this indicates that the long-run relationship exists between all variables and suggested that ECT drives the variables back to their long-run equilibrium relationship. After the existence of cointegration relationship in the model is found, the Granger Causality test based on VECM is applied to examine the causalities of the variables. The existence of cointegration implies the existence of Granger causality in at least one direction (Granger, 1986). Granger Causality test is a complimentary finding from cointegration tests because the cointegration relationship does not indicate the direction of causality between the variables.

The estimation of a VECM requires selection of an appropriate lag length. The number of lags in the model has been determined according to the smallest AIC. The results show lag length that minimises the AIC is 4. Table 3 provides the results from computed t-values of the regression coefficients ECT, F statistics for the short run Granger Causality within the VECM and AIC values for all lags are tested.

The estimated coefficient of ECT in the economic growth (GDP) equation is statistically significant and has a negative sign, which confirms the existence of a long-run equilibrium relationship between the independent and dependent variables at 10.0 per cent level of significance. The calculated relative value of -0.0592 shows the rate of convergence to the equilibrium. Precisely, the speed of adjustment of any disequilibrium towards a long-run equilibrium is that about 5.9 per cent of the disequilibrium in all four variables is corrected each quarter.

For the capital formation (GCF) equation, the estimated coefficient of ECT is negative and statistically significant at 10.0 per cent significance level. Thus, it is possible to say that the speed of adjustment of any disequilibrium towards a long-run equilibrium is about 18.3 per cent of the disequilibrium in all four variables is corrected each quarter. Hence, there is a long run equilibrium relationship between capital formation and all three dependent variables.

Table 3: VECM and Granger Causality Test Results

Variable	ΔGDP_SA	ΔFDI	ΔTO_SA	ΔGCF_SA	$ECT_{e1,t-1}$ (t value)
Lag length=1	AIC = 54.7936				$t_{0.1,45}$: 1.684
ΔGDP_SA		0.4625	0.64	0.0435**	-0.0045 (-1.90465)*
ΔFDI	0.2022		0.9004	0.7951	0.0063 (4.90557)*
ΔTO_SA	0.1621	0.8823		0.9078	-3.24×10^{-8} (-0.97948)
ΔGCF_SA	0.4585	0.1577	0.0627*		-0.0077 (-3.73520)*
Lag length=2	AIC = 54.4060				$t_{0.1,44}$: 1.684
ΔGDP_SA		0.8044	0.0336**	0.0114**	-0.0153 (-1.71175)*
ΔFDI	0.4403		0.7776	0.1309	0.01796 (3.14230)*
ΔTO_SA	0.0034**	0.1934		0.1173	2.73E-07 (2.12554)*
ΔGCF_SA	0.1605	0.1916	0.5978		0.0032 (0.33369)
Lag length=3	AIC = 54.0848				$t_{0.1,43}$: 1.684
ΔGDP_SA		0.0367**	0.0767*	0.0013**	-0.0307 (-3.50619)*
ΔFDI	0.2379		0.8731	0.2357	0.0101 (1.65609)
ΔTO_SA	0.0010**	0.2228		0.3035	3.07E-08 (0.28424)
ΔGCF_SA	0.1096	0.2431	0.8564		-0.0083 (-0.84786)
Lag length=4	AIC = 53.75067				$t_{0.1,42}$: 1.684
ΔGDP_SA		0.3536	0.7217	0.0857*	-0.0592 (-1.83508)*
ΔFDI	0.0203**		0.2675	0.0001**	0.0012 (0.05947)
ΔTO_SA	0.0354**	0.7888		0.3114	1.48E-07 (0.38175)
ΔGCF_SA	0.3346	0.0229**	0.7482		-0.1827 (-1.82245)*

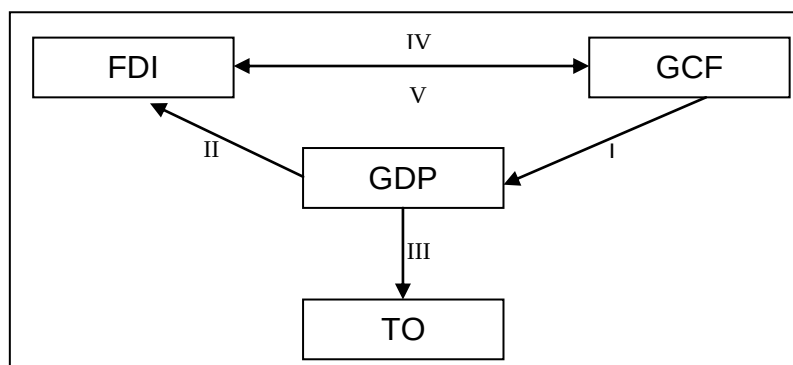
** Significance level at 5%.

* Significance level at 10%.

Note : The above values are the value of F (p value).

The summary of the results of this study can be derived from Figure 2. From this figure we can see the existence of short-run causality effects between variables under study. The result shows that there exists causal unidirectional relationship of capital formation on economic growth. The unidirectional causality also occurred between economic growth and to FDI (II) and economic growth to trade openness (III). The results also suggested that there exist bidirectional causality between capital formation and FDI flows (IV and V).

Figure 2: Granger Causality Relationship



5. CONCLUSION

There are three main objectives of this study; (i) to identify the pattern of time series data economic growth, FDI, trade openness and capital formation, (ii) to determine the long-run equilibrium relationship between all variables, and (iii) to examine the causal relationships between all variables. The time series data cover the period from first quarter 2000 to fourth quarter 2011.

Over the entire period analysed, all variables with the exception of trade openness, showed upward trend. The sub-prime mortgage financial crisis in USA had adversely affected the Malaysian economy in 2008 till 2009 through the trade and financial links. This has caused a significant effect for all four variables used in this study.

Based on the evidence from the Johansen Cointegration test, the study reveals the existence of a long run equilibrium relationship between economic growth, FDI, trade openness and capital formation. This gives the implication that, even though there is a momentary dispersal from the common long run trend, the power of dependent variables will revert to long run equilibrium.

The Granger Causality test is performed to determine the direction of the relationship between both fundamental variables through VECM. The estimated coefficient of ECT in the economic growth equation and capital formation equation are statistically significant and both have negative signs, which confirm the existence of a long-run equilibrium relationship between the independent and dependent variables at 10 per cent level of significance. Furthermore, in the short-term relationships, the findings revealed bidirectional causality between FDI and capital formation. In addition, promoting economic growth may stimulate FDI and trade

openness. The results also suggest that the increases in capital formation may stimulate economic growth in the short term.

Further and more comprehensive research need to be done in order to reveal more evidence to support the hypothesis. It is suggested that in this study the data used can be further analysed by using different methods such as impulse response method, variance decomposition method and autoregressive distributed lag model. Another procedure that can be looked at is to build a model by identifying the determinant of FDI or economic growth. It would also be interesting to provide additional evidence from other countries to determine whether the specific results as reported here for Malaysia can be generalised to other Asian or developing countries.

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