Causal relationship between FDI, trade, economic growth and exchange rate : Malaysian evidence

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Abstract

FDI plays an important role by increasing and supplementing the supply of funds for domestic investment in the host country. The spillovers from FDI can benefit a developing country like Malaysia especially in terms of creating employment and improving the standard of living while indirectly boosting the economic growth. Thus, this paper tests the causal relationship between foreign direct investment, trade openness, economic growth and foreign exchange rate in Malaysia. The findings based on cointegration tests indicate that these variables are theoretically related in the long run. In addition, the findings based on the Generalized variance decomposition (VDC) tend to indicate that economic growth is driven mostly by exchange rate followed by trade openness and FDI. The results appear to be plausible and intuitive and have strong policy implications for an emerging economy like Malaysia.

Keywords: Causality, FDI, trade, growth, exchange rate, VECM, VDC, Malaysia

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INTRODUCTION

Foreign Direct Investment (FDI) is generally referring to a long-term investment by one country in another country. When one talks about FDI, it is commonly referred to capital inflows from abroad. The participation in FDI usually involves a joint venture, capital transfer and transfer of technology and expertise. It involves not only a transfer of resources but also the gaining of control. There are three types of FDI; Horizontal FDI, Platform FDI and Vertical FDI. Horizontal FDI arises when a firm duplicates its home country-based activities at the same value chain stage in a host country through FDI. Platform FDI is a foreign direct investment from a source country into a destination country for the purpose of exporting to a third country while Vertical FDI takes place when a firm moves upstream or downstream in different value chains through FDI.

FDI has been a source of economic growth for Malaysia since the 1990s. It plays an important role by increasing and supplementing the supply of funds for domestic investment in the host country. FDI can also increase the host country's export capacity, affecting the country's foreign exchange earnings to increase. For a developing country like Malaysia, the most important benefit of FDI is that it could create and encourage new employment, helping the country to develop and improve their standard of living. In addition, it enhances technology transfer for the host countries. When the foreign factories are set up in their countries, they will expose a higher technology production and efficiency in management. Mohd Nazari Ismail (2001) finds that foreign direct investment plays a significant role in the Malaysian economy especially in the electronic industry. The foreign multinationals have contributed to the development of the technical capabilities of the locals. This is through the process of technology transfer.

Wang and Blomstrom (1992) and Gu¨nther (2002) stated that there are four main channels of technological spillovers from foreign to local firms, namely imitation, competition, skills and linkage. Imitation occurs when a local firm improves its productivity by imitating the technology used by the multinational firm. It is also known as the learning-by-watching effect. Competition with local firms is created by the presence of foreign firms. Therefore, domestic firms have no choice but to use the existing resources more efficiently and adopt new technologies. The spillover effect of

transfer of knowledge to the host country occurs when there is mobility of well-trained workers and managers from foreign firms to domestic firms. Glass and Saggi (2002). According to Borensztein et al. (1998), FDI spillover arising from linkages occurs when foreign firms have productivity spillover effects on local firms in the same industry (horizontal spillovers) or (and) in upstream and downstream industries (vertical spillovers) by increasing the range and quality of intermediate goods.

Besides FDI, international trade is also believed to be one of the several substances of productivity and growth. The theoretical literature of growth and international trade reveals that trade stimulates the long-term growth. Thus, trade has made an increasingly significant contribution to economic growth in the most of countries as a key component of the development path. A finding from the comprehensive literature confirms that internationally active countries tend to be more productive than countries that only produce for the domestic market. International trade also promotes the efficient allocation of resources and can lead to higher growth that may be converted into greater factor accumulation, especially to those economies associated with technology diffusion and knowledge spillovers.

The majority of past empirical studies were done on either trade and FDI interaction on economic growth (Balasubramanyam et al., 1996; Karbasi et al., 2005) or the relationship between FDI and economic growth (Lipsey, 2000) or (and) the relationship between trade and economic growth (Pahlavani et al., 2005). These studies have concluded that both FDI inflows and trade promote economic growth. However, these studies have failed to provide a conclusive result on the relation in general and the direction of the causality especially in many developing countries. Different countries are affected differently by the growth enhancing effects from FDI inflows and trade. Some studies done by De Mello (1999), Lipsey (2000) and Xu (2000) revealed that FDI and trade can even have a negative impact on economic growth for some countries.

Despite the plentiful empirical studies on FDI, trade and economic growth in emerging and developing countries, there is not much literature on this subject in Malaysia. This paper investigates the causal relationship between trade, FDI and economic growth in Malaysia using annual time-series data covering 44 years starting from 1970. We can draw some important lessons and guidelines or policymakers in the pursuit of a more

effective scheme to promote economic growth in Malaysia by comparing the important roles of FDI and trade.

LITERATURE REVIEW

Findings on relationship and causality between FDI and economic growth vary from different method used by the researchers. A study done by Balasubramanyam et al. (1996) analyzes how FDI affects economic growth in developing economies. Using cross-section data and OLS regressions in his model, he finds that FDI has a positive effect on economic growth in host countries using an export promoting strategy but not in countries using an import substitution strategy. Borensztein et.al (1998), examines the effect of FDI on economic growth in a cross country regression framework and utilizing data on FDI flows from industrial countries to 69 developing countries over the last two decades, finds that FDI is an important medium for the transfer of technology, contributing relatively more to growth than domestic investment. However, the higher productivity of FDI holds only when the host country has a minimum threshold stock of human capital. In other words, FDI contributes to economic growth only when there is a sufficient absorptive capability of the advanced technologies available in the host economy. Another study by the same researcher on the role of FDI in the process of technology diffusion and economic growth in developing countries concludes that the magnitude of the positive effect of FDI on economic growth depends on the amount of human capital available in the host country.

Further study done by Chowdhury and Mavrotas (2003) examines the causal relationship between FDI and economic growth in three developing countries, Chile, Malaysia and Thailand, where all are major recipients of FDI with different history of macroeconomic episodes, policy regimes and growth patterns. The study was done from the period 1969 to 2000 using time series data. They found that in the case of Chile, it is the GDP that affects FDI and not the other way around while in the case of both Malaysia and Thailand, there is a strong evidence of a bi-directional causality between the two variables.

In neo-classical analysis, FDI does not influence the long-run growth rate, but only the level of output. An increase in FDI would increase the amount of capital and income per capita temporarily. This is due to the diminishing returns on the marginal

product of capital in the long run. The impact of FDI on the long-run growth rate can occur only through technological progress or growth of the labor force. The new growth theory explores the determinants and impacts of technological progress. Basically, the main difference between the neoclassical theory and the new growth theory is that the former assumes technological progress to be exogenous, the latter explains technological progress as a form of investment spillover arising from sources such as tangible capital, human capital, or research and development expenditures.

Empirical studies on the impacts of trade openness and FDI on economic growth have produced vague results. A study by Alici and Ucal (2003) examining the effect of Turkey's liberalization process on economic growth by investigating a Granger causal relationship between trade, FDI and economic growth during the period of 1987–2002 on a quarterly basis found that there is evidence of Export-Led Growth Hypotheses (ELGH) but not FDI-Led Growth Hypotheses (FLGH) because the spillover effects from FDI to GDP are not present. However, another study by Caudros et al. (2004) using a vector autoregressive model to investigate the causal relationship between economic growth, inward FDI and trade in Argentina, Brazil and Mexico from the mid-seventies to 1997 confirmed the FLGH but not the ELGH.

Baliamoune-Lutz (2004) found that in Morocco, there is a positive impact of FDI on economic growth and there is a bidirectional relationship between exports and FDI. This shows that FDI can also promote exports and vice versa. On the other hand, Alaya (2006) found that the impact of FDI on economic growth is significantly negative in the case of Morocco, Tunisia and Turkey. Economic growth is mainly determined by exports, domestic investments and to a lesser extent human capital. The author explained that FDI has the tendency to eliminate domestic investments in these three countries and FDI inflows are relatively instable. The volatility of FDI inflows is explained by privatization, which becomes one important source of FDI for these countries in certain years. The volatility is also often correlated with an absence of reinvestment and weak integration of foreign firms within the host country.

A number of studies have been done on the empirical evidence of exchange rate fluctuations (volatility) and economic performance of different economies. The literature suggests that different exchange rate regimes have different impact on the

economy. While the flexible exchange rate has exchange rate regime has negative impacts on growth (Levy Yeyati and Sturzenegger, 2003). On the other hand, Ma and McCauley (2011), found that the intermediate exchange regime is positively correlated with growth in emerging economies but suffers from flexibility. Floating exchange rate regimes do not show any significant impact on the advanced economies, comparatively. However, Vita and Kyaw (2011) argue that the choice of exchange rate regime does not have direct effects on the long-term growth in developing countries. Industrial countries usually have a higher growth rate under the flexible exchange rate policy while in developing countries and emerging markets, the announcement of a peg to the US currency and actual stability in exchange rate normally have positive effects on growth (Harms and Kretschmann, 2009).

In 1970, Aliber was the first one who investigated the effect of exchange rate variation on FDI flows. According to him, he reasoned that countries that have weak money rate might attract FDI with the goal of increasing purchasing power. However, his explanation was not popular until the end of 1980s and the beginning 1990s when exchange rate was seriously introduced as the one of the determinants of FDI. Jeanneret (2007), investigated the impact of exchange rate volatility on FDI using the panel data of 27 countries during 1982 – 2002 and found that there is a U shape and non-uniform relation between FDI and exchange rate. Another research by Xiong (2005) studied the impact of exchange rate uncertainty on FDI for multi-national firms in Australia, Canada, UK, Japan and the US. Using ARDL and data since 1973-2002, he found that exchange rate volatility and bilateral exchange rate have a negative effect on outward FDI in Australia but for Canada, Japan and UK, only the bilateral exchange rate has significant effect. The exchange volatility plays no significant role on outward FDI for all the countries tested.

METHODOLOGY & DATA

In this paper, annual time series data on economic growth, FDI, trade and foreign exchange rate covering 44 years starting from 1970 are used. All the data have been obtained from the World Bank Data. Economic growth is measured by the increase of GDP in each of following period. FDI is the value of foreign direct investment net inflows to GDP ratio. Trade openness (TRO) is the total sum of exports

and imports divided by GDP. Foreign exchange rate, denoted by FRX is the average exchange rate of Malaysian Ringgit per US Dollar at every period. This study uses a time series technique consisting of cointegration, error correction modeling and variance decomposition in order to find empirical evidence of the nature of relations between the variables.

RESULTS & DISCUSSION

Unit roots tests

Firstly, in time series analysis, before running the causality test, the variables must be tested for stationarity. Unit root test is important because there is a major problem with regressions that involve non-stationary variables as the standard errors produced are biased. The bias means that conventional criteria used to judge whether there is a causal relationship between the variables are unreliable. A stationary series has a mean to which it tend to return, a finite variance, shocks are transitory, autocorrelation coefficients die out as the number of lags grows while non-stationary series are the opposite.

To test for stationarity, we use Augmented Dickey Fuller (ADF) and Phillips Peron (PP) test. We expect the variables to be non-stationary in the log-form because they infer long run information. On the other hand, we expect the variables to be stationary in the difference form because long run information has been changed to short term information. The results are shown in the tables below.

ADF Test

	VARIABLE	ADF	VALUE	T-STAT.	C.V.	RESULT
LOG FORM	LGDP	ADF(5)=SBC	77.3596	-2.988	-3.479	Non-Stationary
		ADF(5)=AIC	70.8093	-2.988	-3.479	Non-Stationary
	LFDI	ADF(5)=AIC	53.4801	-2.470	-3.479	Non-Stationary
		ADF(5)=SBC	60.0305	-2.470	-3.479	Non-Stationary
	LTRO	ADF(1)=SBC	50.9889	-0.537	-3.659	Non-Stationary
		ADF(1)=AIC	54.2641	-0.537	-3.659	Non-Stationary

	LFRX	ADF(1)=SBC	44.0724	-2.132	-3.659	Non-Stationary
		ADF(1)=AIC	47.3476	-2.132	-3.659	Non-Stationary

	VARIABLE	ADF	VALUE	T-STAT.	C.V.	RESULT
1ST DIFF. FORM	DGDP	ADF(5)=SBC	77.3593	-3.676	-2.765	Stationary
		ADF(5)=AIC	71.7211	-3.676	-2.765	Stationary
	DFDI	ADF(5)=SBC	60.5620	-3.688	-2.765	Stationary
		ADF(5)=AIC	54.9238	-3.688	-2.765	Stationary
	DTRO	ADF(1)=SBC	49.3272	-3.653	-2.874	Stationary
		ADF(1)=AIC	51.7435	-3.653	-2.874	Stationary
	DFRX	ADF(1)=SBC	42.4620	-4.373	-2.874	Stationary
		ADF(1)=AIC	44.8784	-4.373	-2.874	Stationary

The null hypothesis for both ADF and PP test are non-stationary (T-statistic < critical value) and alternate hypothesis (T-statistic > critical value). Hence, in log form, we expect to accept the null hypothesis whereas in difference form we expect to reject the null hypothesis.

The ADF test shows that all variables are non-stationary in their log form and stationary in their differenced form. On the other hand, using PP test, there is a combination of non-stationary and stationary series in the variables' log form while their differenced form portrays the same result as the first test. As both tests are viable measurement of stationarity, we have chosen to adopt the results from ADF to proceed to the next step.

VAR lag order

In this step we are testing for the number of lags. When running regressions on time-series data, it is often important to include lagged values of the dependent variable as independent variables. In other words, the regression is now called a vector autoregression (VAR). For example, when trying to sort out the determinants of GDP, it is likely that last year's GDP is correlated with this year's GDP. If this is the case, GDP lagged for at least one year should be included on the right-hand side of the regression. If the variable in question is persistent, that is, values in the far past are still affecting today's values, more lags will be necessary. In order to determine how many lags to use, several selection criteria can be used. The two most common are the Akaike

Information Criterion (AIC) and the Schwarz' Bayesian Information Criterion (SBC). The difference between the two is such that AIC focuses on predicting the best of order lags where more concern is given on large value of likelihood while less concern on over-parameter while SBC is more concern on over-parameter. The lag order for this study is found in the following table.

Order	AIC	SBC	p-Value	C.V.
4	32.0667	86.8379	[.897]	5%

We have chosen the highest value for AIC and SBC and check the p-value. Should it be more than the critical value of 5%, we take the corresponding lag order. In this case, the highest AIC has a p-value is 0.897 which is more than 0.05 at lag order of 4 while the highest value of SBC corresponds to a higher lag order of 6. As the highest value for AIC and SBC both conflicting, we take the lower order (4) as higher lag order causes an increase in the mean square forecast errors of the VAR.

Cointegration test

Cointegration indicates that there is a theoretical relationship among the variables and they are in equilibrium in the long run. It implies that each variable contains information for the prediction of other variables. Hence, in this cointegration test, we are checking whether our variables are moving together or not. This can be done by using Engle-Granger and Johansen's cointegration tests. The results are shown below.

Johansen's Test

Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

Null	Alternative	Statistic	95% Critical Value	90% Critical Value	Result
r = 0	r = 1	35.746	31.790	29.130	2 cointegration
r<= 1	r = 2	28.313	25.420	23.100	
r<= 2	r = 3	10.901	19.220	17.180	

Cointegration LR Test Based on Trace of the Stochastic Matrix

Null	Alternative	Statistic	95% Critical Value	90% Critical Value	Result
r = 0	r>= 1	81.160	63.000	59.160	2 cointegration
r<= 1	r>= 2	45.414	42.340	39.340	
r<= 2	r = 3	17.1016	25.77	23.08	

Using the Johansen's test, we found that there are two cointegrations among the variables. The null hypothesis is such that there is no cointegration. If the T-statistic is less than the critical value, then we fail to reject the null. Hence, there is no cointegration. Results from the table above show that the T-statistic is more than the critical value and therefore, we reject the null hypothesis. This indicates that there is cointegration between the variables. However, using the Engle-Granger Test, the results have shown the opposite where we could not find any cointegration among the variables. We use the results obtained from the Johansen test, where there is cointegration among the variables, to continue to the next step.

LRSM

This step attempts to estimate theoretically meaningful long-run relations by imposing on those long-runs relations. The results are presented below.

VRBL	PANEL A	PANEL B	PANEL C	PANEL D	PANEL E
LGDP	1.0000	1.0000	1.0000	1.0000	1.0000
	(*NONE*)	(*NONE*)	(*NONE*)	(*NONE*)	(*NONE*)
LFDI	4.4747	0.00	-0.97096	-1.0330	-1.0446
	(8.4600)	(*NONE*)	(0.42358)	(0.56499)	(0.40673)
LTRO	-15.9120	-3.2388	-.0000	-0.033160	0.00
	(23.0126)	(1.0903)	(*NONE*)	(1.1038)	(*NONE*)
LFRX	13.2281	3.0266	0.55916	0.00	0.00
	(18.6563)	(1.1015)	(0.85214)	(*NONE*)	(*NONE*)
Trend	0.21921	0.023560	-0.032391	-0.023653	-0.024457
	(0.35693)	(0.031207)	(0.018924)	(0.030041)	(013767)
CHSQ(1)	NONE	3.2820[.131]	5.6684[.017]	6.1123[.013]	6.1132[.047]

s.e. in parentheses

In Exact Identification, we are normalizing the coefficients by imposing restriction 1 to our focus variable treated as dependent. In this case, we take GDP as the dependent variable. Empirical studies have shown that the determinants of GDP include FDI and trade openness. Panel A shows the output by imposing restriction 1 to GDP. Dividing the coefficient by standard error will give us the T-statistic. If the T-statistic is greater than 2, then that variable has significant impact on the dependent variable, which in this case is GDP. The output shows that each variable has no significant impact on GDP.

Therefore, we move to Over Identification where we add a restriction on other variables. Firstly, we add a restriction on the first variable where LFDI=0, meaning that it is insignificant to GDP. After running the result, it is found that both trade openness and foreign exchange rate have significant impact on GDP. The p-value is more than 5%, which further confirms the restriction to be correct.

We then restrict the trade openness variable as shown in Panel C. The result shows that only FDI seems to have a significant impact on GDP. However, its p-value is less than 5%, indicating the restriction to be unfitting. The same conclusion applies after we restrict LFRX except none of the variables are significant to GDP. Next, we have added two restrictions; TRO and FRX to see if FDI has an impact towards GDP. The result shows that it has a significant impact towards GDP but the p-value is slightly less than 5%, making the result unviable. Accordingly, we have chosen to carry on to the next step using the added restriction of FDI.

Vector error correction model (VECM)

This step is to find out which variable is strong (exogenous) and which is weak (endogenous). The results include the imposed restriction from the previous step. The test results are depicted below.

ecm1(-1)	Coefficient	Standard Error	T-Ratio [Prob.]	C.V.	Result
dLGDP	-1.1660	0.34180	-3.4185[.002]	5%	Endogenous
dLFDI	-0.15421	0.2661	-0.57948[.567]	5%	Exogenous
dLTRO	0.0077728	0.018616	0.41753[.680]	5%	Exogenous
dLFRX	-0.0084097	.00004496	.40116[.689]	5%	Exogenous

It is found that only GDP is an endogenous variable while the rest of the variables are exogenous. This means that GDP depends on the deviations of other variables. It also implies that GDP bears the effect of short-run adjustment to bring about the long-term equilibrium among the cointegrating variables. On the other hand, FDI, trade openness and foreign exchange rate do not depend on the deviations of other variables. They are the leading variables and initially receive the exogenous shocks resulting in deviations from equilibrium and transmit the shocks to other variables, which in this case is the GDP.

Therefore, the Government of Malaysia should focus on encouraging FDI, trade openness and foreign exchange rate in order to boost the economic growth. This step, however, cannot tell us the relative degree of endogeneity or exogeneity among the variables, as in which variable is the most leading variable to impact the other variables. This shortcoming can be solved using the next step.

Variance Decompositions (VDC)

The VDC decomposes the variance of the forecast error of a particular variable into proportions attributable to shocks in each variable in the system including its own. The proportion of the variance explained by its own past shocks can determine the relative exogeneity/endogeneity of a variable. The variable that is explained mostly by its own shocks is deemed to be the most exogenous of all. The VDC is tested using both Generalized and Orthogonalized VDC. The horizon period of forecasting is defined by every 10 years. The tables below show the results.

Generalized Approach

	HORIZON	LGDP	LFDI	LTRO	LFRX	TOTAL	SELF-DEP	RANKING
LGDP	10	46.55%	8.06%	20.20%	25.20%	100.00%	46.55%	4
LFDI	10	23.44%	52.71%	9.71%	14.14%	100.00%	52.71%	3
LTRO	10	29.37%	0.25%	67.09%	3.28%	100.00%	67.09%	2
LFRX	10	2.96%	4.43%	13.77%	78.85%	100.00%	78.85%	1

	HORIZON	LGDP	LFDI	LTRO	LFRX	TOTAL	SELF-DEP	RANKING
LGDP	20	46.08%	6.98%	21.41%	25.53%	100.00%	46.08%	4
LFDI	20	23.96%	51.61%	9.37%	15.06%	100.00%	51.61%	3
LTRO	20	29.96%	0.15%	67.12%	2.77%	100.00%	67.12%	2
LFRX	20	2.31%	4.51%	15.21%	77.97%	100.00%	77.97%	1

	HORIZON	LGDP	LFDI	LTRO	LFRX	TOTAL	SELF-DEP	RANKING
LGDP	30	45.70%	6.22%	22.30%	25.78%	100.00%	45.70%	4

LFDI	30	24.18%	51.14%	9.24%	15.44%	100.00%	51.14%	3
LTRO	30	30.16%	0.11%	67.14%	2.59%	100.00%	67.14%	2
LFRX	30	2.08%	4.54%	15.73%	77.65%	100.00%	77.65%	1

	HORIZON	LGDP	LFDI	LTRO	LFRX	TOTAL	SELF-DEP	RANKING
LGDP	40	45.42%	5.67%	22.95%	25.96%	100.00%	45.42%	4
LFDI	40	24.30%	50.87%	9.17%	15.65%	100.00%	50.87%	3
LTRO	40	30.27%	0.09%	67.14%	2.50%	100.00%	67.14%	2
LFRX	40	1.97%	4.55%	15.99%	77.49%	100.00%	77.49%	1

Orthogonalized Approach

	Horizon	LGDP	LFDI	LTRO	LFRX	Total	Ranking
LGDP	10	56.2%	4.3%	4.5%	35.1%	100.0%	1
LFDI	10	36.5%	51.6%	2.1%	9.8%	100.0%	3
LTRO	10	38.9%	12.8%	46.3%	2.0%	100.0%	4
LFRX	10	3.6%	3.1%	38.3%	55.0%	100.0%	2

	Horizon	LGDP	LFDI	LTRO	LFRX	Total	Ranking
LGDP	20	54.9%	4.3%	4.0%	36.7%	100.0%	1
LFDI	20	38.3%	49.9%	1.5%	10.4%	100.0%	3
LTRO	20	39.4%	13.3%	45.1%	2.2%	100.0%	4
LFRX	20	2.9%	3.5%	40.7%	53.0%	100.0%	2

	Horizon	LGDP	LFDI	LTRO	LFRX	Total	Ranking
LGDP	30	54.0%	4.3%	3.7%	37.9%	100.0%	1
LFDI	30	39.0%	49.1%	1.3%	10.6%	100.0%	3
LTRO	30	39.6%	13.4%	44.7%	2.2%	100.0%	4
LFRX	30	2.6%	3.6%	41.6%	52.2%	100.0%	2

	Horizon	LGDP	LFDI	LTRO	LFRX	Total	Ranking
LGDP	40	53.4%	4.3%	3.5%	38.8%	100.0%	1
LFDI	40	39.4%	48.7%	1.1%	10.8%	100.0%	3
LTRO	40	39.7%	13.5%	44.5%	2.3%	100.0%	4
LFRX	40	2.5%	3.7%	42.0%	51.9%	100.0%	2

The data using Generalized Approach is normalized by calculating the proportion out of total to make the totals equal to 100%. The highlighted numbers represent the level of dependence on own self. The higher the highlighted number of the variable, the stronger the variable compared to other variables. From the Generalized Approach tables above, we found that FRX is the strongest variable, the

leader of all the variables followed by TRO, FDI and lastly, GDP. This result supports the VECM where we found the FDI, TRO and FRX to be exogenous while GDP to be the only variable endogenous. This means that foreign exchange rate movement is explained the most by its own shock (77%) while only 23% of the movement is due to the shocks from other variables (ie. FDI, trade openness and foreign and GDP). On the other hand, GDP is impacted mostly by the shocks from other variables (54%).

However, using the Orthogonalized Approach, the results show the opposite where GDP is the strongest variable, indicating that GDP is impacted mostly by its own shocks followed by FRX and FDI. The weakest variable found from the result is trade openness where approximately 54% of its movement is impacted by the movement of other variables. This result is not in line with the results gained from the previous step. In VECM, GDP is endogenous while TRO is exogenous, which is only fit that TRO is a stronger variable than GDP as TRO is the leader while GDP is only the follower. This result may be due to the fact that Orthogonalized VDC gives results that are always bias towards the first variable in the equation, which is GDP in this case, although the sum of values in Orthogonalized VDC is equal to 100%. Hence, we have preference for Generalized VDC as it also conforms to the results obtained from VECM.

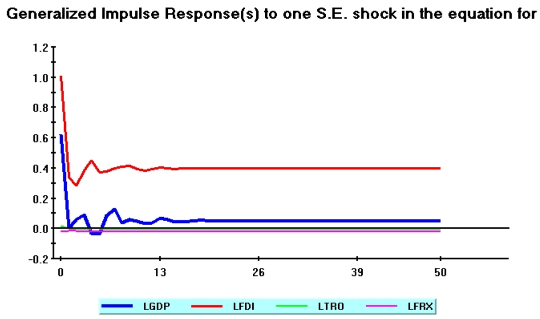
From this result, we can recommend the Malaysian Government to give emphasis on foreign exchange rate as it is the most exogenous variable, impacting the rest of the variables. This concentration will impact the economic growth the most. FDI and trade openness do impact the economic growth as well but not as much as the foreign exchange rate.

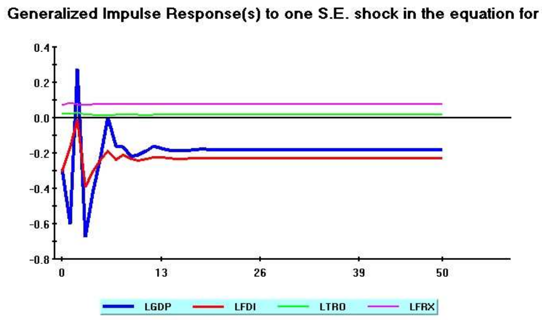
Impulse response (IR)

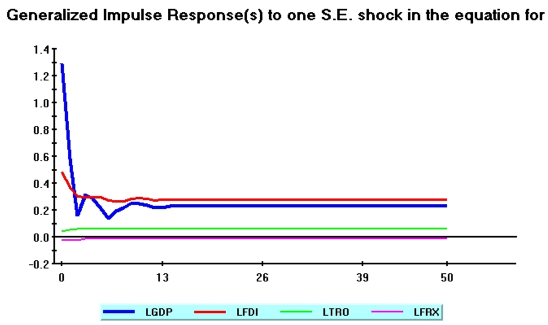
IR tells us about the impact of the shock from one variable on others, their degree of response and how long it would take to normalize. We expect that if leading variable is shocked, the response of weak variables will be significant.

Variable shocked: FDI

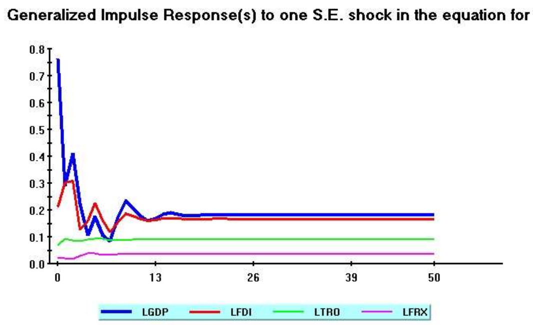
Variable shocked: FRX







Variable shocked: GDP

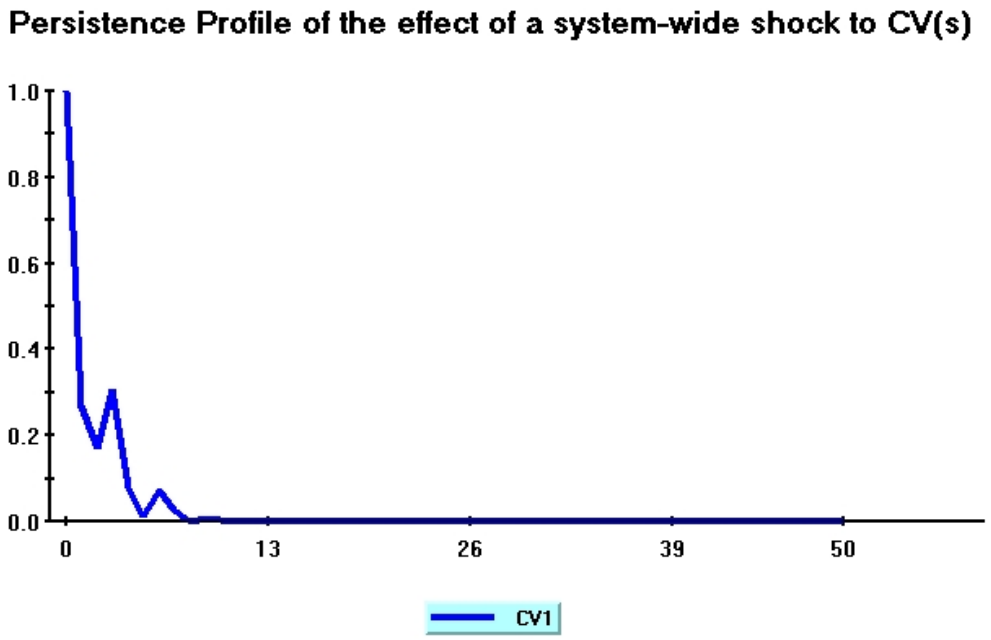


Variable shocked: TRO

Basically, IR produces the same information as the VDCs, except that VDC is presented with figures while IR is presented in graphical forms.

Persistence Profiles (PF)

Just like IR, PF also maps out the dynamic response path of long-run relations. IR traces out the effects of a variable-specific shock on the long-run relations while PF traces bout the effects of a system-wide shock on the long-run relations. This last step will show us how long it would take for the whole system to stabilize is all the variables are shocked by some external factors i.e, global crisis. The chart below shows the persistence profile for the cointegrating equation of this study.



When we give external shock to our equation. The result shows that all variables will move differently and away from the equilibrium in the short run, making them temporarily not cointegrated. However, the chart shows that it would take 8 to 10 years for all variables in the cointegrating equation to return to the long-run equilibrium after a system-wide shock.

CONCLUSION

This paper examines the relationship among the series of economic growth, foreign direct investment, trade openness and foreign exchange rate in Malaysia for the period of 1970 – 2013. It implements the 8-step model using Microfit software to investigate the existence of a long-run relationship among the above noted series and to test the direction of causality between the variables. The results show that there is a cointegration among the variables specified in the model. It is found that there is no significant causality from FDI to economic growth but there occurs to be significant causality from trade openness and foreign exchange rate to the economic growth in Malaysia when FDI is insignificant. Three variables are found to be the leading variables, led by foreign exchange rate and followed by trade openness and FDI while economic growth is found to be the weakest variable, indicating that economic growth is affected by foreign exchange rate, trade openness and FDI. Foreign exchange rate

has the most impact on economic growth followed by trade openness and FDI. This means that emphasis should be put on foreign exchange rate policy in Malaysia, as it has the most significant influence towards economic growth. While FDI and trade openness are also influences of economic growth, they are not as strong as a factor compared to foreign exchange rate. We found that FDI has the least impact on economic growth followed by trade openness. It is also found that the economic growth, FDI, trade openness and foreign exchange rate will take 8 to 10 years in order to adapt to external shock such as global crisis.

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