Do the trading partners' exchange rates impact the export performance of a country? evidence from Malaysia

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Do the trading partners' exchange rates impact the export performance of a country? evidence from Malaysia

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Abstract

This paper focuses on the following three major questions: (i))Is the export of Malaysia co-integrated with the exchange rates of her trading partners?(ii)Do the exchange rates of the trading partners have a significant impact on the competitiveness of Malaysia's exports? (iii)Is there a need for Malaysia to cut her profit mark up to increase exports when her trading partners' currency depreciated against Ringgit? Our findings tend to give the corresponding answers to the above three questions:(i) .Yes, the export of Malaysia is cointegrated with the exchange rates of her trading partners. (ii) No, Malaysia's export is found to be the most exogenous variable in the model thus making Malaysia's export variable impacting the exchange rates. (iii) No, based on our quantitative analysis, policy makers are advised not to be very sensitive to the exchange rate fluctuations of its trading partners ,since the partners' exchange rate changes may have no significant impact on her exports. The findings have strong policy implications for a developing country like Malaysia.

Keywords: export performance, exchange rates of trading partners, VECM, VDC, Malaysia

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1.0 OBJECTIVE

This paper tries to focus on three main issues on the impact of exchange rates of three major trading partners on the export performance of Malaysia. In regard to such topic, this study will elaborate further by raising three possible research questions, namely:

1. Is the export of Malaysia cointegrated with the exchange rates of the trading partners?
2. Does exchange rate of the trading partners have a significant impact on the competitiveness of Malaysia's exports?
3. If the theory of exchange rate appreciation will decrease export, is there a need for Malaysia to cut their profit mark up to increase exports when the trading partners' currency depreciated against Ringgit?

2.0 LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Exports are the most important source of foreign exchange, which can be used to ease pressure on the balance of payments and generate job opportunities in developing countries like Malaysia. According to AbouStait (2005), an export-led growth strategy aims to offer producers incentives to export their goods through various governmental policies. The tactic also aims at increasing the capability of producing goods that can compete in the world market using advanced technology and make provision for foreign exchange needed to import capital goods. Exports can help the country to integrate in the world economy and to reduce the impact of external shocks on the domestic economy. Exports allow domestic production to achieve a high level of economies of scale. Tsen (2006) stated that the experiences of East Asian economies provide good examples of the importance of the sector to economic growth and development, and this emphasizes the role of exports as an engine for economic growth.

Malaysia's exports have been increasing steadily from RM206 billion in 1998 to RM535.5 billion in 2005 and RM594.5 in 2006. Malaysia continued to record strong trade position with total trade exceeding RM606 billion in 2007 and RM666 billion in 2008. However, total trade in the year 2009 was valued at RM562 billion due to the global economic crisis. The crisis was triggered by the bubble in United States subprime mortgage.

Policy makers have generally assumed that exchange rate depreciation would stimulate exports while exchange rate appreciation would be detrimental to exports (Abeysinghe, 1998). This is however is not true in some of the cases. Duasa (2007) found that the role of exchange rate is insignificant in initiating changes in the trade balances in the case of Malaysia. Our paper seeks to show empirically, the significance of the exchange rate fluctuations of Malaysia trading partners in affecting the competitiveness of Malaysia's exports.

3.0 DATA AND METHODOLOGY

3.1 DATA

The analysis is conducted using the monthly data series covering a period of fourteen years starting January 1998. A total of 165 observations were obtained. We are employing four variables to capture the impact of exchange rate fluctuations of the trading partners on export performance of Malaysia. The variables are:

1. Exports of Malaysia (XPT)
2. Nominal exchange rate in US dollar (USD) against the national currency. (e.g. 1USD = RM3.8)
3. Nominal exchange rate in Singapore dollar (SGD) against the national currency (RM)
4. Nominal exchange rate in Hong Kong dollar (HKD) against the national currency(RM)

All data are expressed in logarithmic forms. The source of data was DataStream.

3.2 METHODOLOGY

This study employs a time series technique, in particular, co-integration, error correction modelling and variance decomposition, in order to find empirical evidence of the nature of relations between equity markets as alluded to in the introductory paragraphs. This method is favoured over the traditional regression method for the following reasons.

Firstly, most economics or finance variables are non-stationary. This means that performing ordinary regression on the variables will render the results misleading, as statistical tests like t-ratios and F statistics are not statistically valid when applied to non-stationary variables. Performing regressions on the differenced form of these variables will solve one problem, at the expense of committing an arguably even graver mistake. When variables are regressed in their differenced form, the long term trend is effectively removed. Thus, the

regression only captures short term, cyclical or seasonal effects. In other words, the regression is not really testing long term (theoretical) relationships.

Secondly, in traditional regression, the endogeneity and exogeneity of variables is pre-determined by the researcher, usually on the basis of prevailing or a priori theories. However, in this case, as we are dealing with a relatively nascent sector, there is notable absence of established theories. Co-integration techniques are advantageous in that it does not presume variable endogeneity and exogeneity. In the final analysis, the data will determine which variables are in fact exogenous, and which are exogenous. In other words, with regression, causality is presumed whereas in co-integration, it is empirically proven with the data.

Thirdly, co-integration techniques embrace the dynamic interaction between variables whereas traditional regression methods, by definition, exclude or discriminate against interaction between variables. Economic intuition tells us national exchange rate appreciation would be unfavourable to a country's export.

4.0 RESULTS AND FINDINGS

4.1 TESTING STATIONARITY OF THE VARIABLES

We begin our empirical testing by determining the stationarity properties of the variables of the model. To analyze the causal relationship, in the context of Granger-causality, and specify

an appropriate model for empirical investigation, it is necessary to determine the stationary properties of the variables of the model. The unit root test or the test of order of integration is conducted using the Augmented Dickey-Fuller (ADF). The ADF test is a two-step procedure:

i. The first step is to test the null hypothesis that the variables in their level form are non-stationary, integrated order of one, I (1). Rejection of the null indicates that the variables are stationary and non-rejection indicates they are non-stationary and will be subject to further testing.

ii. The second step tests the null hypothesis that the variables in their first differenced form are stationary, integrated of order zero, I (0). The differenced form for each variable used is created by taking the difference of their log forms. For example, DXPT = LXPT – LXPT(-1)

The table below summarizes the results. See appendix 1 for details.

Table 1(a): Variables in Level form

Variable	Test Statistic	Critical Value	Implication
LXPT	-2.5073	-3.4387	Variable is non stationary
LUSD	-1.6211 (SBC)	-3.4387	Variable is non stationary
	-0.7999 (AIC)	-3.4387	Variable is non stationary
LSGD	-2.8134	-3.4387	Variable is non stationary
LHKD	-1.7697 (SBC)	-3.4387	Variable is non stationary
	-0.8624 (AIC)	-3.4387	Variable is non stationary

Table 1(b): Variables in differenced form

Variable	Test Statistic	Critical Value	Implication
DXPT	-8.3351(SBC)	-2.8798	Variable is stationary
	-5.8741 (AIC)	-2.8798	Variable is stationary
DUSD	-3.7642	-2.8798	Variable is stationary
DSGD	-4.4671	-2.8798	Variable is stationary
DHKD	-3.7541	-2.8798	Variable is stationary

Relying primarily on the AIC and SBC criteria, the conclusion that can be made from the above results is that all the variables we are using for this analysis are integrated of order 1 (I1) and thus we may proceed with the testing of co-integration. Note that in determining which test statistic to compare with the 95% critical value for ADF statistic, we have selected the ADF regression order based on the highest computed value for AIC and SBC. In some instances, AIC and SBC give different orders and in that case, we have taken difference orders and compared both (for example, this applies to the variable LUSD, see the table above). This is not an issue as in all cases, the implications are consistent.

4.2 DETERMINATION OF ORDER THE VAR MODEL

Before proceeding with test of co-integration, we need to first determine the order of the vector auto regression (VAR), that is, the number of lags to be used. As per the table below, results show that AIC is maximum at order 2 whereas SBC is maximum at order zero.

Table 2 (a) : Order of VAR result

	AIC	SBC
Optimal Order	2	0

Given this apparent conflict between recommendation of AIC and SBC, we address this in the following manner. First, we checked for serial correlation for each of the variables and obtained the following results.

Table 2 (b) : Checking for serial correlation

Variable	Chi-sq p value	Implication at 10%
DXPT	0.089	There is serial correlation
DUSD	0.099	There is serial correlation
DSGD	0.006	There is serial correlation
DHKD	0.284	There is no serial correlation

As evident from above, there is serial correlation in 3 out of the 4 variables. Thus, if we adopted a lower order, we may encounter the effect of serial correlation. The disadvantage of taking higher order is that we risk over-parameterization. Considering the trade off of lower and higher orders, we decided to choose the maximum VAR order of 2, as stated by AIC.

4.3 TESTING CO-INTEGRATION

Once we have established that the variables are integrated of order one (I1) or in other words non stationary in level form and determined the optimal VAR order as 2 , we are ready to test for co-integration. Using Johansen testing, there are two test statistic, namely Maximal

Eigenvalue and Trace statistics. With the rejection of null hypothesis is at 10% level, Maximal Eigenvalue indicated two and trace statistics indicates one co-integrating vector(s). For the purpose of this study, we use the co-integrating vectors from trace statistics and shall assume that there is one co-integrating vector. The result from trace statistic can be found in the below table:

```
   Cointegration with unrestricted intercepts and restricted trends in the VAR
         Cointegration LR Test Based on Trace of the Stochastic Matrix
*****************************************************************************
 163 observations from 1998M3  to 2011M9 . Order of VAR = 2.
 List of variables included in the cointegrating vector:
 LXPT            LUSD            LSGD            LHKD            Trend
 List of eigenvalues in descending order:
.22999     .15427    .035730    .021833      .0000
*****************************************************************************
 Null    Alternative    Statistic     95% Critical Value     90%Critical Value
 r = 0      r>= 1        79.4398           63.0000                59.1600
 r<= 1      r>= 2        36.8396           42.3400                39.3400
 r<= 2      r>= 3         9.5287           25.7700                23.0800
 r<= 3      r = 4         3.5982           12.3900                10.5500
*****************************************************************************
 Use the above table to determine r (the number of cointegratingvectors).
```

Table 3 : Long run cointegration based on trace statistics

The co-integration implies that the relationship among the variables is not spurious, which means that there is a theoretical relationship among the variables and that they are in equilibrium state in the long run.

4.4 LONG RUN STRUCTURAL MODELLING (LRSM)

Next, we attempt to quantify this apparent theoretical relationship among the variables. We do this in order to compare our statistical findings with theoretical expectations. Relying on the Long Run Structural Modelling (LRSM) component of MicroFit, and normalizing our variable

of interest, the exports volume of Malaysia, we initially obtained the results in the following table:

Variable	Coefficient	Standard error	T ratio	Implication
LXPT	-	-	-	-
LUSD	-11.4686	4.1058	2.7933	Variable significant
LSGD	-.39285	0.16586	2.3686	Variable significant
LHKD	35.2365	12.6670	2.7818	Variable significant

Table 4 : LRSM test results

Calculating the t ratio manually, we found all variables to be significant. To further verify the significance of the variables, we test the variable for overidentifying restriction by putting HKD as insignificant variable (See Appendix 4). With the null hypothesis of 'restriction is correct', we are 100% sure that we can reject the null at significance level of 5%. The further verification proves that HKD is a significant variable and should be taken into consideration in this model.

From the above analysis, we arrive at the following co-integrating equation (numbers in parentheses are standard deviation):

$$XPT - 11.47USD - 0.39SGD + 35.24HKD \rightarrow I(0)$$
$$\quad (4.11) \quad (0.17) \quad (12.67)$$

4.5 VECTOR ERROR CORRECTION MODEL (VECM)

Having testified the co-integration relationship among variables does not automatically tells us the causal relationship of these related variables. To find out the exogenous and endogenous variables in the system and the causal direction, Granger causality test procedure is employed.

Information on direction of Granger causation can be particularly useful for policy makers. By knowing which variable is endogenous and which is exogenous, the policy makers can better forecast or predict on the exogenous variables as it initially receives the exogenous shocks resulting in deviations from equilibrium and transmit the shocks to other variables. The result from VECM is presented in the following table:

Variable	ECM(-1) t ratio p value	Implication
LXPT	0.887	Variable is exogenous
LUSD	0.005	Variable is endogenous
LSGD	0.485	Variable is exogenous
LHKD	0.001	Variable is endogenous

Table 5: VECM exogeneity and endogeneity result

The exogeneity of XPT perplexes us as theoretically, this variable should be endogenous as the national exchange rate depreciation supposes to stimulate exports. Reason being, exchange rate depreciation can make a country's exports cheaper thus receives more demand from the trading partners. By strengthening of Malaysian Ringgit against USD dollar, products in Malaysia would be much expensive thus this would lead exports to fall. The endogeneity of USD is probably due to the exchange rate policy exercised by the government especially in 1997 Asian financial crisis through fixed exchange rate against USD which started in September 1998. The controls gradually reduced and ended in 2005. This extensive intervention which amount to 83 months from the total of 168 observations (50%) is perceived to be the main factor that makes USD becomes an endogenous variable in this study. This should explain the gap between theory and empirical outcome.

4.6 VARIANCE DECOMPOSITION (VDC)

The VDC gives information about the relative importance of each random shock to the variable in the VAR. In other words, VDC shows the percentage of forecast error variance for each

variable that may be attributed to its own shocks and to fluctuations in the other variables in the system.

Table 6(a): GENERALIZED VARIANCE DECOMPOSITION

		Percentage of Forecast Variance Explained by Innovations in:			
		ΔXPT	ΔUSD	ΔSGD	ΔHKD
	Period				
Relative variance in ΔXPT	1	99.924	0.002	0.057	0.016
	10	99.837	0.058	0.023	0.081
	20	99.880	0.043	0.019	0.059
	30	99.895	0.037	0.018	0.050
	40	99.903	0.034	0.017	0.046
	50	99.908	0.032	0.016	0.044
Relative variance in ΔUSD	1	0.321	44.234	12.729	42.716
	10	0.869	44.133	13.973	41.024
	20	0.989	44.118	14.212	40.681
	30	1.035	44.112	14.303	40.550
	40	1.059	44.109	14.351	40.481
	50	1.074	44.107	14.380	40.439
Relative variance in ΔSGD	1	0.035	16.424	65.645	17.896
	10	0.020	13.547	71.257	15.176
	20	0.011	13.344	71.583	15.063
	30	0.007	13.270	71.700	15.023
	40	0.005	13.233	71.760	15.002
	50	0.004	13.209	71.797	14.989
Relative variance in ΔHKD	1	0.284	43.305	13.838	42.574
	10	1.021	43.129	15.356	40.494
	20	1.193	43.086	15.678	40.044
	30	1.258	43.069	15.800	39.872
	40	1.293	43.060	15.865	39.782
	50	1.314	43.055	15.904	39.727

Looking along the main diagonal, the results reveal that the own shock is relatively high for XPT and SGD. This implies the exogeneity of XPT and SGD in variance decomposition. The result shows that in period 10, contribution of export to its own variance is 99.84% and 99.91% in period 50. This shows the extreme relative exogeneity of XPT, which means that other variables only contribute to less than 1% to its variance. For SGD, it shows that 71.7% of variance of SGD is explained by its own past shock in period 30. This implies that Singapore has the strongest currency among the analyzed trading partners as it is not easily affected by other currencies.

No	Variable Relative Exogeneity			
	Period 1	Period 20	Period 40	Period 50
1	XPT	XPT	XPT	XPT
2	SGD	SGD	SGD	SGD
3	USD	USD	USD	USD
4	HKD	HKD	HKD	HKD

Table 6 (b) : Order of the relative exogeneity

From the above results, we can make the following key observations:

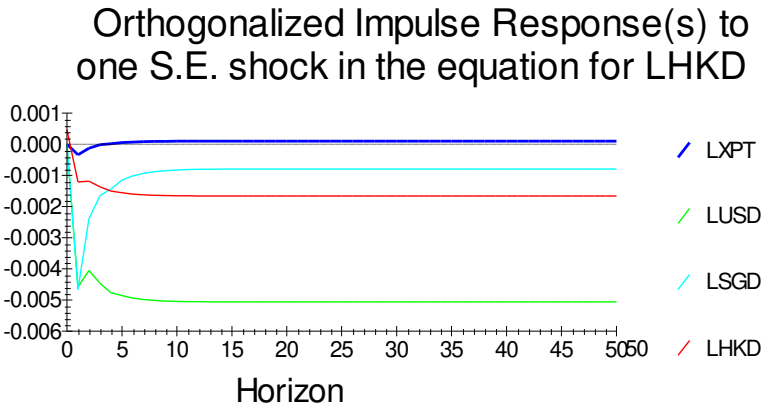
- The generalized VDCs confirm the results of the VECM in that XPT is the most exogenous variable followed by SGD.
- The relative rank in exogeneity is consistent over time. There is no change between period 1 till period 50.
- The difference in exogeneity between the indices is substantial. For example, in horizon 30 (highlighted in table xx), a total of 60% separate the most exogenous and the most endogenous variable.

4.7 IMPULSE RESPONSE FUNCTIONS (IRF)

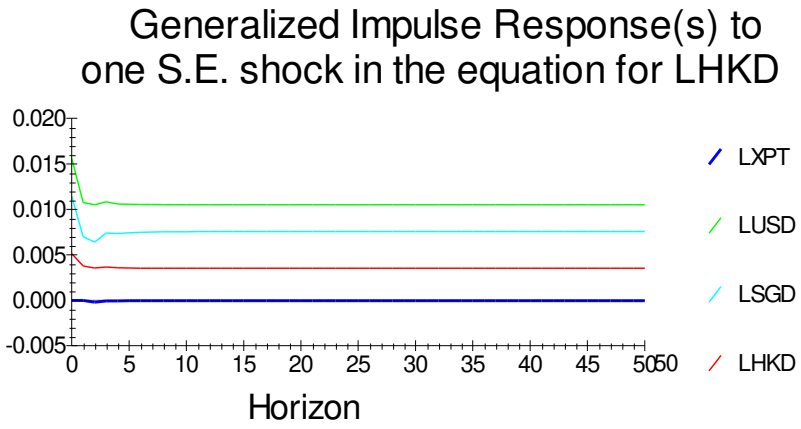
The impulse response function (IRF) is an alternative method to VDCs for examining the effects of shocks to the dependent variables, except that they can be presented in graphical

form. We started out by applying orthogonalized impulse response to all variables. We then later run generalized impulse response to compare the result. XPT and USD are more or less came out with the same graph for both orthogonalized and generalized impulse response. However, the graphs for LSGD and LHKD seemed to be different.

Orthogonalized Impulse Response Function
Variable: LHKD

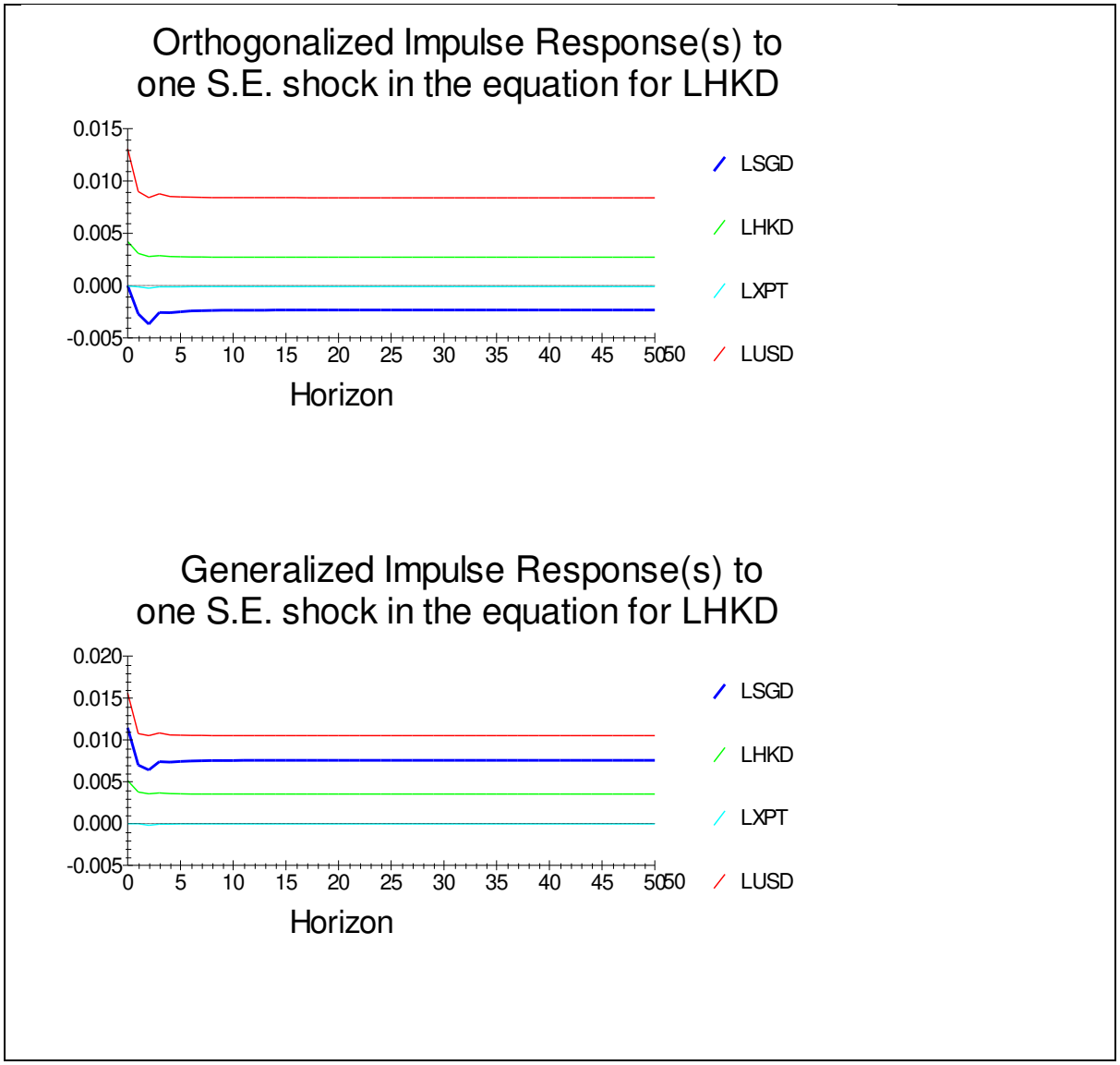


Generalized Impulse Response Function
Variable: LHKD



The difference is probably because of the limitations of orthogonalized results where it assumes that when a particular variable is shocked, all other variables are "switched off". Secondly, and more importantly orthogonalized impulse response do not provide a unique

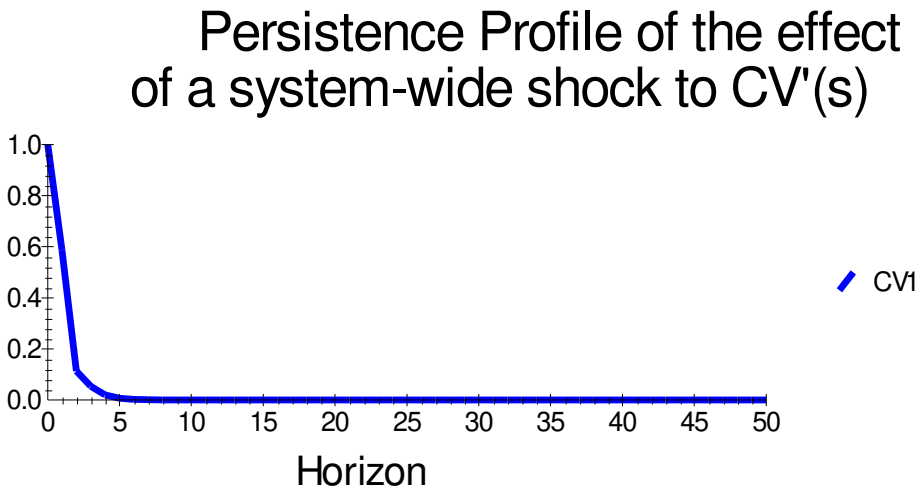
solution. The generated graph is dependent upon ordering of the variables in the VAR. Typically the first variable would be specified as the most exogenous variable. To experiment whether the assumptions are true, we switched the order of the variable by putting LSGD in the first place followed by LHKD, LXPT and LUSD and run orthogonalized and generalized test for LHKD. As we can see in the below graphs, the result for generalized remain the same unlike the result for orthogonalized. The result confirmed our suspicion.



4.8 PERSISTENCE PROFILE

The persistence profile illustrates the situation when the entire co-integrating equation is shocked, and indicates the time it would take for the relationship to get back to equilibrium.

Here the effect of a system wide shock on the long run relations is the focus (instead of variables specific shocks as in the case of IRFs). The chart below shows the persistence profile for the co-integrating equation of this study.



The chart indicates that it would take approximately 5 months for the co-integrating relationship to return to equilibrium following a system wide shock.

5.0 SUMMARY AND CONCLUSION

As a summary, the Augmented Dickey Fuller (ADF) and Philip Perron (PP) tests are utilized and generally all variables in the model are stationary in first difference. There is also an

evidence of long run co-integrating relationship between all variables as Johansen co-integration test detect at least one co-integrating equation for the model. This analysis also concludes that it will take only 5 months for the variables to get back to the equilibrium if the export is shocked.

Last but not least, we revisit the three research question posed on the onset of this study. **Based on the quantitative analysis**, we found the answers to be:

1. Is the export of Malaysia co-integrated with the exchange rates of the trading partners?

   Yes, the export of Malaysia is co-integrated with the exchange rate of the trading partners. An increase of export of Malaysia by 1% will appreciate RM against USD but react reversely with HKD.

2. Does exchange rate of the trading partners have a significant impact toward the competitiveness of Malaysia's exports?

   No, Malaysia's exports is found to be the most exogenous variable in the model thus making Malaysia's export as the variable impacting the exchange rates.

3. Is there a need for Malaysia to cut their profit mark up to increase exports when the trading partners' currency depreciated against Ringgit?

   Based on this quantitative analysis, policy makers are suggested not to be very sensitive to exchange rate fluctuations as in the case of Malaysia, exchange rate changes had no impact on exports.

6.0 LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The following are some possible limitations of these study hence present opportunities for further research.

1. As stated earlier, the endogeneity of USD is probably due to the exchange rate policy exercised by the government especially in 1997 Asian financial crisis through fixed exchange rate against USD which started in September 1998. The controls gradually reduced and ended in 2005. This extensive intervention which amount to 83 months from the total of 168 observations (50%) is perceived to be the main factor that makes USD becomes an endogenous variable in this study. This should explain the gap between theory and empirical outcome.
2. While conducting Johansen test, we should prioritize the result from maximal eigenvalue instead of trace statistic. Choosing 2 co-integrating vector as stated by eigenvalue might have given us better outcome. However, opting for 2 co-integrating vector require us to have additional prior economic assumptions.
3. To avoid conflicting result of theoretical and empirical, more variables should be added to the research. The variables that can be considered are trade balance (export-import) or trade volume (export + import), income and money supply.

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