Macroeconomic variables and stock markets (domestic and foreign): evidence from Malaysia

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Macroeconomic variables and stock markets (domestic and foreign): evidence from Malaysia

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Abstract: The growing literature on the relationship between Malaysia's macroeconomic variables and its relation to the performance of Kuala Lumpur Composite Index (KLCI) is well documented. The aim of this term paper is to extend the existing literature by using selected macroeconomic variables and also, include the external variables i.e. the performance of other stock markets around the world namely, United Kingdom's Financial Times Index, United States Dow Jones Index, Singapore Straits Times Index, and Japan Nikkei Index into the equation. Thus, this paper will provide an analysis on the cointegration relationships among these variables (internal and external) in the long-run by using the standard time series techniques. The result indicates that stock exchanges are a cointegrated market and that there is a long run theoretical relationship among all the selected variables. The variance decomposition analysis tends to reveal that the Malaysian stock market is driven mostly by the exchange rate followed by the stock markets of Singapore and Japan.
The results have strong policy implications.

Keywords: stock market returns(domestic and foreign), macroeconomic variables, VECM, VDC, Malaysia

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1.0 Introduction

A lot of research has been done on the areas of stock market performance in relation to macroeconomic variables such as, gross domestic product, exchange rates, money supply, industrial index and so on. Most of these literature concluded that there is a positive relationship among these variables with the performance of stock price in the long run. In the Malaysian context, the same literature is also available and the conclusions are similar. However, not many literature have included the performance of other stock markets around the world (external variables) namely United Kingdom's Financial Times Index, United States Dow Jones Index, Singapore Straits Times Index, and Japan Nikkei Index into the equation to test the relationship with KLCI. Therefore, this paper attempts to provide the relationship between Malaysia's selected macroeconomic variables and other external variables with the performance of KLCI. It is hoped that this conclusion/findings of this paper will add to the existing body of knowledge.

2.0 Motivation & Objective of Research

The purpose of this research paper is different from the previous research done on the performance of KLCI which focused only on the macroeconomic variables either looking at its determinants or relation. In our view the performance of KLCI should not only be looked at with the internal variables but also the external influence. Most financial analyst & fund managers every morning will turn on the CNN, BBC or the financial news to know what happens to other market globally and see how these movements might have an impact on the local bourses. The theory is that if the US stock market collapses, the impact will also be felt by the Asian region stock market. This will require the investors to adjust/selling of the portfolio in order to protect themselves against risk. In our view the above must also have a significant relationship in the performance and movement of KLCI. Therefore, the motivation of this paper is to extend the previous research by including other external stock market

variables i.e. The US Dow Jones Index (USDJ), Japan Nikkei Index (JPNIK), UK Financial Times Index (UKFT) & Singapore Straits Times Index (SPST)on top of selected macroeconomic variables i.e. the exchange rate and gross domestic product to see the significant relationships. Further, all these variables will be tested using a more reliable model i.e. standard time series techniques. Apart from using the latest data, we also employ different macroeconomic variables that are considered most relevant in the Malaysian context as well as other external variables mentioned earlier.

3.0 Literature Review and Theoretical Framework

As mentioned earlier there are many literature on the issue of concern either focusing on emerging market or developed market. Most literature agreed that there is a positive relationship between macroeconomic variables and the performance of KLCI. However, in view of time constraints, we will only focus on the available literature in the case of Malaysia. In the Malaysian context, Ibrahim investigate the dynamic interactions between stock market and economic activities by conjecturing that the stock market leads the movement of macroeconomic variables. Azman, Muzafar & Azali on the other hand investigate the causal behaviour between the nominal Malaysian ringgit exchange rate (MYR/US) and the Kuala Lumpur main and second board stock indices (currently there is no more second board in KLSE). They conclude that main board index leads exchange rate during the crisis period, while exchange rate leads second board index during the pre-crisis period. In all other cases, there are bi-directional causal relationships between the stock price indices and exchange rate, which indicates that exchange rate could only be a useful predictive indicator for the second board index. Mehdi, Zamri & Lai study the impact of four major macroeconomic variables on the stock market indices in Malaysia, China and U.S and concluded that there is both long and short run relationship between macroeconomic variables and stock market index in each of these three countries. Aisyah, Sidek & Fauziah (2009) explore the interaction between selected macroeconomics variables and

stock prices. The study shows that Malaysian stock market is sensitive to changes in the macroeconomic variables. Furthermore, based on the variance decomposition analysis it reveals that Malaysian stock market has stronger dynamic interaction with reserves and industrial production index as compared to money supply, interest rate, and exchange rate.

The theoretical framework of stock market and economic activity is based on Ross (1976) who introduces the Arbitrage Pricing Theory (APT) that links stock returns to several variables. Since then many studies have looked into the 'exchange rate channel' of monetary policy transmission and found out that macroeconomic variables were significantly influenced by the extent of international stock market integration. Here, macroeconomic variables used tend to differ across studies as there is no standardized set of macroeconomic variables. However, the most popular variables used are rate of inflation, money supply, exchange rate, international reserves, and industrial production as proxy to GDP. In term of relationship between stock price and exchange rate, there are two contradicting views, with one group of economists believed that stock prices may lead exchange rates with negative correlation and the second group believed the other way around. The latter group argued that currency appreciation under the floating exchange rate regime would affect the international competitiveness of local product and trade balance position of the nation. This in turn may lead to firm's future cash flows affected by the deterioration of real output deterioration which then resulted in lower stock price. Further the theoretical relationship between domestic stock market and foreign stock market is based on the idea of contagion effect whereby shocks in major market such as the US (being the largest economy in the world), will spill over into other stock exchange around the world. In other words the stock markets around are basically connected and that the performance of one stock market bears influence on the others.

4.0 Research Methodology, Results and Interpretation

As mentioned earlier, this research will be done by using the standard time series techniques instead of the normal regression. As we know the normal regression model has a number of flawed assumptions i.e. all data are assumed to be stationary (if not, normal regression model cannot be used), there is no autocorrelation (serial correlation) or heteroscedasticity or multicollinearity.

In view of that, the use of time series techniques will try to address this flawed assumptions by firstly testing all the variables used whether it's non-stationary or stationary (since we know in reality that variable is non stationary). Secondly in time series there is no pre-decided exogeneity and endogeneity of variables as assumed by regression. Therefore the significance of the variables will decide its relative exogeneity and endogeneity (empirically proven). Thirdly, time series in particular cointegration will tell us that the relationship among variables is not spurious (by accident), which means there is a theoretical relationship among variables and that they is in equilibrium in the long run. Lastly, in LRSM, we can also test the coefficient with theoretical expectation which will address the criticism from regression people.

The variables used for this paper comprise of MYKLCI – Malaysia Kuala Lumpur Composite Index; MYGDP – Malaysia Gross Domestic Product; MYEX – Malaysia Exchange Rate; USDJ – US Dow Jones Industrial Index; JPNIK – Japan Nikkei Index; UKFT – UK Financial Times Index; SPST – Singapore Straits Times Index taken quarterly series over 20 years starting from the first quarter of 1991 (a total of 80 observations) from Datastream.

4.1 Testing the Non-Stationarity/Stationarity of Each Variable

One of the critics of Regression model is the model assumes that all variables are stationary[1]. If variables are non-stationary[2], using regression model is considered null and void. Further the assumption is unrealistic in the sense that variables are in fact non-stationary (variance is changing i.e. not constant. Therefore, in order to ensure econometric model (time series) is relevant, the first step is to test the non-stationarity/stationarity of each variable. A variable must be non-stationary on its original level form and stationary in its first differenced form [ex. DYMYKLCI = YMYKLCI – YMYKLCI (-1)]. The former is tested by using Augmented Dickey-Fuller (ADF) test (second table result which includes linear trend) of the test , which tests the null hypothesis (H_o=null is non-stationary) by comparing the 95% critical value of the ADF against the t-ratio represented by the order of Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC)[3]. For example, YMYKLCI (see appendix I(a), the highest value of AIC is at order 4 i.e. 48.8351 and SBC at order 0 i.e. 41.8941. Therefore, the test statistic for YMYKLCI at order 4 and 1 are between -2.4638 and -2.0619 (ignore negative sign) respectively. As such, since both these values are lower than the 95% critical value for ADF i.e. -3.4704, which means that the null is accepted i.e. the variables of YMYKLCI is non-stationary at its original level form. The summary of the tests result each variables on its original level and first differenced forms are as per summary below:

Variable	Test Statistic	Critical Value	Implication
Variables in Level Form			
YMYKLCI	2.4638(AIC) 2.00619(SBC)	3.4704	Variable is non-stationary
YMYGDP	2.5096	3.4704	Variable is non-stationary
YMYEX	0.94281	3.4704	Variable is non-stationary
YUSDJ	1.5248	3.4704	Variable is non-stationary
YJPNIK	2.7657	3.4704	Variable is non-stationary
YUKFT	2.1315	3.4704	Variable is non-stationary
YSPST	3.4702(AIC) 2.5637(SBC)	3.4704	Variable is non-stationary

[1] Variable is called stationary if it has constant mean, a constant variance and a constant covariance

[2] A non-stationary time series could have a deterministic or a stochastic trend (process)

[3] Choose the highest values represented by AIC and SBC. Normally SBC will select a lower order compared with the AIC

Variable	Test Statistic	Critical Value	Implication
Variables in Differenced Form			
DYMYKLCI	4.8630(AIC) 7.2773(SBC)	2.9012	Variable is stationary
DYMYGDP	5.4792	2.9012	Variable is stationary
DYMYEX	7.5575	2.9012	Variable is stationary
DYUSDJ	8.1180	2.9012	Variable is stationary
DYJPNIK	6.1157(AIC) 6.4576(SBC)	2.9012	Variable is stationary
DYUKFT	7.8199	2.9012	Variable is stationary
DYSPST	7.6053	2.9012	Variable is stationary

Based on the above results, it is confirmed that the variable in its original form is non-stationary and stationary in its first differenced from. As such, we can proceed to the next step i.e. determination of the order of the VAR Model.

4.2 Determination of the Order of the VAR Model

The next step require us to determine the order of the Vector Auto Regression (VAR) before we can proceed to the next step i.e. cointegration. The process requires us to put arbitrarily a relative higher order for the VAR (in this case, VAR=5) and in the command editor all variables must be in the log differenced form. From the result, we choose the optimum lag corresponding to the highest value of AIC and SBC. The result of the test is summarised as follows):-

	Choice Criteria	
	SBC	AIC
Optimal order	0	2
Adjusted LR Test	2%	58..6%

Apparently, there is a conflict between the highest value given by AIC and SBC, where AIC gave a higher VAR i.e. 2 as compared with SBC i.e. 0. Therefore it is advisable to test for serial correlation for each variable before we proceed and choose the order of lag. The following table summarizes the results of our test for serial correlation:-

Variable	LM Version p-ratio	Implication (at 10%)
DYMYKLCI	0.186	There is NO serial correlation
DYMYGDP	0.097	There is serial correlation
DYMYEX	0.402	There is NO serial correlation
DYUSDJ	0.942	There is NO serial correlation
DYJPNIK	0.975	There is NO serial correlation
DYUKFT	0.837	There is NO serial correlation

Variable	LM Version p-ratio	Implication (at 10%)
DYSPST	0.526	There is NO serial correlation

From the above result, there is serial correlation in one (1) out of seven (7) variables. This result indirectly confirmed that we need to choose a higher order i.e. 1 to 2 and not zero because if we do choose 0, we may come across the effects of serial correlation. Further since the adjusted LR test also indicates that if we choose order 0 the p value is 2% (less than 10%), which means that we have to reject the null for the order 0. Here, the order of VAR is not at order 1. Therefore, since we decided to choose the higher order of VAR = 2 (as per AIC), given then the adjusted LR test also indicates that the p-value is more than 10% (58.6%), which means that we need to accept the null for the order 2.

4.3 Testing Cointegration

Once we already determine the order (or lags) of the VAR model, we can now proceed to the next step i.e. to test for cointegration[4]. By using Johansen method, we will be able to get the number of cointegrating equation in our model. Basically, the null hypothesis for this test is that there is no cointegration. r=0 is accepted, there is no cointegration among the variables and if r=0 is rejected, there is cointegration among variables. For examples, the LR test based on Maximal Eigen Value indicates that at r=0, the statistical value is 64.9313 which are higher than the 95% critical value of 49.3200. Therefore, we must reject the null hypothesis by accepting error rate of 5%. However, at r<=1, the statistical value is 36.5155 which are lower than the 95% critical value of 43.6100, which means that we need to accept the null (r<=1). The rest of the result from Microfit point out that the maximum Eigen values, trace and SBC provide us with one cointegrating vectors, whereas AIC and HQC indicate that there is 5 and 2 cointegrating vectors respectively. The summary is as follows:

[4] Cointegration implies that the relationship among variables is not spurious i.e. there is a theoretical relationship among the variables and that they are in equilibrium in the long run.

Criteria		Number of cointegrating vectors or relationship (# of 'r')
Maximal Eigen values		1
Trace		1
AIC		5
SBC		1
HQC		2

Based on the above result we can conclude that the there is cointegration at r=1 and the variables are moving together in the long run. Therefore the implication of the above test also pointed out that the relationship among variables is not spurious. Each variable contains information for the prediction of other variables. However, as mentioned earlier, testing for cointegration only tell us that there is theoretical relationship among variables but cointegration reveals no information on the direction of Granger-causation as to which variables is leading and which is lagging (i.e. which variables is exogenous and which is endogenous).

4.4 Long Run Structural Modelling (LRSM)

Since we already established the number of cointegrating vectors mathematically using Johansen test, the next step i.e. LRSM endeavours to estimate theoretically meaningful long-run (or cointegration) relations by imposing on those long-run relations (and then testing) both identifying and over-identifying restriction based on theories. As such, LRSM will help us to test the coefficient of all variables whether they are significant. Basically in LRSM we have can test both using exact identifying and over identifying restrictions based on theories. In exact identifying, we normalize the variable of interest or focus variable in order to come up with LRSM equation (with coefficient). Using MicroFit we then normalize the focus variable or variable of interest i.e. YMYKLCI, which is A1=1. The following summarises the result of our restrictions:

Variable	Coefficient	Standard Error	t-ratio	Implication
YMYKLCI	-	-	-	**-**
YMYGDP	3.7569	1.1336	3.314	**Variable is significant**
YMYEX	0.32133	0.42664	0.75	Variable is insignificant

Variable	Coefficient	Standard Error	t-ratio	Implication
YUSDJ	0.84314	0.33309	2.53	**Variable is significant**
YJPNIK	0.36272	0.14338	2.52	**Variable is significant**
YUKFT	0.11802	0.24306	0.48	Variable is insignificant
YSPST	0.78303	0.19593	3.99	**Variable is significant**

The above result indicates that four out of six variables (excluding the focus variable) are significant and the remaining 2 variables i.e. YMYGDP and YUKFT are insignificant. Testing against theory (as I understand it), I felt that the YUKFT variable can be insignificant because in term of trade (between Malaysia and UK) the volume is on decreasing trend due to uncertainty of exchange rate. This supports the traditional view that exchange rate uncertainty on trade suggests that higher volatility of exchange rate will act to deter the volume of trade as profits to be earned from international trade transactions seemed to be uncertain. Therefore I assume that the movements in the YUKFT will not have significantly impact to KLCI. However, I fail to understand why the MYEX variable is insignificant due to the fact that this variable is actually an important indicator for investors. Theoretically, currency appreciation under the floating exchange rate regime would affect the international competitiveness of local product and trade balance position of the nation. This in turn may lead to firm"s future cash flows affected by the deterioration of real output deterioration which then resulted in lower stock price. Or maybe the first group theory (mentioned in 3.0) of negative correlation prevail. Nevertheless, in order to confirm whether the exact identifying restriction is correct, I will then test the insignificant variables using over-identifying restriction in order to confirm whether my earlier restriction is correct i.e. (A1=1, A3=0; A6=0). The following is the summary of the over-identifying results:-

Variable	Chi-Sq p-value	Implication
YMYEX	0.593	Variable is insignificant
YUKFT	0.385	Variable is insignificant

From the above, it appears that when we made the over-identifying restrictions all at once, that is, testing the null hypothesis that YMYEX & YUKFT Were all insignificant, the null hypothesis is ACCEPTED, which means that my restriction

is correct and we need to accept the null (>10%). As such the final ***cointegrating equation*** is as follows:-

1YMYKLCI – 3.09YMYGDP + 0.576YUSDJ + 0.3349YJPNIK – 0.7832YSPST ~ I(0)

Standard Deviation: (None) (1.1336) (0.33309) (0.14338) (0.19593)

However the above equation still did not provide us with the information on direction of Granger-causation as to which variable is exogenous and which is endogenous. Therefore, we have to go to another step which is VECM to address this problem.

4.5 Vector Error Correction Model (VECM)

The null hypothesis for VECM is that the coefficient of the lagged ECT is equal to zero. As such, if t-ratio p-value for the coefficient of the lagged ECT is less than 10%, than we can we can reject the null. By rejecting the null, the variables is said to be is endogenous in the equation and it depends on the deviations of other variables (follower instead of leader variable). The summary result of the VECM test is as follows:-

Variable	ECM(-1) t-ratio p-value	Implication
YMYKLCI	0.079	Variable is endogenous
YMYGDP	0.000	Variable is endogenous
YMYEX	0.261	**Variable is exogenous**
YUSDJ	0.096	Variable is endogenous
YJPNIK	0.537	**Variable is exogenous**
YUKFT	0.526	**Variable is exogenous**
YSPST	0.288	**Variable is exogenous**

From the above results, variables that are exogenous are YMYEX, YJPNIK, YUKFT and YSPST. The result of YMEX being exogenous variables is expected and proves the theory of positive relationship between exchange rate and stock price which will be explain using the endogenous example. As for the endogenous variables it is towards my expectation that the YMKLCI and YMYGDP are dependent on the deviations of other variables rather than its own. This is acceptable because once the exogenous (let say exchange rates) variables received a shock its will transmit the effect of those shock other

variables in this case YMYKLCI and YMYGDP. The empirical evidence is that in the Asian financial crisis, when the currency being heavily attack by speculators, the value of ringgit began to swing wildly i.e. from the value of RM2.50 in June 1997, it went down to RM4.50 in January 1998. Malaysian stock market were not spared from the impact, which saw the Bursa Malaysia index declined from about 1200 points when the crisis struck Malaysia and reached its historic low of 262 point a year later. Obviously, the decline of ringgit had led to panic sell not only from the foreign investors but also locally, which in turn affected the overall economy, which saw Malaysia's economic growth fell from 7.3% in 1997 to -7.4% in 1998.

However, for YUKDJ to be endogenous rather than exogenous is quite difficult to accept (t-ratio p-value for the coefficient of the lagged ECT close to 10% i.e. at 9.6%). The theoretical idea of the impact of bigger market such as the US (being the largest economy in the world), will spills over into other stock exchange around the world in this case KLCI is not happening. I might think that the reason for the deviation of the result is because YUSDJ might not be the accurate variable to use to determine the relationship with KLCI. Instead, the variable of New York Stock Exchange Index would be a better proxy to establishing a leader-follower pattern from bigger to smaller market. As such I accept the fact that the YUSDJ is endogenous based on the reason above.

In addition, VECM also produces a statistic that may be of interest to investors. The coefficient of e_{t-1} tells us how long it will take to get back to long term equilibrium if that variable is shocked. The coefficient represents proportion of imbalance corrected in each period. For instance, in the case of the YMYEX, the coefficient is 0.261. This implies that, when there is a shock applied to this variable, it would take, on average, 26 quarters for the variable to get back into equilibrium with the other variables. Although VECM will indicate which variable is exogenous and which is endogenous, but it fails to tell us the relative degree of exogeneity and endogeneity among the variables. The shortfall in VECM will be addressed through Variance Decomposition (VDC).

4.6 Variance Decompositions (VDC)

In this step i.e. VDC will tell us the relative/absolute exogenous and endogenous. It is done by forecasting the number of periods into the future. Thus VDC decomposes variance of forecast error of a particular variable into proportions attributable to shock from each variable in the system including its own. The variable which is mostly explained by its own past shocks (not by others) is considered to be the most exogenous variables of all. In this step, we will use Orthogonolized VDCs and Generalized VDCs. In orthogonolized VDCs, it is assumed that one variable is shocked, the rest of the variables are 'switch off'. Therefore, orthogonolized VDCs does not produce unique solution, it depends on the order of the variance in the VAR. Whereas in Generalized VDCs, no such assumption was made and therefore it gives unique solutions.

Results of Orthogonolized VDCs (Horizon 10)

	YMYKLCI	YMYGDP	YMYEX	YUSDJ	YJPNIK	YUKFT	YSPST
YMYKLCI	**0.457**	0.007	0.248	0.020	0.016	0.000	0.252
YMYGDP	0.496	**0.105**	0.215	0.115	0.043	0.002	0.025
YMYEX	0.040	0.007	**0.881**	0.022	0.001	0.029	0.021
YUSDJ	0.018	0.025	0.032	**0.901**	0.003	0.005	0.017
YJPNIK	0.094	0.003	0.051	0.183	**0.581**	0.041	0.046
YUKFT	0.048	0.003	0.004	0.644	0.015	**0.258**	0.029
USPST	0.148	0.036	0.126	0.145	0.071	0.014	**0.460**

* The columns read as the percentage in which that variable contributes to other variables in explaining observed changes. The diagonal line of the matrix (highlighted) represents the relative exogeneity.

The ranking according to exogeneity and endogeneity are as follows:-

Ranking	Exogenous Variables	(%)	Ranking	Endogenous Variables	(%)
1	YMYEX	88.1	1	YMYGDP	10.5
2	YJPNIK	58.1	2	YMYKLCI	45.7
3	YSPST	46.0	3	YUSDJ	90.1
4	YUKFT	25.8			

For Generalized VDCs, we need to make some adjustment from the result given by MicroFit because the original number did not total up to 1. Therefore based on our re-computation (1/total of row **x** the original amount of the specific variable), the following is the summary of the result

Horizon 10	YMYKLCI	YMYGDP	YMYEX	YUSDJ	YJPNIK	YUKFT	YSPST
YMYKLCI	**0.306**	0.001	0.230	0.023	0.101	0.023	0.316
YMYGDP	0.274	**0.067**	0.160	0.084	0.166	0.074	0.175
YMYEX	0.037	0.004	**0.856**	0.005	0.021	0.048	0.029
YUSDJ	0.007	0.008	0.019	**0.369**	0.060	0.282	0.254
YJPNIK	0.046	0.001	0.032	0.101	**0.425**	0.126	0.266
YUKFT	0.020	0.000	0.003	0.265	0.069	**0.380**	0.262
USPST	0.084	0.012	0.104	0.094	0.128	0.095	**0.484**

* The columns read as the percentage in which that variable contributes to other variables in explaining observed changes. The diagonal line of the matrix (highlighted) represents the relative exogeneity.

The ranking according to exogeneity and endogeneity is as follows:-

Ranking	Exogenous Variables	(%)	Ranking	Endogenous Variables	(%)
1	YMYEX	85.6	1	YMYGDP	6.7
2	YJPNIK	42.5	2	YMYKLCI	30.6
3	YSPST	48.4	3	YUSDJ	36.9
4	YUKFT	38.0			

As mentioned in the previous steps, it is not surprising to see the relative exogeneity of YMYEX because of the positive relationship with stock price. Any movements in the exchange rate (or currency) will have a direct impact to KLCI and also GDP. Further since Malaysia equity market is small and therefore, it establishes the theory of leader-follower pattern from bigger to smaller market. This can be seen by the exogeneity of YJPNIK, YSPST and YUKFT relative to KLCI.

Since generalized VDCs gave the same ranking (but with lower percentage) as per orthogonolized VDCs, therefore the arguments above still stand.

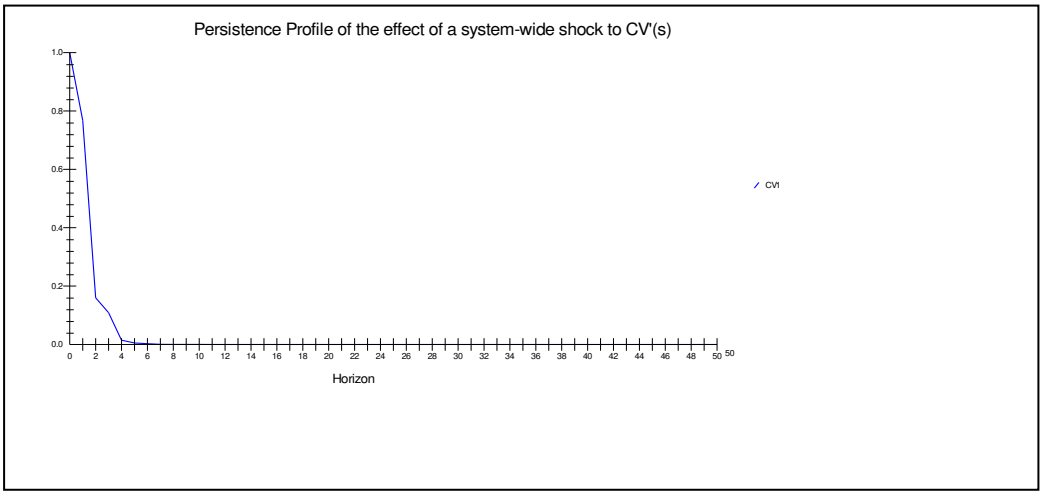
4.7 Impulse Response Functions (IRF)

Generally, the information contained in the VDCs can be equivalently represented by IRF's. The difference is that in IRF the same information can be presented in a graphical format. IRFs map out dynamic response path of a variable owing to a one-period standard deviation shock to another variable. In other words, by shocking one variable we can see the impact of the rest of

the variables. For ex. if we shock YMYEX (using Generalized VDC), the most impacted variables are YMYKLCI with negative 10% deviation.

4.8 Persistence Profiles (PF)

The last step of the application is to test the persistence profile which will indicate to us the time horizon required for all the variables to get back to equilibrium when there is a system wide shock. Therefore the main difference between PF and IRFs is that the former trace out the effects of a system-wide shock on the long-run relations whereas the latter only trace out the effects of a variable-specific shock on the long run relations. The following is the graphical format:-



Based on PF test, the above chart indicates that it would take approximately six (6) quarters for the cointegrating relationship to return to equilibrium following a system-wide shock. Meaning in the short run, all the variable will move to a different direction and temporary not cointegrated. In the long run (about six months) all the variables will then cointegrated and return to long term equilibrium.

5.0 Conclusion

Firstly based on our research objective, it is proven that not only macroeconomic variables have a long term relationship with KLCI but also external variables. The most exogenous variable i.e. exchange rates does play

it roles in determining the direction of Malaysia KLCI and economic growth. Nevertheless, it is also important to note that stock market movements can also be accounted for, not only by observable economic factors but also unobservable factors such as investor sentiment (speculation).

References

Aisyah, A.R., Sidek, N. and Fauziah, H.T. (2009), Macroeconomic determinants of Malaysian Stock Market, African Journal of Business Management, 3(3), 95 -106.

Chen, N., Roll, R., and Ross, S. (1986), Economic forces and the stock market, *Journal of Business,* 59(3), 83-103.

Cochrane, J. (1991), Production-based Asset Pricing and the Link between Stock Return and Economic Fluctuations, *Journal of Finance*, 46, 209-238.

Engle, R., and Granger, C. (1987), Cointegration and error correction representation, estimation and testing, *Econometrica,,* 55(2), 251-276

Fama E. and French, K. (1989), Business Conditions and the Expected Returns on Stocks and Bonds, *Journal of Financial Economics*, 25, 23-49.

Fama, E. (1986). Term premiums and default premiums in money markets. *Journal of Financial Economics,* 17, 175-196.

Hussin, M., Muhammad, F., Abu, M. and Awang, S. (2012), Macroeconomic Variables and Malaysian Islamic Stock Market: A time series analysis, *Journal of Business Studies Quarterly,* 3(4), 1-13

Islam, M. (2003), "The Kuala Lumpur stock market and economic factors: a general-to-specific error correction modeling test", *Journal of the Academy of Business and Economics*, 1(1), 37 - 47.

Johansen, S and K. Juselius (1990), Maximum Likelihood Estimation and Inferences on Cointegration With Application to The Demand For Money, *Oxford Bulletin of Economics and Statistics*, 52, 169-210.

Kwon, C. and Shin, T. (1999), Cointegration and Causality Between Macroeconomic Variables and Stock Market Returns, *Global Finance Journal*, 10(1), 71- 81.

Masih, R. and Masih, A. M. M.(1996), Macroeconomic Activity Dynamics and Granger Causality: New Evidence from a Small Developing Economy Based on a Vector Error-Correction Modelling Analysis, *Economic Modelling*, 13(3), 407-426.

Maysami, R. & Koh, T. (2000), A Vector Error Correction model of the Singapore stock market, *International Review of Economics and Finance*, 9(1),79-96.

Maysami, R. & Sim, H. (2002), Macroeconomics variables and their relationship with stock returns: error correction evidence from Hong Kong and Singapore, *The Asian Economic Review,* 44(1), 69-85.

Mukherjee, T. and Naka, A. (1995), Dynamic Relationship between Macroeconomic Variables and The Japanese Stock Market: An Application of a Vector Error Correction Model, *The Journal of Financial Research*, 18(2), 223-237.

Pesaran , M. and Timmermann, A. (1995), Predictability of Stock Returns: Robustness and Economic Significance, *Journal of Finance*, 50(4), 1201-1228.