Impact of various islamic equity markets on sharia (islamic) compliant equity invesments in emerging markets

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Abstract

Islamic finance has been growing globally particularly after the subprime crisis of 2007-2008.This paper is an attempt to ask two questions on Islamic finance:(i)Assuming that an investor is bounded by Shariah compliant equity investment in the emerging markets, which equity market is more influencial in affecting the returns? (ii) Equally, if an investor is limited to Shariah compliant equity investment in the emerging markets, which index can be used as the most referred benchmark for his/her return? The standard time series techniques have been applied for the analysis. Our findings tend to indicate the following answers corresponding to the above two questions.(i)For a Shariah compliant equity investor in the emerging markets, Islamic equity markets of Asia Pacific and overall market (represented by DJIAP and DJIM as the proxy) are evidenced to be more influencial in affecting returns.(ii) Among the Islamic equity markets of US, Japan, Euro zone and Asia Pacific, the Japanese market (represented by DJIJAP as the proxy) is evidenced to be the main referenced market for the Shariah compliant investors who invest in the emerging markets.

Keywords:Islamic equity markets, emerging markets, VECM, VDC

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(i) OBJECTIVE AND MOTIVATION OF RESEARCH

The main purpose of this research is to ascertain the extent of the influence of various Islamic equity markets on Islamic equity investment made in the emerging markets. It also seeks to find empirical evidence as to which market has greater or lesser influence on the returns of Islamic equity investments made in emerging markets.

Therefore, the research question for this paper is as follows:

a. Assuming that an investor is bounded by Shariah compliant equity investment in the emerging markets, which equity market is more influencial in affecting the returns?
b. Equally, if an investor is limited to Shariah compliant equity investment in the emerging markets, which index can be used as the most referred benchmark for his return?

The variables that are used to represent the equity markets are as follows:

(i) Dow Jones Islamic Market index (DJIM)
(ii) Dow Jones Islamic Euro index (DJIEURO)
(iii) Dow Jones Islamic Asia Pacific index (DJIAP)
(iv) Dow Jones Islamic Emerging Markets index (DJIEMER)
(v) Dow Jones Islamic United States index (DJIUS)
(vi) Dow Jones Islamic Japan index (DJIJAP)

From the above indices, Dow Jones Islamic Emerging Markets index (DJIEMER) is used as the proxy variable to represent the Shariah compliant equity investment in the emerging markets.

The results of this research would be of particular interest to an investor that is bounded by Shariah compliant equity investment made in the emerging markets. Thus, it might assist the investor to recognise which of the relevant indices that can be used as the reference point in making and monitoring his/her investment performance.

(ii) LITERATURE REVIEW AND THEORETICAL FRAMEWORK

There had been various research works done, which had empirically tested and found the linkages or relationships among several equity markets globally. One of those researchs is done by Masih and Masih (2001). From a particular perspective, the notion that equity markets the world around are "interrelated" (one equity market bears influence on the others) is quite appealing to our intuition. Hence, it is not surprising that the researcher himself would have no major problems in accepting this general idea. Therefore, this would be the main theoretical framework of this paper and it will be tested by the data.

To the best but humble and limited knowledge and expereince of the author, there has not been may, if any research work dedicated to empirically establishing connection among the Shariah compliant equity markets on the Shariah emerging markets. Hence, this will be the research gap that this paper seeks to address.

(iii) RESEARCH METHODOLOGY, RESULTS AND INTERPRETATION

This study employs a time series technique, namely, cointegration, error correction modelling and variance decomposition, with the purpose of finding empirical evidence to the nature of relationships among various Shariah equity markets as had been highlighted in the earlier sections. This time series method is favoured over the traditional regression method due to the following reasons:

a. Regression assumes that variables are stationary. It makes this assumption without any testing. Stationary variables will have stationary means and variances. However, most, if not all, finance variables were found to be non-stationary. This feature of stationarity also includes the variables of stock market indices (as will be evidenced later).

The implication would be that, by performing ordinary regression on the variables, it will render the results as misleading. This is due to the statistical

tests such as t-ratios and F statistics will not be a valid one since it is applied to non-stationary variables. This would serve as a problem to the statisticians.

In order to adjust for the above, we might resolve to the differenced form of the variables to make it stationary and apply regressions with the relevant statistical tests. However, one should be concerned that by differentiationg the variables, the long term and theoretical information would be effectively removed.

Thus, with regression method, only short term and seasonal information will be captured. By this, we are also inferring that, regression method will not be a valid method to test a theory since the long term information is removed. This will serve as a problem to the economists since one of their main interests is to test the relevant thoeries.

The above issues had been solved by Engle and Granjer. According to them, the relevant statistical tests can be performed and valid if the variables are non-stationary and move together in the long term; i.e. cointegrated. In doing this, we keep the variables in their level form (not differentiating it) and test whether it is stationary or non-stationary. It is done in the augmented Dickey-Fuller (ADF) test. To test for cointegration, the variables must be non-stationary. Then, we test for cointegration. Both of the stationarity and cointegration tests are done in the time series method.

b. In the traditional or regression method, the dependant and independant variables are pre-determined by the researcher. This means that, the right side of the variables will determine the left side of the equation. This is normally done on the basis of a prevailing or priori theory.

The issue of the above is that, we are more or less biased in our study. In other words, regression method is biased towards the theoretical notion of the researcher. This biasness should be the corcern of all researchers.

Economic and finance (social science) related study particularly, need to give more attention to this issue (in comparison to physical science) since there are various conflicting theories in relation to a certain topic or issue.

Contrasting to the regression method, time series will not presume dependancy of the variables. The method will indicate whether the variable is dependant or independant.

c. In regression method, we cannot prove causality. Generally, we may say that regression is just a correlation exercise. Under the time series method, we can prove causality and it will be decided by the data by doing the causality test.

Causality information is important since one might want to know which varible need to be targeted in order to influence other variables. Under the causality test, we may know which variable is considered as the leading or lagging indicator. More than that, it can reveal which variable is the most or least leading indicator.

3.1 TESTING FOR STATIONARITY

We start our empirical test with determination of the variables stationarity. This is done in order for us to proceed with cointegration test later. Ideally, the variables tested should be I(1). It means that, in its original level form, they are non-stationary and in their first differenced form, they are stationary.

The differenced form of each variable is the difference of its log form. For example, DDJIM = LDJIM – $LDJIM_{t-1}$. Then, we conducted the augmented Dicjey-Fuller (ADF) test on each of the variables in both of their level and differenced form. The following table summarizes the results:

Variable	Test statistic	Critical value	Implication
Variables in level form			
LDJIM	-1.9895 (AIC)	-3.4330	Variable is non-stationary
	-1.8590 (SBC)		Variable is non-stationary
LDJIEURO	-1.8785		Variable is non-stationary
LDJIAP	-1.8453 (AIC)		Variable is non-stationary
	-1.6868 (SBC)		Variable is non-stationary
LDJIEMER	-1.6915		Variable is non-stationary
LDJIUS	-1.9762		Variable is non-stationary
LDJIJAP	-1.8389		Variable is non-stationary
Variables in differenced form			
Variable	**Test statistic**	**Critical value**	**Implication**
DDJIM	-9.2074	-2.8759	Variable is stationary
DDJIEURO	-9.2074		Variable is stationary
DDJIAP	-8.6445		Variable is stationary
DDJIEMER	-10.3987		Variable is stationary
DDJIUS	-8.7851 (AIC)		Variable is stationary
	-9.4917 (SBC)		Variable is stationary
DDJIAP	-9.4249		Variable is stationary

In the above results, we are relying on the AIC and SBC criteria. In determining which statistic to compare with the chosen 90% critical value, 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 (e.g. LDJIM in level form) . If this is the case, we have considered and compared for both results. From the comparisons made, there are no issues since it will give the same result.

The null hypothesis for the ADF test is that, the variable is non-stationary. In all cases of the variables in level form, the test statistics are lesser than the critical value. Thus, we cannot reject the null. This will infer that the variables are non-stationary in its level form.

To the opposite, test statistics of the variables in the differenced form are larger than the critical value. Hence, we can reject the null. This will mean that the variables in its differenced form are stationary.

Overall, from this ADF test, it shows that all of the variables are I(1). Hence, we may proceed with the next step, which is determining the order of VAR model and cointegration test.

3.2 DETERMINATION OF THE ORDER OF THE VAR MODEL

Before we can proceed with the cointegration test, we need to first determine the order of the vector auto regression (VAR), which is the number of lags that need to be used. Below table summarises the results.

	Chosen criteria	
	AIC	**SBC**
Optimal order	3	0

From the above table, it shows that, AIC recommends three (3) whereas SBC recommends zero (0) lag .

Knowing this this apparent conflict of recommendation between AIC and SBC, we address this issue by checking for serial correlation for each of the variables. The results are as per the following table:

Variable	**Chi-Sq p-value**	**Implication (at 10%)**
DDJIM	0.001	There is serial correlation
DDJIEURO	0.004	There is serial correlation
DDJIAP	0.001	There is serial correlation
DDJIEMER	0.039	There is serial correlation
DDJIUS	0.003	There is serial correlation
DDJIAP	0.262	There is no serial correlation

From the above table, we can see that there are autocorrelations in 5 out of 6 variables. Therefore, if we adopt a lower order, we might encounter the effectfs of serial correlation. On the other hand, if we were to take the higher order, the drawback is that, we risk over-identification.

Nevertheless, in our situation, with a relatively long time series of 208 observations, this serve as a lesser concern. In conclusion after considering the trade-off between the lower and higher orders, we decided to choose the higher order of three (3) of the VAR model.

3.3 TESTING FOR COINTEGRATION

After we had established that the variables are I(1) and the optimal VAR order as 3, we are prepared to test for cointegration. The test results are summarised in the following table:

Criteria	Number of cointegrating vectors
Maximal Eigenvalue	3
Trace	3
AIC	6
SBC	1
HQC	5

From the above table, it apparently suggests different results which are conflincting with each other; amid same results for maximal Eigenvalue and Trace test.

We are inclined to believe that there is one (1) cointegrating vector. This is due to our intution and experience with contemporary equity markets which indicated to us that equity markets are typically connected or interrelated to each other. This means that the movement of a particular market tends to effect on other markets, in a way or another, by various magnitudes.

Thus, based on the above statistical results and our intuition, for the purpose of this study, we shall assume that there is one (1) cointegrating vector.

As per the statistical interpretation, it indicated to us that, in some combination of the variables which we have chosen, it results in a stationary error term.

Adding to that, the economic interpretation is that, the six (6) chosen indices are theoretically related. This would mean that, their relationships with each other is not by chance or spurious.

3.4 LONG RUN STRUCTURAL MODELLING (LRSM)

Moving to the next step, we will try to quantify the theoretical relationships among the variables. We then compares the statistical results with our theoretical expectations or intuitions. Below table summarises the results.

Variable	Coefficient	Standard Error	t-ratio	Implication
LDJIM	-7.8727	3.7415	-2.10	*Variable is significant*
LDJIEURO	1.8824	0.83189	2.26	*Variable is significant*
LDJIAP	0.59089	1.0671	0.55	Variable is insignificant
LDJIEMER	-	-	-	-
LDJIUS	3.4273	1.8044	1.90	Variable is insignificant
LDJIJAP	0.75702	0.26754	2.83	*Variable is significant*

Apart from the above result, we verify the significance of the variables by subjecting the estimates to over-identifying restrictions. We did this for all of the variables by making one over-identifying restriction at a time). The resuls are as the following table:

Variable	Chi-Sq p-value	Implication
LDJIM	0.000	*Variable is significant*
LDJIEURO	0.000	*Variable is significant*
LDJIAP	0.000	*Variable is significant*
LDJIEMER	-	-
LDJIUS	0.000	*Variable is significant*
LDJIJAP	0.000	*Variable is significant*

From the above two tables, we may conclude that all of the variables chosen are significant. Hence, we ariive at the following cointegrating equation (with numbers in parentheses are the standard deviations):

DJIEMER – 7.87DJIM + 1.88DJIEURO + 0.59DJIAP + 3.43DJIUS + 0.76DJIJAP → I(0) (3.74) (0.83) (1.07) (1.80) (0.27)

3.5 VECTOR ERROR CORRECTION MODEL (VECM)

Up to this point, we have established that all of the variables are cointegrated to a significant degree. Nevertheless, the cointegrating equation resulted does not reveal the causality information. By causality, we mean that, which index is trhe leading variable and which is the laggard variable.

Causality or information on the direction of Granger-causation might be proven significant to the investors concerned. By knowing which variable is the leader and which is the follower, investors can better forecast the outcome of their investment.

In a typical situation, a aprticular investor would be focusing on the index which is the 'leader' among the variables. From this, he would closely monitor the performance of that particular index as it will have a momentous effect on the movement of other indices. This 'leader' variable is also called exogenous variable. The 'follower' variables are also called endogenous variable.

With this understanding, we proceed our study with analysis that involves Vector Error Correction Model (VECM). It is from this analysis we are able to determine which variable is endogenous and which is exogenous. The following table summarises the result.

Variable	ECM(-1) t-ratio p-value	Implication
LDJIM	0.060	Variable is endogenous
LDJIEURO	0.094	Variable is endogenous
LDJIAP	0.000	Variable is endogenous
LDJIEMER	0.170	Variable is exogenous
LDJIUS	0.197	Variable is exogenous
LDJIJAP	0.000	Variable is endogenous

From the above table, we may conclude that DJIUS is the 'leader' among the chosen variables. Therefore, it should be the main index of interest compared to the other indices.

As a 'leader' and exogenous variable, it will be the most refered index in the context that, it it moves, other indices will follow suit.

3.6 VARIANCE DECOMPOSITIONS (VDC)

In variance decomposition (VDC), we will attempt to ascertain the relative endogeneity (or exogeneity) of the variables. VDC decomposes the variance of forecast error of each variable into proportions attributable to shocks from each variable in the system, including its own. The least endogenous variable is thus the variable whose variation is explained mostly by its own past variations.

We start our analysis by applying orthogonalised VDCs and the results are as the following:

Forecast at period of 25 weeks

	DJIM	DJIEURO	DJIAP	DJIEMER	DJIUS	DJIJAP
DJIM	53.45%	8.55%	1.10%	12.24%	17.69%	6.98%
DJIEURO	56.00%	17.05%	0.84%	8.99%	12.58%	4.55%
DJIAP	49.74%	8.49%	9.15%	12.34%	13.43%	6.84%
DJIEMER	38.74%	8.51%	5.36%	32.60%	11.68%	3.10%
DJIUS	53.14%	4.11%	0.31%	9.93%	25.53%	6.98%
DJIJAP	40.11%	4.04%	6.20%	2.86%	13.01%	33.79%

Forecast at period of 50 weeks

	DJIM	DJIEURO	DJIAP	DJIEMER	DJIUS	DJIJAP
DJIM	51.30%	9.15%	1.20%	12.77%	18.38%	7.20%
DJIEURO	54.32%	17.62%	0.92%	9.34%	13.09%	4.72%
DJIAP	47.93%	9.05%	9.20%	12.80%	14.00%	7.03%
DJIEMER	37.29%	9.07%	5.49%	32.69%	12.22%	3.24%
DJIUS	51.23%	4.44%	0.15%	10.50%	26.44%	7.24%
DJIJAP	39.22%	4.38%	6.22%	3.04%	13.55%	33.59%

From the above two tables, we can summarise the results by considering the diagonal line of the matrix (highlighted), which is the relative exogeneity. Below table summarises the result.

No.	Index
1	DJIM
2	DJIJAP
3	DJIEMER
4	DJIUS
5	DJIEURO
6	DJIAP

For the second part of VDC, we apply generalised VDC. The results are as the following:

Forecast at period of 25 weeks

	DJIM	DJIEURO	DJIAP	DJIEMER	DJIUS	DJIJAP
DJIM	16.51%	18.85%	15.21%	19.56%	15.38%	14.48%
DJIEURO	16.90%	21.35%	15.35%	18.39%	14.68%	13.34%
DJIAP	15.19%	17.54%	17.92%	20.22%	12.36%	16.78%
DJIEMER	14.46%	17.25%	16.28%	28.31%	11.88%	11.82%
DJIUS	17.37%	18.19%	13.69%	18.37%	18.46%	13.92%
DJIJAP	14.24%	15.52%	16.32%	14.31%	12.35%	27.26%

Forecast at period of 25 weeks

	DJIM	DJIEURO	DJIAP	DJIEMER	DJIUS	DJIJAP
DJIM	16.25%	18.93%	15.18%	19.91%	15.03%	14.70%
DJIEURO	16.71%	21.36%	15.32%	18.64%	14.46%	13.50%
DJIAP	14.99%	17.62%	17.82%	20.51%	12.14%	16.93%
DJIEMER	14.25%	17.34%	16.22%	28.50%	11.64%	12.04%
DJIUS	17.08%	18.29%	13.69%	18.75%	18.03%	14.16%
DJIJAP	14.11%	15.61%	16.26%	14.57%	12.19%	27.25%

From the above two tables, we can summarise the generalised VDC results by considering the diagonal line of the matrix (highlighted), which is the relative exogeneity. Below table summarises the result.

No.	Variable
1	DJIEMER
2	DJIJAP
3	DJIEURO
4	DJIUS
5	DJIAP
6	DJIM

We are inclined to opt for results generated by the generalised VDCs since there are several disadvantages related to orthogonalised VDCs. Such of those disadvantages are as follows:

(i) it assumes that when a particular variable is shocked, all other variables are "switched off". This is somewhat unrealistic since most (if not all) of the economies in today's markets are very dynamic and interrelated to each other.

(ii) it produce the results according to the order of variables in the VAR. What does this means is that, the first variable will report the largest percentage and therefore will likely to be recognised as the most exogenous variable. This is the exact scenario that we had in our data, where DJIM, which appears first in the VAR order, and it is reported to be the most exogenous.

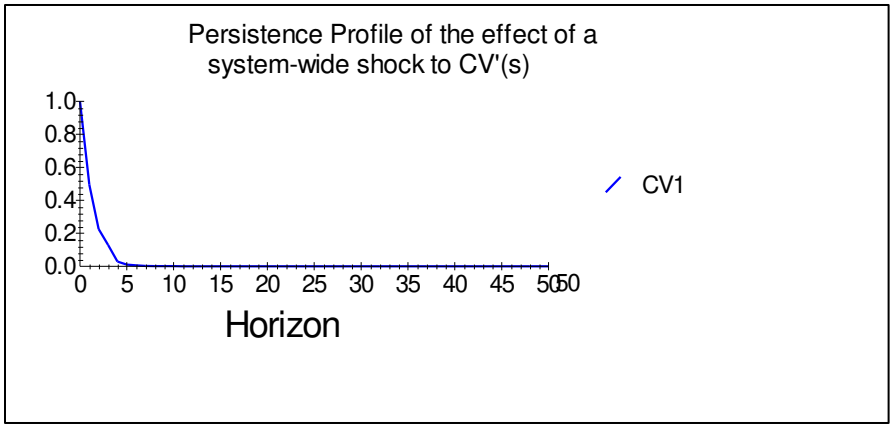
It is due to the above drawbacks of orthogonalised VDCs that we decided to depend on generalised VDCs. According to this, the most exogenous variable is DJIJAP (after DJIEMER).

3.7 IMPULSE RESPONSE FUNCTION (IRF)

The impulse response functions (IRFs) essentially reveal the same information as the VDCs, except that they can be presented in a graphical form.

3.8 PERSISTENCE PROFILE

The persistence profile indicates the scenarios when the whole cointegrating equation is shocked. It illustrates the time (how many periods) it will take for the relationship to return back to equilibrium. Hence, the effect of a system-wide shock on the long-run relationships of the variables is the focus in this analysis. This is in contrast to the variable-specific shocks as in the case of IRFs. The chart below illustrates the persistence profile for the cointegrating equation of this paper.



(iv) CONCLUSIONS

As a conclusion, we return back to the two research question posed in the earlier part of this paper. Therefore, considering the empirical results and the intuition of the author, below are the answers:

a. For a Shariah compliant equity investors in the emerging markets, Islamic equity markets of Asia Pacific and overall market (represented by DJIAP and DJIM as the proxy) are more influencial in affecting returns.
b. Among the Islamic equity markets of US, Japan, Euro zone and Asia Pacific, Japan (represented by DJIJAP as the proxy), is the main referenced market for the Shariah compliant investors who invest in the emerging markets.

REFERENCES

Bacha, O. and Mirakhor, A. (2013): *Islamic Capital Markets*, Singapore, John Wiley and Sons.

Chen N.F., Roll, R. and. Ross, R.A.(1986), Economic Forces and the Stock Market, Journal of Business, 59(3),. 383-403.

Engle, R. F., and Granger, C. (1987), Co-Integration and Error Correction: Representation Estimation and Testing, *Econometrica*, 55 (2), 251-276.

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

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

Masih M., Al-Elg A. and Madani, H. (2009) Causality between financial development and economic growth: an application of vector error correction and variance decomposition methods to Saudi Arabia. *Applied Economics*, 41(13),1691–1699.

Masih, R. and Masih, A. M. M. (2001), Long and Short Term Dynamic Causal Transmission Amongst International Stock Markets, *Journal of International Money and Finance*, 20, 563-587.

Maysami, R. C. and Sim H. H. (2001). An empirical investigation of the dynamic relations between macroeconomics variable and the stock markets of Malaysia and Thailand. J*urnal Pengurusan,* 20, 3-26.

Maysami, R. and 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.

Poon, S. and Taylor, S. J. (1991), Macroeconomic factors and the UK stock market, *Journal of Business Finance and Accounting*, 19, 619-636