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Cointegration of Islamic Stock Indices: Evidence from Five ASEAN Countries

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ABSTRACT : This paper investigates the dynamic causal linkages in the daily returns among five ASEAN Shariah-compliant indices (such as, FTSEMY index, MSSNGIL index, JAKSEIS index, MSTHFIL index and MSPHISL index) through the application of the standard time series techniques. Essentially, the purpose of this research is to identify the extent of linkages of Islamic stock indices in five ASEAN countries. Our study is focused on investigating the following empirical questions: (i) are these selected five Shariah-compliant stock indices cointegrated? and (ii) which major stock index was driving the selective Shariah-compliant stock indices?

Our findings tend to suggest: (i) the selected Islamic stock indices appear to have a theoretical and long-run comovement (as evidenced in the Cointegration and LRSM tests) (ii) Finally, what stands out is the leadership of the Malaysia Shariah stock index in driving all Islamic stock indices (as evidenced in the VDCs tests).

Keywords: Stationary, Co integration, VECM estimation, Shariah compliant stock indices, LRSM, VDCs, IRFs, causal relationship

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1. Introduction

Trade and financial liberalization, since the late 20th century, enhanced due to the process of globalization, trade ties and economic synchronization, and integration of international stock market indices. A decision by a country's government to permit foreigners to buy stocks in that country's stock market is called stock market liberalization. The rational behind financial liberalization is to restore growth and stability by raising savings and improving economic efficiency. Following the collapse of the Bretton Woods system , the developed countries initiated the international financial liberalization process [1].

There is plenty of literature on stock market interdependence and integration. Following the influential works of Engle and Granger [2], Johansen [3] and Johansen and Juselius [4], many studies beginning with Taylor and Tonks [5], Kasa [6] and, subsequently, Masih and Masih [7-8], Chowdhry [9] and Chowdhry et al [10] have employed the cointegration hypothesis to identify the international integration of financial markets. But, depending on the data, methodology, and theoretical models employed, there is no clear resolution of the issues relating to dynamic causal linkages among the stock markets as yet. These issues have been addressed by numerous studies [7-8, 11-14]. However, because of the inconsistent results, they are placed under critical examination [8]. If there is a common long-term relationship among stock markets, the benefits of diversifying portfolios in international assets is doubtful. A common long-run relationship indicates relatively high long-term cross-market correlations, thereby reducing any possible diversification benefit over the long-run. Any potential achievement from international diversification of a portfolio is inversely correlated to the extent of stock market integration. A low correlation between returns on stock market indices allows investors to minimize portfolio risk by international diversification. According to Masih and Masih [7-8,13], another significant implication of integrated markets is that assets associated with similar degrees of risk in different countries should also

lead to a similar degree of return. Therefore, an analysis of the long-run comovement of stock market prices and their short-run temporal relationships is significant for dealing with an international portfolio.
Most researchers [7-8,13] have focused on the interdependencies of conventional stock indices and empirical works on Islamic stock indices are either not available or inconclusive. Given the conflicting conclusions of the research in this field, further highlights should be made available through an investigation of an alternative set of financial markets, particularly, a set of Islamic stock indices, at least, from an international diversification perspective. Islamic stock indices can most likely offer a far greater diversification potential for attracting global portfolios. Furthermore, investigations into the dynamic linkages of Islamic stock indices over time and across markets are of significant importance to investors and financial policy makers; A more fundamental issue, at least from the perspective of the *Shariah* compliant equity investors, is to identify the Islamic, regional and international equity markets on Shariah compliant equity investment. Basically, this paper has two research questions, namely:

(i) Are these selected five *Shariah*-compliant stock indices cointegrated? and (ii) which major stock index was driving the selective *Shariah*-compliant stock indices?

These questions have been previously addressed by some researchers purely on conventional stock markets [7-8,13]. However, over the recent years mainly because of the financial crises, the investors have been looking for alternative sources of investment such as, the fast growing Islamic finance. This paper, therefore, wants to shed more light on these issues by analyzing several *Shariah* compliant stock indices.
This paper is organized as follows. Following this introduction, Section Two gives a brief review of the Islamic investment criteria and an overview of selective stock exchange markets; Section Three reviews the related literature and Section Four introduces a brief description on the methodology used in this study. This is followed in Section Five by a discussion of data and empirical results. Concluding remarks, limitations of study and directions of future research are given at the end of the paper.

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2. Islamic Investment Criteria

Islamic investment is growing rapidly in South East Asia, GCC and MENA regions as an alternative investment class for all investors, both Muslim and non-Muslim, for its foundation in ethical business practices, social responsibility and fiscal conservatism. While Islamic investors may be mandated to invest only in a *Shariah*-compliant manner, other investors do so for the benefits they derive, including greater stability of returns, transparency and diversification [1][1].

In Islamic finance, a market should be free from prohibited activities and elements such as *riba* (usury), *maisir* (gambling), *gharar* (ambiguity), and also other activities like gambling, alcohol, and so on. To describe the Islamic principle in detail, *riba* technically is defined as the "premium" which should be paid by the borrower to the lender together with the principal amount as a condition in the contract of the loan or for an extension in the duration of loan" [15. *p.7*]. More specifically, both the premium and the principal are guaranteed regardless of the investment performance. Islamic stock must not include firms that pay or receive interest of any form. However, the percentage of today's listed firms that are fully in compliance with the *Shariah* is in small number [1]. Some degree of tolerance therefore is required.

The modern *Shariah* scholars have provided general rules for *Shariah*-compliant investors to evaluate or screen whether a particular company is *halal* (lawful) or *haram* (unlawful) for investment [16-17]. There are two types of stock screening approaches such as qualitative and quantitative screens. The first one is qualitative screen, the screening process that focuses on the activity of a company that is used as the

[1] Case for Islamic Asset Management, by CIMB bank, June 30, 2010.

main principle in Islamic investment criteria. The second one is quantitative screen, where Islamic scholars have applied a principle of tolerance associated with filtering criteria, namely[2]:

(1) Debt/equity ratio. If a company's debt financing is more than 33 percent of its capital, then it is not permissible for investment.
(2) Interest-related income. If interest-related income of a company is more than 10 percent of its total income, then it is not permissible for investment. This income, however, should not come from its main business activities but from placing its surplus funds in investments that could yield interest income [18].
(3) Monetary assets. This parameter refers to the composition of account receivables and liquid assets (cash at banks and marketable securities) compared to total assets. Various minimums have been set for the ratio of non-liquid assets (assets that are not in the form of money) necessary to make an investment permissible. Some set this minimum at 51 percent while a few cite 33 percent as an acceptable ratio of non-liquid assets to total assets.

Chapra [19] and Chapra et al. [20] who mention that there are four basic conditions in Islamic finance that may prevent the two main causes of financial crisis, which are excessive leverage and the formation of speculative bubbles in credit markets. Firstly, all transactions have to be based on real assets rather than merely fictitious or notional assets. This may discourage all speculative transactions which involve excessive ambiguity or gambling. Secondly, the transaction must involve the possession of exchange objects on the seller/lesser where this condition may guarantee that, to obtain certain return, the owner will share the risk with his partner. Thirdly, the transaction must be genuine with full intention to give and take delivery which in turn will prevent the excessive speculation using imaginary assets. Lastly, the credit risk must be borne by the creditor up to the maturity, which is subject to the rule of prohibition of selling the debt except at par value. This is to ensure that the creditor cannot transfer the risk by selling the debt to the market within a speculative and derivative transaction and that prevents the excessive growth of the debt beyond reasonable limits.

3. Literature Review

Reviewing at most of literatures done over decade, stock markets and its relations has been widely studied. Anyhow, research work devoted to empirical linkages between Malaysia and other *Shariah* Compliant Countries and its equity markets has not been many. Majority of the research work concentrating on conventional finance. Most of them can be found under Masih and Masih [7,8].

The stock market is a complex system that all interconnected and one drives the other "the market moved the economy in 1990's-2000 and in 2008 the "economy moved the market." It has always been one depends on another as the same apply to shariah compliant equity. Stock market interdependence is due to the increase diversification of investment on an international level, and the existence of stock market leader and followers [13].

The basic objective of this study is to assess whether Islamic index prices in the Malaysia stock markets move as the random walks theory suggests. In other words, is the Malaysia stock market mechanism efficient in the manner stipulated in South East Asia countries? The following objectives are also conceptualized in the study under consideration: i) To study whether the stock price movement depicts any trend or are market movement interdependent? ii) In the absence of interdependence, does the stock prices movement follow a random walk? iii) To empirically test whether the strong form of efficient market hypothesis holds well in Malaysia stock markets encompassing observable interdependence countries.

Nowadays, stock market has become a major part of investment for many countries especially in the west side of the world where stock exchange has become a core activity for the country and people. There are plenty of study that been conducted regarding stock market especially on the interdependencies among market but since 1997 Asian crisis, study regarding interdependencies of stock market between countries has been expanded and focuses on Asian market [13]. These days, the stock markets around the world

[2] http://www.djindexes.com/islamicmarket/

also becoming more correlated and major financial market share increase cointergration. It is because in the midst of a global information revolution driven by the rapid introduction of new technologies which globalize economies and communications of fast changing today global stock markets. In another note, due to globalization, deregulation and more liberalization of the stock market that the cointergration has been increase over years. Lately, the stock exchange activity not only been held within the country, but also has been expanded globally.

The current indications about the markets in Malaysia point to a favourable situation for the development of a *Shariah* compliant index. The existing studies have shown that the situation here more conducive to such a venture than what exists in many Islamic nations itself. The huge amount of funds locked up in the Muslim world for want of proper and ethical investment opportunities is a potential indicator of how much the Malaysia markets can still perform better.
Time series econometric techniques has been applied by many researchers in the result of short term and long term correlation among international stock market indices with particular focus on Asian emerging stock market such as Singapore, Malaysia, Hong Kong, Japan, Thailand and Taiwan markets. According to author knowledge, there wasn't analysis of *Shariah* compliant equity markets in South East Asia region. This could be the new gap of study that this assignment would offer. The study of market interdependence holds important implications for the theory of financial econometric; in particular, the degree to which markets are integrated determines the benefits of investment.

4. Data, Empirical Results and Discussions

We want to apply the standard cointegration, long run structural modelling, vector error correction and variance decomposition techniques to address the issues of this paper.

4.1 Data

This paper investigates the dynamic causal linkages in the daily returns amongst five major International Islamic Stock Price Indices in East Asia, namely, Malaysia, Singapore, Philippines, Thailand and Indonesia Islamic Stocks from 29th February 2008 to 1st January 2013 all obtained from Datastream.

Table 1: List of Variables

Variables	Country	Symbol	Level form	Difference form
Philippines Islamic Stock Index	Philippines	MSPHISL	LMSPHISL	DMSPHISL
Thailand Islamic Stock Index	Thailand	MSTHFIL	LMSTHFIL	DMSTHFIL
Singapore Islamic Stock Index	Singapore	MSSNGIL	LMSSNGIL	DMSSNGIL
Indonesia Islamic Stock Index	Indonesia	JAKSEIS	LJAKSEIS	DJAKSEIS
Malaysia Islamic Stock Index	Malaysia	FTSEMY	LFTSEMY	DFTSEMY

4.2 4. Empirical Results and Discussions

Based on the variables, the regression analysis assumes that all are stationary. The Ordinary Least Square (OLS) method is used to evaluate the data of variables. In the real world, the variables are non-stationary hence the OLS method cannot be applied. Therefore, we need to use Augmented Dickey-Fuller (ADF) test on each variable in both level and differenced form to test whether it is non-stationary or stationary.

Based on results in Table 2, it indicates that while all variables contain a deterministic trend, we cannot reject the presence of a unit root for any of the variables. Therefore, overall, we could not find evidence that the variables are not I(1) which are variables were found non-stationary at the 'level' form but stationary after 'first-differencing' (Δ).

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Table 2: Tests of the unit root hypothesis of individual stock price indices

Augmented Dickey – Fuller (ADF-TEST)		
	τ_μ	τ_τ
	Levels	
LMSPHISL	-3.0236	-3.2001
LMSTHFIL	-2.6277	-2.6277
LMSSNGIL	-2.1945	-2.1653
LJAKSEIS	-2.8232	-2.8592
LFTSEMY	-2.8242	-2.8124
	First-differences (Δ)	
DMSPHISL	-20.4236	-26.9667
DMSTHFIL	-16.3622	-23.4459
DMSSNGIL	-15.5328	-24.9386
DJAKSEIS	-16.0865	-23.1637
DFTSEMY	-24.9941	-24.9941

Notes: Variables represent aggregate Islamic stock market price indices for Malaysia (FTSEMY), Philippines (MSPHISL), Thailand (MSTHFIL), Singapore (MSSNGIL) and Jakarta (JAKSEIS). The optional lag use for conducting the Augmented Dickey-Fuller test statistic was selected based on an optimal criteria (Akaike's final prediction error) using a range of lags.

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Before proceed with cointegration test, we need to determine 'optimal' order for Vector Auto Regression (VAR), that is, the number of lags to be used. Results in Table 3 suggested that AIC favors order of 3 while SBC favors 1 lag.

Table 3: Selection of Optimal Order

Choice Criteria		
Optimal order	AIC	SBC
6	18759.2	18358.5
5	18763.7	18427.7
4	18769.4	18498.0
3	**18772.3****	18565.5
2	18767.2	18625.1
1	18749.8	**18672.3***
0	18683.6	18670.6

Note: ** indicates that optimal order based on AIC whereas * indicates optimal order based on SBC. The optimal lag structure for each of the VAR models was selected by maximizing the Akaike's information criteria. In the final analysis, we use a lag of 2.

The results based on Johansen's (Johansen, 1988; Johansen and Juselius, 1990) multivariate cointegration tests in Table 4 tend to suggest that these five variables are bound together by long-run equilibrium relationship.

Table 4: Johansen's test for multiple cointegrating vectors

Vector:LMSPHISL,LMSTHFIL, LMSSNGIL,LJAKSEIS, LFTSEMY				Critical Values (95%)	
H_0:	H_1:	Eigenvalue	Trace	Eigenvalue	Trace
r = 0	r = 1	**42.0223****	**117.7795****	37.8600	87.1700
r ≤ 1	r = 2	27.6813	**75.7572****	31.7900	63.0000
r ≤ 2	r = 3	21.8238	**48.0759****	25.4200	42.3400
r ≤ 3	r = 4	16.8691	**26.2521****	19.2200	25.7700
r ≤ 4	r = 5	9.3830	9.3830	12.3900	12.3900

Note: r indicates the number of cointegrating relationships. ** indicates significance at the 5% level.

Evidence of cointegration among these five Islamic indices has several implications. First, it rules out 'spurious' or 'accidental' correlations and also the possibility of Granger non-causality which in turn implies at least a unique channel for Granger causality to emerge either unidirectional or bidirectional. Secondly, the actual number of cointegrating (or equilibrium) relationships found in Table 4 shows that maximal Eigenvalue indicates there is only one cointegrating vector whereas the trace value indicates that there are four cointegrating vectors.

We tends to believe that the Islamic stock markets are typically "connected" or "integrated" with the performance of one market tends to have an effect on other markets. Based on the above statistical result, the purpose of this study is to indicate which Islamic indices influence on Malaysia Islamic index which we assume there is one cointegrating vector, or long-run relationship. So there is one cointegration vector (r=1) in the consequent analysis.

This finding is consistent with studies by Masih and Masih [7] among others, find that nine major international equity markets possess at least one cointegrating vector. Furthermore, based on evidence using similar techniques on a system of five OECD equity markets, Masih and Masih [8] find evidence that the crash did not affect the number of common stochastic trends within this particular system.

After that, we try to quantify this apparent theoretical relationship among the stock markets. By doing this, we are able to compare our statistical findings with theoretical (or intuitive) expectations. We normalize our focus variable (index), the Malaysia Islamic Index, by relying on the Long Run Structural Modelling (LRSM). We initially obtained the results in the Vector 1 of Table 5. We found three variables (indices) are significant which are Philippines, Singapore and Jakarta Islamic Index by calculating the t-ratios manually.

Furthermore, we decided to verify the significance of the variables by subjecting the estimates to over-identifying restrictions. We have done over-identifying restriction for all the insignificant variables one by one and the results confirmed earlier findings that only Philippines, Singapore and Jakarta Index were significant. In all cases, *p*-value is greater than 0.05 which implies that H_0 is accepted, therefore, our restrictions are correct. So, based on the evidence of a significant cointegrating relationship as well as based on LRSM test, we proceed with Vector 2 for the remainder of the analysis, as detailed in the Table 5.

Table 5: ML estimates subject to exactly and over-identifying restriction

	Vector 1	Vector 2
MSPHISL	0.79165 0.56380	**0.47897**** 0.27718

MSTHFIL	1.3136 0.58693	-0.78997 0.21585
MSSNGIL	0.61373 0.61115	**0.68073**** 0.26731
JAKSEIS	0.52229 0.39118	**-0.47327**** 0.18011
FTSEMY	1.0000 (NONE)	1.0000 (NONE)
Chi-Square	None	8.336 [0.004]

Notes: The output above shows the maximum likelihood estimates subject to exactly identifying (Vector 1) and over identifying (Vector 2) restrictions. The results show that LMSPHIL, LMSSNGIL AND LKJAKSEIS are significant variables while the rest of them are insignificant based on t-ratio. In exact-identifying restriction, p-value is greater than 0.05 which implies that H_0 is accepted, therefore, our restriction is correct. So, based on the evidence of a significant cointegrating relationship as well as based on LRSM test, we proceed with vector 2 for the remainder of the analysis. ** indicates the significant variables.

Cointegrating equation is based on the over-identifying restriction (Vector 2):

$$\underset{}{LFTSEMY} + \underset{(0.27)}{0.48LMSPHISL} + \underset{(0.26)}{0.68LMSSNGIL} - \underset{(0.18)}{0.47LKJAKSEIS} \rightarrow I(0)$$

From the above analysis, we concluded that Philliphine Islamic, Singapore Islamic and Jakarta Islamic Stock Index may have greater impact on Malaysia Islamic stock index, whereas, none of Islamic complaint indices have influence on this particular Islamic complaint market.

Cointegration test, however, cannot inform us the direction of Granger-causality among the variables as to which variable is leading and which variable is following and which variable is exogenous and which variable is endogenous. To identify the endogeneity or exogeneity of the variables, we applied the vector error-correction modeling (VECM) technique. Information on direction of Granger-causation can be particularly useful for investors. Investors can better forecast or predict expected results of their investments by identifying which variable is exogenous and endogenous. Typically, an investor interested to know which index is the exogenous, then the investor is able to monitor the performance of that index closely as it would have significant bearing on the expected movement of other indices in which the investor has invested. This exogenous index would be the index of interest to the investor.

Summary results, based on the VECM formulation, are presented in Table 6 and are of some interest. By looking at the significance or otherwise of the coefficient of the error-correction term we find that the MSPHISL, MSTHFIL and JAKSEIS Islamic Stock are the endogenous variable, whereas FTSEMY and MSSNGIL variables are exogenous. That tends to indicate that the MSPHISL, MSTHFIL and JAKSEIS Islamic Stock are the follower whereas FTSEMY and MSSNGIL variables are driver. This finding is consistent with studies by Masih and Masih [7] among others, find that the relatively leading role of all established markets in driving the fluctuations in the Asian NIC stock markets.

The error-correction model also helps us distinguish between the short term and long term Granger-causality. The error-correction term stands for the long-term relations among the variables. The speed of short-run adjustment to bring about the long term equilibrium is given by the coefficient of the error-correction term. The results tend to indicate that if the long term equilibrium between the variables is disturbed by any shocks, they will take about between 15.5 and 219.5 days to restore the equilibrium. The

FTSEMY Malaysia Islamic Stock is within the shortest period while the JAKSEIS is within the longest period to get back long-run equation.

Table 6: Vector Error Correction Estimates

	MALAYSIA ISLAMIC	PHILIPPINES ISLAMIC	THAILAND ISLAMIC	SINGAPORE ISLAMIC	JAKARTA ISLAMIC
DFTSEMY (1)	0.0643 0.0360	0.0050 0.0156	0.0046 0.0203	0.0709 0.0273	0.0781 0.0226
DMSPHISL (1)	0.0377 0.0678	0.0104 0.0295	0.0068 0.0380	0.2757 0.0513	0.0132 0.0426
DMSTHFIL (1)	0.0134 0.0628	0.0110 0.0273	0.0434 0.0354	0.0219 0.0476	0.9028 0.0395
DMSSNGIL (1)	0.0798 0.0472	0.0489 0.0205	0.0636 0.0266	0.0369 0.0358	0.0315 0.0297
DJAKSEIS (1)	0.0446 0.0576	0.0242 0.0250	0.0573 0.0324	0.1260 0.0436	0.0046 0.0362
ECM1(-1)	0.004689 0.003947	0.0153140 0.0074361	0.034199 0.006890	0.007295 0.005177	0.019711 0.006319
Chi-sq SC(1)	27.7250[.000]	12.2445[0.000]	16.8514[0.000]	0.021873[0.882]	5.4760[0.019]
Chi-sq FF(1)	0.68640[0.407]	0.63251[0.426]	0.43709[0.509]	11.4209[0.001]	0.0075[0.931]
Number of Days	15.5	96.2	23	27	219.5

Notes: The above within-sample results tend to indicate that in the long term Philippines, Thailand and Jakarta Islamic Stock are endogenous, whereas Malaysia and Singapore Islamic Stocks variables are exogenous.

The diagnostics of all the equations of the error-correction model (testing for the presence of serial correlation and functional form) tend to indicate that the equations are more or less well-specified. Normality and heteroscedasticity are least important to time series data, so these two diagnostic tests are excluded from our analysis.

Although the error-correction model tends to indicate the endogeneity or exogeneity of a variable, we applied the Generalized Variance Decomposition Analysis (Table 7) to identify the relative degree of endogeneity or exogeneity of the variables. The relative exogeneity or endogeneity of a variable can be determined by the proportion of the variance explained by its own past. The variable which is explained mostly by its own shocks is deemed to be the most exogenous of all.

In Table 7, at the end of the forecast horizon number 30, we find that 90.104 per cent of the forecast error variance of Malaysia Islamic Index is explained by its own shocks, and in the case of Jakarta Islamic Index that proportion is only 47.458 per cent. But in the case of Philippines Islamic Index, 73.665 per cent of the forecast error variance of the income variable is explained by its own shocks. That tends to indicate that the Malaysia Islamic Index is the most exogenous of all. These out-of-sample variance forecast results given by the generalized variance decompositions are consistent with our earlier within-sample results given by the error-correction model that Jakarta Islamic Index is only the endogenous variable. The order of exogeneity rank in 30 days and 60 days time horizon are given as in Table 8.

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Table 7: Generalized Variance Decomposition Analysis

Percentage of Forecast Variance Explained by Innovations in:

DAYS		MALAYSIA ISLAMIC	PHILIPPINES ISLAMIC	THAILAND ISLAMIC	SINGAPORE ISLAMIC	JAKARTA ISLAMIC
30	**Δ MALAYSIA ISLAMIC**	**90.104**	5.0467	3.1113	1.1779	0.56021
60		**81.988**	10.639	5.5771	1.3179	0.47778
30	**Δ PHILIPPINES ISLAMIC**	23.646	**73.665**	0.37235	2.2542	6.25E-02
60		29.381	**66.798**	1.3611	2.3605	9.97E-02
30	**Δ THAILAND ISLAMIC**	29.787	1.2318	**68.506**	0.14585	0.32974
60		30.606	0.98382	**67.92**	0.14375	0.34647
30	**Δ SINGAPORE ISLAMIC**	19.942	1.9994	8.5588	**69.479**	2.12E-02
60		18.439	3.2217	9.729	**68.595**	1.55E-02
30	**Δ JAKARTA ISLAMIC**	30.426	4.5257	11.321	6.2698	**47.458**
60		29.336	5.5761	12.176	6.3203	**46.591**

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For the above table, rows read as the percentage of the variance of forecast error of each variable into proportions attributable to shocks from other variables which is in columns including its own. The diagonal line of the matrix (highlighted) represents the relative exogeneity. According to Generalized Variance Decomposition Analysis, the ranking of indices by degree of exogeneity (extent to which variation is explained by its own past variations) is as per the Table 8 (respectively 30 and 60 days time horizon).

Table 8: Relative exogeneity based on Generalized Variance Decomposition Analysis

No.	Indices	
	30 Days	60 Days
1	LFTSEMY	LFTSEMY
2	LMSPHISL	LMSSNGIL
3	LMSSNGIL	LMSTHFIL
4	LMSTHFIL	LMSPHISL
5	LJAKSEIS	LJAKSEIS

We had already identified that generalized VDCs gives us more reliable information. So we just conducted generalized impulse response functions analysis in favour of its reliability. The generalized impulse response functions (IRFs) essentially produce the same information as the generalized VDCs, except that they can be presented in graphical form We then applied the generalized impulse response functions and found that, consistent with the earlier results, the FTSEMY Index variable is the least sensitive to a one standard deviation shock to other variables while JAKSEIS Islamic Index is the most sensitive.

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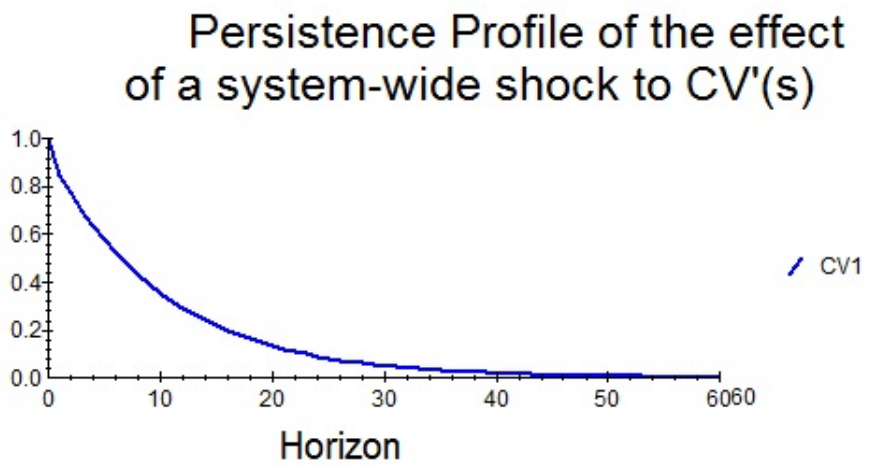
Last but not least, an application of the persistence profile analysis in figure below indicates that if the whole cointegrating relationship is shocked, it will take about 40 days for the equilibrium to be restored. The figure shows that the persistence profile for the cointegrating equation.

Figure 1: Persistence Profile Analysis



5. Implications of Empirical Results

Our results hold several implications in the area of financial research concentrating on linkages among a set of conventional and Islamic equity markets, on both methodological and substantive levels. In this part, we briefly discuss the methodological implications of this analysis and also the implications that the derived results hold for issues associated with:

1. Which indices are affecting the movement of FTSEMY Malaysia Islamic Market
2. Which index will have more related on returns
3. Implications of results for which major stock market dominated the selective Asian emerging markets.

At a methodological level, procedures which do not rely upon the knife-edge distinctive requisites of exact unit roots and cointegration do seem to be a welcome relief for practitioners concerned with performing causal inference in systems containing possibly integrated processes. Pre-testing for the explicit number of unit roots in the system and information on the rank of certain submatrices in the cointegrating space is also required, and is also problematical for those attempting to determine the appropriate limit theory.

More substantially, the results of cointegration and causal linkages of Islamic markets provide some interesting evidence to compare with current and previous research. Foremost interest in much of the empirical international financial literature is the extent to which equity markets have become internationally integrated. We found that there is long-run relationship among the Islamic markets. This finding is consistent with studies by Masih and Masih (2001), among others, find that nine major international equity markets possess at least one cointegrating vector. Furthermore, based on evidence using similar techniques on a system of five OECD equity markets, Masih and Masih (1997) find evidence that the crash did not affect the number of common stochastic trends within this particular system.

By conducting Long Run Structural Modelling (LRSM), we concluded that Philippines, Singapore and Jakarta Islamic Stocks may have greater impact on Malaysia Islamic stock. Another interesting statistical finding that comes out of Tables 8 is that the Malaysia Islamic Stock appears to be the more dominant market leader in the long run. The role of Malaysia as the leader in the region has been impressive.

However, JAKSEIS Jakarta Islamic Index is the most follower in the ranking list. It is still largely influenced by Islamic stock markets such as FTSEMY Malaysia Islamic Index. As a conclusion, among the Islamic South East Asian Index markets of Philippines, Thailand, Singapore and Jakarta, the Malaysia Islamic Index (FTSEMY) is the driving index, insofar as the Islamic compliant equity investor is concerned.

6. Conclusions and Limitations

This paper investigates the dynamic causal linkages in the daily returns amongst five major Islamic stock indices in South East Asia, namely, FTSEMY Malaysia Islamic Index, LMPHISL Philippines Islamic Index, LMSSNGIL Singapore Islamic Index, LMSTHFIL Thailand Islamic Index and JAKSEIS Jakarta Islamic Index covering the period from 29th February 2008 to 1st January 2013.

These time series method provides useful techniques of information to international financial analysts and investors. Moreover, we tried to support the mechanical statistical results with economic intuition and policy implications. At a more substantive level, this study provides further evidence of significant interdependencies among selective emerging Asian markets, and also the leadership of the Malaysia Islamic Stock market in the long run. However, the evidence presented should be assessed bearing in mind that finance theory does not give any clear predictions about the movements of stock prices in response to asset price fluctuations of other markets (Masih and Masih, 2001).

The limitations in doing the studies are that about time because it only covers around two years data. A more detailed study focusing on these events and using data observed at longer period could provide a positive and practical step for future research in international finance and financial economics.

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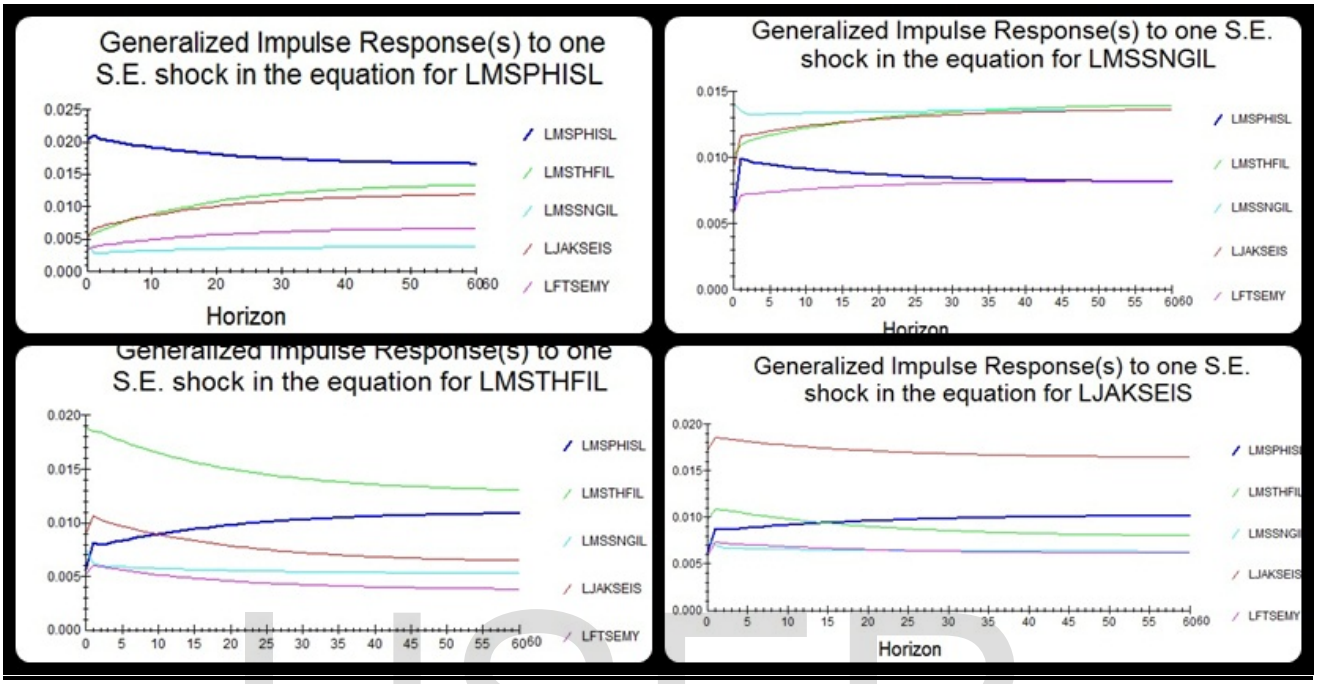
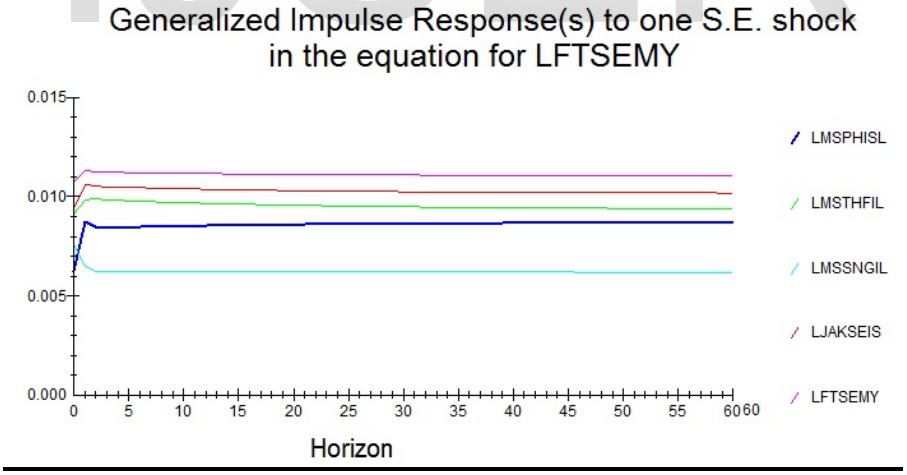
APPENDICES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