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Regime-dependent relation between Islamic and conventional financial markets☆

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Abstract

The aim of this paper is to examine regime-dependent dynamic relation between Islamic and conventional financial markets by means of Markov Switching Vector Autoregression (MS-VAR). Empirical results suggest evidence in favor of regime-switching properties in all returns series. These findings provide strong evidence in favor of nonlinear relation between the conventional and Islamic stock markets and thus, it is necessary to employ the MS-VAR models to determine the dynamic relationship between series. The regime-dependent Granger causality test and impulse-responses analysis results suggest that Islamic stock market is affected from conventional stock markets in both the bear and bull markets regimes. Therefore, the idea that Islamic financial markets provide diversification benefits and they are safe havens during financial distressed periods cannot be supported empirically.

JEL classification: G1; C3; C5

Keywords: Islamic finance; Financial markets; MS-VAR

1. Introduction

Empirical studies in the finance literature have showed that the relationship among international stock markets has escalated over recent years subject to several factors (e.g., globalization, bilateral trade and financial liberalization) and hence diversification opportunities in the international stock markets have decreased. Therefore, academics and practitioners in the finance profession have focused on exploring alternative investment tools to increase returns whilst minimizing risk. Thus, there may be potential benefits of Islamic finance instruments in terms of portfolio diversification (El Alaoui, Dewandaru, AzharRosly, & Masih, 2015; Jawadi, Cheffou, & Jawadi, 2016).

Islamic finance provides alternatives to conventional financial market instruments for investors that have religious sensitivities or concerns. In Islamic law, interest (including derivatives with guaranteed interest, bonds and bills, etc.), gharar (uncertainty), gambling and speculative investments are prohibited and profit/loss sharing and physical asset-based financial transactions are encouraged. These prohibitions and encouragements constitute basic principles of Islamic finance.

The fast growth of the Islamic financial system is evident during last decades and the volume of total assets in the Islamic financial system has reached $1.9 billion at the end of 2014 and it is estimated that it will reach $6.5 billion by 2020 (Mensi, Hammoudeh, Sensoy, & Yoon, 2015). Although the share of Islamic banks is 73% (Mensi et al., 2015; 3), global trend in the Islamic finance industry is to invest in the Islamic capital market instruments rather than the banking system

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because the Islamic capital markets have a higher growth rate (Dewandaru, Bacha, Masih, & Masih, 2015; 116).

Although Islamic stock indices are quite new financial products when compared with conventional stock indices, they are the most traded instruments in the Islamic capital markets. For instance, Dow Jones Islamic Market World Index has been created in 1999 by S&P Dow Jones is the most well-known Islamic finance index. The index formed from stocks that are included in the Dow Jones Global Index that covers approximately 95% of global stock markets covers companies operating in 10 sectors located in 58 countries (Hammoudeh, Mensi, Reboredo, & Nguyen, 2014:196). In determining the eligibility of the companies to be included in the index, two types of filters formed according shari'ah compliance screens are used. Eligibility is determined by an independent shari'ah supervisory board and quarterly updates are made.

Dewandaru, Rizvi, Masih, Masih, and Alhabshi (2014) emphasized several distinctive features of Islamic stock markets such as lower financial leverage, smaller size of firms, and under-diversification of the market and hence one can expect different performances for Islamic and conventional stock indices (El Alaoui et al., 2015; 54). Moreover, Islamic stock indices can be expected to perform better particularly during crisis periods where financial risks are substantially high (Al-Khazali, Lean, & Samet, 2014; Ho, Abd Rahman, Yusuf, & Zamzamin, 2014; Jawadi, Jawadi, & Louhichi, 2014; Milly & Sultan, 2012). On the other hand, there have been extensive studies that show Islamic indices have lower performance than conventional indices, while both Islamic indices and conventional indices are subject to global shocks (Ajmi, Hammoudeh, Nguyen, & Sarafrazi, 2014; Hammoudeh et al., 2014; Ghorbel, Abdelhedi, & Boujelbene, 2014; Shamsuddin, 2014; Nazlıoglu, Hammoudeh, & Gupta, 2015; Yilmaz, Sensoy, Ozturk, & Hacihasanoglu, 2015). There is also a growing literature that examines the relation between Islamic financial markets and conventional stock markets in terms of portfolio diversification. While some studies provide evidence in favor of diversification benefits between the Islamic and conventional stock markets (Al-Khazali et al., 2014; Ho et al., 2014; Jawadi et al., 2014; Milly and Sultan, 2012), there are respectable studies that show a lack of diversification benefits (Ajmi et al., 2014; Ghorbel et al., 2014; Hammoudeh et al., 2014; Nazlıoglu et al., 2015; Shamsuddin, 2014; Yilmaz et al., 2015).

In addition, empirical studies have examined Islamic financial instruments in terms of their performance because Islamic financial instruments that are constructed according to sharia'ah rules have similar return performances. For instance, Hayat and Kraeussl (2011) showed that the Islamic equity funds underperform in terms of risk and return when compared with Islamic and conventional stock indices. Hoepner, Rammal, and Rezec (2011) empirically obtained similar results for 256 Islamic equity funds over 20 countries. Aloui, Hammoudeh, and Hamida (2015) examined the relation between Islamic stock indices and sukuk indices via bivariate two-state Markov regime switching EGARCH model and found that Islamic financial instruments have different levels of performance. Furthermore, they indicated that the Islamic investors' behavior shift to safe havens in the bear market regime and hence they tend to invest sukuk indices specifically in the bear market regime.

The literature cited hitherto focuses on the relation between Islamic and conventional stock markets using different econometrics models. Most of these studies have used conventional (linear or asymmetric) causality tests to examine the dynamic relation between Islamic and conventional stock markets. However, there has been a growing literature that finds regime-switching properties in stock returns (Schaller & van Norden, 1997; Li, 2007; Chen, 2008; Shen & Holmes, 2014). Furthermore, Aloui et al. (2015) showed that Islamic stock indices exhibit two-state Markov regime switching properties. Therefore, the dynamic relation between the Islamic and global financial markets may not be stable over time and hence it is more appropriate to employ regime-switching models to investigate the dynamic relations between the two.

The main objective of this paper is to examine the regime dependent relation between Islamic financial markets and conventional stock markets by means of a Markov Switching-VAR (MS-VAR) model. The two important features of the Islamic financial markets that have been widely discussed in the literature are providing portfolio diversification benefits and safe havens during financial distress times. While the portfolio diversification benefits can be examined using a linear VAR model, this model unfortunately fails to account for asymmetry (such as crisis and non-crisis periods). Hence nonlinear models must be employed to study the asymmetric behavior of Islamic financial markets. In this paper, we combine VAR and regime switching models (MS-VAR) to examine the two features of the Islamic financial markets. To the best of our knowledge, this study is the first attempt to examine the regime-dependent relation between the Islamic financial markets and conventional stock markets by using the MS-VAR model.

The rest of the paper is organized as follows. Section 2 provides the theoretical framework for the MS-VAR model. The empirical results are given in Section 3 and Section 4 concludes.

2. The MS-VAR model

The MS-VAR model suggested by Krolzig (1997) is the multivariate version of a univariate regime-switching model proposed by Hamilton (1989). The MS-VAR model differs from the linear VAR model as the nature of the causal linkages among the model variables can be different in different regimes. Therefore, all variables in the MS-VAR model are treated as endogenous and causality test and impulse-responses analysis can be used to examine regime-dependent relations among the variables.

Consider r_t to be a T x 1 vector containing the returns series and let $R_t = (r_{1t}, r_{2t}, \ldots, r_{Kt})$ be K-dimensional time series vector where $t = 1, 2, \ldots, T$ and T is the sample size. Then, the MS-VAR model with a *p-th* order and m state can be written as:

$$R_t = \begin{cases} v_1 + A_{11}R_{t-1} + \cdots + A_{p1}R_{t-p} + B_1 u_t & if\ s_t = 1 \\ v_m + A_{1m}R_{t-1} + \cdots + A_{pm}R_{t-p} + B_m u_t & if\ s_t = m \end{cases} \quad (1)$$

where v_i are intercepts and A_{1i}, …, A_{pi} are autoregressive coefficient matrices for the VAR parameters of the states. $B_1 u_t$ indicate the reduced-form shock matrices, and u_t follows a multivariate normal distribution. N (0, I_K) is the regime-dependent variance-covariance matrix for the residuals:

$$\sum_i = E\left(B_i u_t u_t' B_i'\right) = B_i E(u_t u')B_t' = B_i I_K B_i' = B_i B_i' \quad (2)$$

The first order m state Markov stochastic process is employed to obtain the transition process of the MS-VAR model. In this manner, p_{ij} that indicate transition probabilities can be defined as follows:

$$p_{ij} = P(s_{t+1} = j / s_{t+1} = i), \sum_{j-1}^{m} p_{ij} = 1 \quad \forall i,j \in (1,\ldots,m) \quad (3)$$

We use the maximum likelihood estimation procedure based on the Expectation-Maximization (EM) algorithm suggested by Krolzig (1997) to estimate Equation (1) because the state parameter (s_t) cannot be observed. This technique estimates the parameters and the transition probabilities by using the Markov chain of the unobserved states.

Kanas and Ioannidis (2010) showed that the causality test in the MS-VAR model is uses a Likelihood Ratio (LR) test where the causality relation imposes restrictions for the values of the autoregressive coefficients. Note that the LR test has an asymptotic χ^2 (k) distribution in which k indicates the numbers of restrictions. We also employ impulse-responses functions proposed by Ehrmann, Ellison, and Valla (2003) to examine the dynamic regime-dependent relation between the Islamic and conventional stock markets.[1]

The first step of the regime-dependent impulse-response analysis is to estimate the regime-dependent variance-covariance matrices. However, Ehrmann et al. (2003) emphasized an identification problem for the MS-VAR model because the numbers of estimated parameters in the reduced-form model are higher than in the structural model. In other words, although there are K^2 unknown parameters in the reduced form shock matrix, only $K(K+1)/2$ parameters can be obtained from the variance-covariance matrix. Therefore, Ehrmann et al. (2003) used a Cholesky decomposition to overcome the identification problem for the regime-dependent impulse-response functions.

When one standard deviation shock to the variable k occurs at time t and in regime i, regime-dependent impulse-response functions at time $t + h$ can be formulated as follows:

$$\left[\frac{\partial E_t R_{t+h}}{\partial u_{k,t}}\middle| (s_t = \ldots s_{t+h} = i)\right] = \theta_{ki,h}, \quad h = 0,1,2,\ldots \quad (4)$$

[1] The Cholesky decomposition suggested by Ehrmann et al. (2003) is employed to orthogonalize the shocks.

Table 1
Descriptive statistics.

	IFE	G7	EM
Mean	0.165	0.101	0.290
Std. Dev.	5.045	4.461	6.640
Skewness	−0.583	−0.790	−0.781
Kurtosis	4.333	4.799	2.282
Jarque-Bera	26.235 [0.000]	47.796 [0.000]	63.785 [0.000]
ARCH (5)	5.250 [0.000]	3.166 [0.008]	1.539 [0.177]
ADF	−12.945***	−6.677***	−11.446***
PP	−12.990***	−12.349***	−11.562***
KPSS	0.089***	0.093***	0.116***

Notes: The figures in square brackets show the probability (p-values) of rejecting the null hypothesis. ARCH (5) indicates LM conditional variance test. *** indicate that the series in question is stationary at the 1% significance level.

The generalized version of the regime-dependent impulse-responses functions suggested by Ehrmann et al. (2003) can be written as follows:

$$\widehat{\theta}_{ki,h} = \begin{cases} \widehat{B}_i u_0 & if\ h = 0 \\ \sum_{j-1}^{\min(h,p)} \widehat{A}_{ji}^{h-j+1} \widehat{B}_i u_0 & if\ h > 0 \end{cases} \quad (5)$$

3. Data and empirical results

We consider Dow Jones Islamic Market World Index (hereafter IFE) for the Islamic financial market. Two regional stock markets indices that are calculated by the Morgan Stanley Capital International (MSCI) for the global stock market are used. The MSCI G7 (hereafter G7) and Emerging Markets (hereafter EM) stock indices represent stock market activity in the developed and emerging countries.[2] We use monthly data in which stock market prices are collected from the MSCI (www.msci.com) and the IFE is obtained from the Google Finance covering the period from July 1999 to February 2016.[3] The logarithmic return series are obtained by using the $r_t = 100\ x\ ln\ (P_t/P_{t-1})$ throughout the empirical analysis.

Descriptive statistics for all return series are presented in Table 1. These show that the monthly mean of all return series are positive and varies between 0.101% and 0.290% for the sample period. While the highest mean return occurs in the emerging stock market, the developed stock market yields

[2] The MSCI G7 index covers stock market indices of the USA, Germany, France, Japan, the UK, Italy and Canada. The MSCI Emerging Markets index captures across 23 Emerging Markets countries. Information on these countries can be reached at website: https://www.msci.com/index-country-membership-tool.

[3] It should be noted that using high frequency data for MS-VAR model requires the estimation of a large number of parameters to render the residuals white noise. Increasing number of estimated parameters leads to an estimation problem in the Cholesky decomposition to obtain regime dependent impulse-response functions. In addition, high frequency data consists of several outliers that lead to a problem in classifying the regimes. Furthermore, the Granger causality test based on daily data is similar and the results are available upon on request.

lowest mean returns during the sample period. Furthermore, emerging stock market return series exhibit higher volatility according to the standard deviation parameters. All returns series are found to be leptokurtic because the descriptive statistics indicate that all returns series have strong negative skewness and excess kurtosis. The Jarque-Bera normality test results indicate that the null hypothesis of normal distribution can be rejected at the 1% significance level. The unit root test results indicate that all series are stationary in levels.

We start our analysis by first testing the null hypothesis of no regime-switching against the alternative of the two-state Markov-switching model by using a Hansen (1992) Likelihood Ratio (LR) test. The results in Table 2 show that because all p-values are lower than 5%, the null hypothesis can be rejected for all returns series at the 5% significance level.[4] These findings suggest the presence of nonlinearity in the conventional and Islamic stock markets and hence, the MS-VAR model is more appropriate for modeling the relationship between Islamic and conventional stock markets.

After confirming the presence of regime-switching behavior of all returns series, we estimate the two-state MS-VAR model. Note that as in the linear VAR model, the determination of lag orders for the MS-VAR model is an important task. Accordingly, we consider the model information criterion and the diagnostics tests for the residuals in the first stage and we find that one lag is adequate to render the residuals white noise. According to the MS-VAR results in Table 3, the constant terms are significantly higher in the second regime than the first regime ($v_1 < v_2$). In addition, the standard deviations of the second regime are lower than the first regime ($\sigma_1 > \sigma_2$). These findings imply that the first regime can be called a "bear market regime" while second one cab ne characterized as a "bull market". In this context, the probability of remaining in a bull market regime at time t when the returns series is also in a bull market regime at time t-1 is 0.952% and the mean duration of a bull market regime is 21 months. On the other hand, the probability of remaining in a bear market regime at time t when the series is also in a bear regime at time t-1 is 0.946% and the mean duration is 18 months. These results suggest that the bull market regime is more persistent than the bear market regime. Finally, we conduct diagnostics test such as normality, serial correlation and heteroskedasticity for the MS-VAR model residuals and the results are also reported in Table 3. These tests results confirm the MS-VAR model fits the data well at the 1% significance level.

The smoothed transition probabilities for the bear market regime in Fig. 1 present an obvious picture corresponding to the timing of regime switches of the returns series. According to transition probabilities, there were four periods for the bear market regime in which volatility in stock markets seems to be substantially high. Thus, it can be said that the bear market regime tracks all financial distress periods during sample period such as the internet bubble collapse in 2000, the global financial crisis in 2008 and the European sovereign debt crisis in 2011. It seems financial markets have turned into a bear market regime at the end of 2015.

Table 2
Hansen linearity test.

	G7	EM	IFE
LR stat	3.834 [0.000]	2.456 [0.024]	5.265 [0.000]

Note: The figures in square brackets show the probability (p-values) of rejecting the null hypothesis.

It is well known that the parameters of the MS-VAR model cannot be directly interpret to describe the dynamic relation among the variables in the system and hence we first employ regime-dependent Granger-causality tests to describe the dynamic relationships. The results are presented in Table 4. The Granger-causality test results suggest that the stock index price changes in conventional financial markets Granger-cause Islamic financial markets in both the bear and the bull market regimes. In the case of the conventional financial market, we find the Granger causality running from the developed financial markets to the emerging stock market only in the bull market regime. Note that we cannot determine any causal link going from Islamic financial market to the global financial market in both bear and bull market regimes.

These findings are consistent with those in the existing literature (e.g. Ajmi et al., 2014; Ghorbel et al., 2014; Hammoudeh et al., 2014; Nazlıoglu et al., 2015; Shamsuddin, 2014; Yilmaz et al., 2015). It should be noted that the presence of causal link going from the conventional stock market to the Islamic stock market makes sense because DJIM and conventional stock markets share many common stocks.[5] Furthermore, it is well known that the causality relations between financial markets are related to their size. In this context, although the volume of total assets in the Islamic financial system has reached $1.9 billion, the market capitalization of conventional stock markets exceeds $36 trillion. Sizewise conventional financial markets are 18 times as large as the Islamic financial system. Therefore, one can expect the causal link to run from conventional stock markets to the Islamic stock markets.

Finally, we employ regime-dependent impulse-responses functions to trace the responses of the endogenous variables to exogenous shocks and the results are presented in Fig. 2.[6] Some observations on the results in Fig. 2 are as follows: The responses of emerging and Islamic stock markets to a shock in the developed stock market are positive and statistically significant in both regimes. However; although emerging

[4] The grid setting is: $p_{22} = 0.4, 0.5, 0.6, 0.7, 0.8, 0.9$; $\mu_2 = 0.3, 0.2, 0.1, 0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6$; $\sigma_2 = 1.50, 1.65, 1.80, 1.95, 2.10, 2.25, 2.40, 2.55, 2.70, 2.85$ and it has 3600 points.

[5] Approximately 80% of the stocks in the DJIM index are composed of developed country stocks from the G7 (The US forming the majority with 61%, followed by Japan and the UK with 6% each, and Germany, Canada and France with 2% each).

[6] We use bootstrap method with 1000 repetitions to obtain confidence interval.

Table 3
MS-VAR model results.

	Regime 1 (Bear Market)			Regime 2 (Bull Market)		
	$R_{G7,t}$	$R_{EM,t}$	$R_{IFE,t}$	$R_{G7,t}$	$R_{EM,t}$	$R_{IFE,t}$
Panel A: Coefficients						
Constant	−1.113 [0.112]	−0.770 [0.448]	−0.015 [0.960]	1.483 [0.000]	1.396 [0.010]	0.205 [0.116]
$R_{G7,t-1}$	0.126 [0.617]	0.037 [0.919]	0.883 [0.000]	−0.458 [0.008]	−0.577 [0.025]	0.742 [0.000]
$R_{EM,t-1}$	0.057 [0.733]	0.200 [0.411]	0.158 [0.035]	0.172 [0.096]	0.337 [0.025]	0.148 [0.000]
$R_{IFE,t-1}$	−0.087 [0.374]	−0.064 [0.653]	−0.081 [0.066]	−0.057 [0.533]	0.071 [0.632]	−0.087 [0.015]
σ	5.586	8.184	2.553	2.660	4.522	1.117

	Regime 1	Regime 2
Panel B: Transition Matrix		
Regime 1	0.946	0.048
Regime 2	0.054	0.952

	Observation Number	Probability	Duration
Panel C: Regime Properties			
Regime 1	85.5	0.467	18.36
Regime 2	113.5	0.433	20.99

	MS-VAR	Linear VAR
Panel D: Likelihood and Information Criteria		
Log-likelihood	−1446.206	−1519.218
AIC	15.117	15.449
BIC	15.372	15.570
HQ	15.746	15.747
Panel E: Diagnostics Test		
P-χ^2		109.510 [0.220]
N- χ^2		9.202 [0.162]
H- χ^2		55.565 [0.019]

Note: σ gives the standard error of regression. P-χ^2 indicates the Portmanteau serial correlation test, N-χ^2 indicates the normality test and H-χ^2 indicates the heteroskedasticity test of the residuals. The figures in square brackets show the *p*-values.

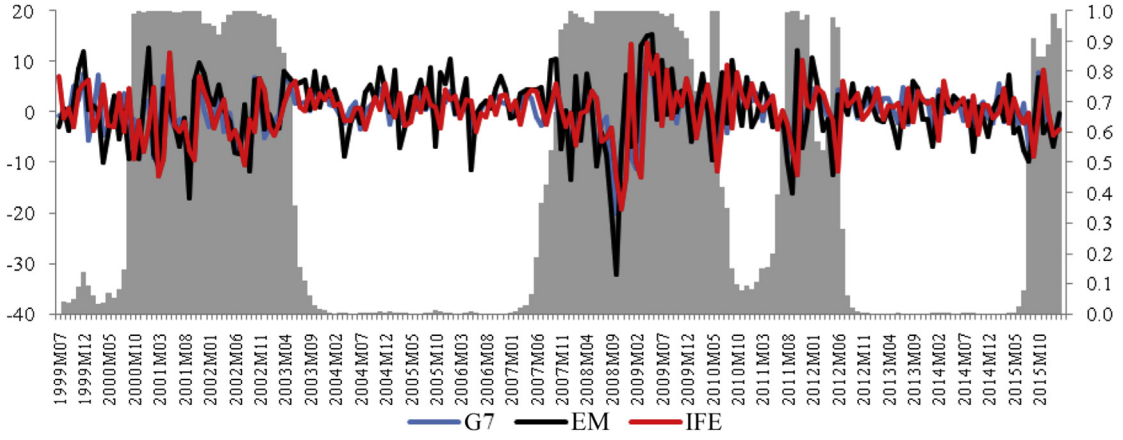

Fig. 1. Returns series and smoothed transition probabilities. Note: Shaded areas are smoothed transition probabilities for bear market regime.

Table 4
Regime-dependent Granger-causality test results.

Causality relation	Bear Market		Bull Market	
G7 → EM	0.010	[0.918]	5.117**	[0.023]
EM → G7	0.116	[0.732]	2.808	[0.093]
G7 → IFE	64.564***	[0.000]	160.488***	[0.000]
IFE → G7	0.795	[0.372]	0.390	[0.531]
EM → IFE	4.541**	[0.033]	18.086***	[0.000]
IFE → EM	0.202	[0.632]	0.229	[0.631]

Note: The figures in square brackets show the probability (*p*-values) of rejecting the null hypothesis. *** and ** indicate causal relation at the 1% and 5% significance level respectively.

stock market reacts immediately to a shock in the developed stock market, the responses of the Islamic stock market occur one month later and they seem to be weaker than emerging stock market. Therefore, it can be said that faith based investors do not quickly react to the unexpected shock in the conventional stock market and when an unexpected shock occurred in the conventional stock market, it affects the Islamic stock market one month later. The most important finding is that the impact of developed stock market on emerging and Islamic stock market is stronger in the bear market regime than bull market regime.

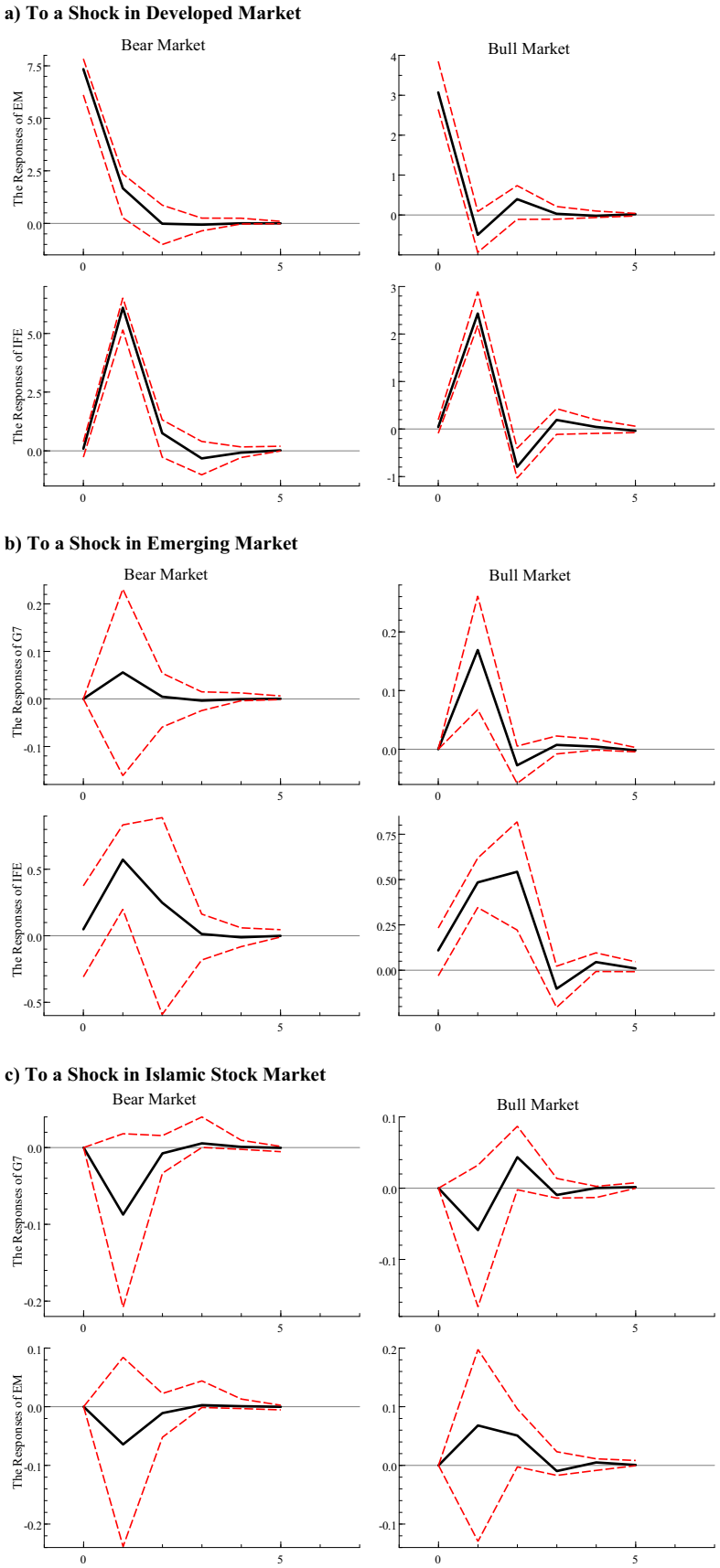

Fig. 2. Regime-dependent impulse response analysis results. a) To a shock in developed market. b) To a shock in emerging market. c) To a shock in Islamic stock market. Note: Dashes line indicates standard errors confidence interval.

Although the responses of developed stock markets to a shock in emerging stock markets are positive, they are statistically significant only in the bear market regime. On the other hand, the responses of Islamic stock market to a shock in the emerging stock market are positive and statistically significant in both regimes. As in Panel a, the Islamic stock market starts to react to a shock in the emerging market one month later. These results suggest that the shock transmission between conventional and Islamic stock markets is not fast as well as the shock transmission between developed and emerging stock markets. It should be noted that the responses of Islamic stock index to a shock in emerging stock market are stronger and more persistent in the bull market regime than a bear market regime.

Furthermore, the responses of developed stock market to a shock in Islamic stock markets are negative but not statistically significant over the regimes. On the other hand, the responses of emerging stock market to a shock in Islamic stock market are negative in the bear market regime and positive in the bull market regime but they are not statistically significant.

4. Conclusions

In this study the regime-dependent relationship between Islamic and the conventional stock markets is analyzed by means of the MS-VAR model. Hansen's (1992) LR test results indicate the presence of regime-switching characteristics in Islamic and conventional stock returns. These findings suggest the presence of nonlinearity in the conventional and Islamic stock markets and hence a MS-VAR model is appropriate to model the relationship between Islamic and conventional stock markets. After confirming the return series follow a two-state Markov process, we identify the regimes based on estimated coefficients as a bear market and a bull market regime.

The regime-dependent Granger causality test results suggest that Islamic stock market is affected from both developed and emerging markets in both regimes. The regime-dependent impulse response analysis results confirm the causality test results. On the other hand, the responses of the Islamic stock market to a shock in developed stock market are stronger and more persistent in the bear market regime than bull market regime. The responses of the Islamic stock market to a shock in the emerging market are found to be more persistent in the bull market regime than the ones in the bear market regime. Finally, we find a strong relation between the Islamic and conventional stock markets over the regimes.

Our findings are consistent with recent studies in the literature (Ajmi et al., 2014; Ghorbel et al., 2014; Hammoudeh et al., 2014; Nazlıoglu et al., 2015; Shamsuddin, 2014; Yilmaz et al., 2015). The literature emphasizes two main hypotheses regarding the relationship between Islamic and conventional markets; (i) Islamic markets can provide portfolio diversification benefits, and (ii) Islamic markets are safe havens during financial distressed times. Our empirical results do not lend support to these two hypotheses because we find strong and statistically significant relation between the conventional and Islamic stock market over the regimes. Therefore, the idea that Islamic financial markets are isolated from the global shocks during crisis period has little support in the data.[7]

These results have several implications for international investors and portfolio managers who invest in Islamic and conventional stock markets. For instance, the presence of high dependence between the Islamic and conventional stock markets during both bear and bull market regimes is important in terms of risk management. In this manner, the Islamic stock markets cannot mitigate portfolio risk and hence financial managers and hedgers who invest the conventional stock market should seek alternative investments and instruments to hedge their portfolio against global risk. Moreover, our findings are important for policy makers because empirical results suggest that the Shariah screening criteria may not be really enough for decoupling Islamic stock markets from their counterparts and hence authorities and policy makers should review the Shariah screening rules.

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[7] Note that there is a growing literature that examines the relation between the Islamic financial market and conventional stock market in terms of portfolio diversification and the empirical findings are very sensitive to econometric methods and sample periods. For instance, Milly and Sultan (2012), Ho et al. (2014), Jawadi et al. (2014), Al-Khazali et al. (2014) and El Mehdi and Mghaieth (2017) found evidence in favor of decoupling hypothesis, Ajmi et al. (2014), Hammoudeh et al. (2014), Ghorbel et al. (2014), Shamsuddin (2014), Nazlıoglu et al. (2015) and Yılmaz et al. (2015) found that the decoupling hypothesis is not well supported by empirically.

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