

PRIMARY RESEARCH

Stock Market Return and Volatility Spillovers: The Case of Selected Muslim Majority Countries

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Abstract. As integration is related to systemic risk and rewards in the stock markets, it is coupled with both weak and semi-strong forms of efficiency. Little evidence is found on return and volatility spillover within the Muslim country markets. This study investigates if the Muslim majority countries are interconnected with each other through returns and volatility spillovers among the stock markets for the span of about twenty years from July 1996 to February 2016. Vector Autoregressive (VAR) method as applied by Diebold and Yilmaz (2009) has been used to find the static and dynamic spillover indices of nine countries with religious similarity in 80% of the population and their three developed counterparts. We found overall significant spillovers; returns connectedness was 36.5% and volatility connectedness 22.4%. The study did not find any outright integration or evidence of spillover from developed markets to the Muslim majority group. However, US and Japan caused returns and volatility shocks respectively. In dynamic analysis, both returns and volatility spillover showed a gentle and stable increase in integration. Moreover, volatility spillover responded not only to the major global financial crises but also to the Arab Spring. These findings have major implications for diversified investment in the global financial market.

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INTRODUCTION

With the undeniable phenomenon of globalization, the financial markets are increasingly interlinked, and asset allocation is becoming boundary-free resulting in a more efficient allocation of resources, fewer intermediation costs, maturation of domestic capital markets and, in turn, an impact on economic growth. On one hand, the markets are more competitive and expanding to realize their growth potential, while on the other hand, financial systems at country levels are not fully integrated due to home country biases and segmentation of domestic markets. This integration is not only affecting firms and country finance globally but has also resulted in regional arrangements like EU, NAFTA, ASEAN, SAARC, and MENA with Intra-regional financial sector policy coordination strengthening measures for macroeconomic monitoring and liquidity support to increase regional financial stability. Interestingly, there is a large difference in the integration of the national capital markets with the international markets beyond regional cooperation initiatives.

With the greater uplift of integration of the financial markets, studying the level and dynamics of relationships and synchronicity is imperative for institutional investors and portfolio managers. In this globalized arena, not only the returns linkages are important to study but the volatility spillovers are also significant as they have implication in hedging strategies. According to Bartram, Brown, and Stulz (2012), excess volatility affects the overall level of investments and increases the risk for individual investors. Hartmann, Straetmans, and De Vries (2004) emphasized the researches on financial linkages not only for understanding the causes of crises, but also the systematic risk and stability. So, volatilities are more important when discussed in the global context of financial crises as they spread speedily and aggressively if generated anywhere. The optimum investment portfolios can't be attained without considering volatilities which represent a risk, in combination with returns to check the risk and reward relationship.

According to financial literature, Efficient Market Hypothesis (EMH) explains the price discovery mechanism, but empirically, even the weak form of efficiency is violated, and this can be explained by factors other than economic rationale (King & Wadhvani, 1990). On the other hand, domestic returns and volatilities are not only influenced by domestic factors but also international contexts (Gebka & Serwa, 2007; Lin, Engle, & Ito, 1994) that could be regional, cultural, and religious (Ng, 2000). Empirical evidence suggests that developed markets trigger the returns and volatility shocks in case of both developed and emerging markets (Calvo, 1999; Dungey, Fry, Gonzalez-Hermosillo, & Martin, 2007; Zheng & Zuo, 2013).

Financial connectedness and its drivers are of crucial importance to study and to be explored in the era of globalization. Levine and Zervos (1998) discussed that stock market integration and more capital flows not only open the door for diversification but also increase the risk due to crisis spread and a gap of trade among the developed and developing markets. According to IMF report 2007, globalization threatens the economically weak countries if there are transmission channels, with higher volatility spillover. Financial integration in the globalized world gives investors an unconstrained access to the international financial markets for their investment and financial decisions. Integration gives stability to

the markets (Ibrahim, 2005), helps attain economic prosperity (Lee & Hsieh, 2014; Lee, Huang, & Yin, 2013), and decreases the cost of capital (Odell & Ali, 2016). But on account of contagion impact of crises, the national markets grip shocks rapidly through an increased volatility spillover. Therefore, there is an immense need to study financial linkages of the national markets with the global markets for the benefit of academicians, policy makers, and portfolio managers. The understanding of level and form of both returns as well as volatility spillover is vital to individuals and institutions in terms of application of Value at Risk and hedging strategies.

Psychology, religious belief, regional proximity, and culture can be the factors of returns and volatility spillover in an international context (Durand & Coeurderoy, 2001; Eun & Shim, 1989). Guiso, Sapienza, and Zingales (2003) explained that religiously socialized people, even if they disprove religion on being an adult, show common collective behavior and preferences. Iannaccone (1998) recognized the importance and relevance of religion as a triggering force in economic decisions. Arrunada (2010) and Stulz and Williamson (2003) showed the difference in financial behavior with respect to the people having Catholics and Protestants beliefs, and it is also observed that religious people have favorable behavior towards financial development (Guiso et al., 2003). But surprisingly, even being identified as an important factor, there is scarce research specifically on the individual and collective behavior of people with same religion in the context of integration and segmentation of the international financial markets.

The importance of stock markets in the growth of economies is well-established (MacKinnon, 1973; Schumpeter, 1911). It is especially for the Muslim countries where Islamic banking and finance is being evolved over last four decades. From the historical context, in the 19th century, almost all the Muslim countries were under the colonial power of France, Great Britain, and The Netherlands and their institutional structures were replaced by their Master's Capitalistic Systems (Moore, 1997). It's relevant to explore a trend in collective financial decision-making in the Muslim population, as interestingly, Islamic methods of finance, particularly the equity-based, were still practiced by individual Muslims in colonial era (Gait & Worthington, 2007). Therefore, it is crucial to investigate the role of stock markets in the Muslim countries in the globalizing world. So, this study investigates the impact of religion on the collective decision-making and investment behaviors.

This study puts a unique effort to develop Return and Volatility Spillover indices following the method of Diebold and Yilmaz (2009) with Forecast Error Variance (FEV) decomposition through VAR process. Countries, where more than 80% population is the follower of Islam, are taken as a case of religious similarity and treated as a group for portfolio investment strategy. Dynamic spillover indices capture the interdependence in normal periods and contagion in turmoil periods as well, as financial crises have been more relevant in the integrated globalized world after 1990. The inclusive aim of any such study is to take the maximum benefits of the international financial integration while taking care of potential problems (Thapa & Poshakwale, 2012).

Next sections of the paper are structured as follows: Section 2 reviews the literature about return and volatility linkage with respect to culture and religion in particular. Section

3 describes variables construction and the methodology of constructing static and dynamic indices through variance decomposition process of FEVs in VAR. Section 4 presents the results, and Section 5 concludes the study and highlights derived implications.

LITERATURE REVIEW

In the context of EMH, integration of the international markets can be well-defined by the 'Law of One Price'. Barrett (2001) defines the law of one price as the equilibrium point with the non-existence of arbitrage opportunity where prices are identical with the bound of transaction cost. There are many studies on international financial integration (Baele, Bekaert, & Inghelbrecht, 2010; Bekaert, Hodrick, & Zhang, 2009; Candelon, Piplack, & Straetmans, 2008; Krugman, 1995; Lin et al., 1994) which imply an increasing integration in the markets through liberalization and globalization.

Ease of understanding language, culture, religion, institutional structures, norms, and behaviors are always considered as main factors in inter-country trade mobilization other than geographical proximity as considered by Cairnes (1874) and Senior (1827). It's relatively novel to consider these factors as the determinants of the financial markets' performance and foreign investment.

Behaviors impact the financial decisions as Kahneman and Tversky (1979) described, according to which the decisions which investors take on the psychological weightage of perception of risk, are labeled as a bias in their prospect theory. Stonehill and Stitzel (1969) were the pioneers in conceiving the idea of looking at finance from a cultural perspective. But, this specific field of "Cultural Finance" is too young with significant work in the last decade only. Culture instills systemic biases in investor's and manager's behavior (Roe, 2003). Many pieces of research explained that psychological, evolutionary processes and mechanisms are impacted by culture, and religion is not independent of the whole, which impacts societal progress.

Drogendijk and Slangen (2006) proved that culture could even define the corporate foreign investment policy. Chan and Cheung (2012) and Han, Kang, Salter, and Yoo (2010) established the evidence that there is a significant contribution of culture to corporate governance and policies. Huberman (2001) discussed a bias known as the familiarity bias-investors do invest in the markets which they are familiar with or are similar to their language, religion, and geography, which in turn, impact the stock price movements (Parker, 2014).

Aggarwal and Goodell (2014) explained that firms often couldn't access to finance other than traditional sources and markets because of uncertainty avoidance. These results can be related to the stream of research about the familiarity to the dimensions of external society. Chui, Titman, and Wei (2010) explained the role of culture in determining the trading strategies of investors in the equity markets.

Guiso et al. (2003) concluded that economic and social development is affected by certain attitudes of religious people. Shu, Sulaeman, and Yeung (2012), while studying mutual funds, also found that risk behaviors are affected by religious beliefs of the area. Kumar, Page, and Spalt (2010) used religion to explain gambling tendencies, corporate decisions,

and stock returns. In financial exchanges, religion as a social institution provides enhancements and is considered advantageous, and commonality in religion will certainly have implications in financial linkages and ultimately spillovers.

Risk-averse behavior is consistently proved to be attached to the Muslim, and Christian societies (Miller, 2000; Miller & Hoffmann, 1995; Osoba, 2003) and Muslims are more risk-averse than Christians as concluded by Bartke and Schwarze (2008) in their seminal work "Risk-Averse by Nation or by Religion". In line with this argument, if being Muslim affects risk preferences, then having similar faith nationally in a collective nexus can influence the bilateral linkages as well as the international financial market connectedness, in terms of both returns and volatility spillovers. The exploration of volatility dynamics in the Muslim-majority countries, their linkage within the group, and with other financial markets is important at both micro and macroeconomic levels.

Diebold and Yilmaz (2009) investigated the return and volatility spillovers throughout the world's equity markets; Engle (2002) studied the East Asian equity markets, and Joshi (2011) studied the Asian markets and found bi-directional evidence. Further, there are researches on the currency market and interaction of equity and currency markets. Do, Brooks, Treepongkaruna, and Wu, (2016) studied both equity and currency market in three higher moments and found evidence of spillover in both developed and emerging markets. Antonakakis (2012) and Budak, Agrawal, and El Abbadi (2011) also studied the currency markets in this vein of literature. So spillovers of returns and volatility are extensively researched phenomena.

The existing literature discusses the two categories on the subject of spillover, i.e., real/fundamental/economic models, and financial models. Cass and Pavlova (2004) proved that linkages are due to real trade and un-systematic reasons. There are many other studies in this strand like that of Baxter and Crucini (1993) and Cole and Obstfeld (1991) who advocated that the tie of real economy and finance was the only linkage. These real economy-based models could not rationalize the financial crises contagion in the countries where there were no fundamental linkages and that spread in the countries other than the neighboring ones. On the other hand, financial models theoretically explained the reasons of spillovers/contagion through financial linkages like Foreign Direct Investments (FDI), rebalancing of portfolios by fund managers (Van Rijckeghem & Weder, 2001), liquidity issues and sovereign ratings (Christiansen, 2000), and information asymmetries through related information cascade models and herding behaviors (Bikhchandani & Sharma, 2000; Hernandez & Valdes, 2001). The financial linkage models contributed more to understanding the globalized financial markets in returns/volatility connectedness both in stable and crises situations.

Dong, Bowers, and Latham (2013) explained that if there is evidence regarding the interconnectedness/spillover between the markets, it means that the markets are semi-strong inefficient. If the markets are cointegrated, then there are arbitrage opportunities, the markets are not efficient, and the law of one price is breached (Arshanapalli & Doukas, 1993). On the other hand, there are studies emphasizing the violation of weak form of efficiency with evidence of market integration, as the lagged price of one market can predict the current price of another (Diamandis, 2009; Laopodis, 2004; MacDonald & Power, 1994). More-

over, with fully integrated markets, the benefits of diversification extinguish (Balli, Pericoli, & Pierucci, 2014).

Lucey and Zhang (2010) used shared religion as a proxy of culture and showed that religious similarity leads to market integration. Akhtar, Ali, and Sadaqat (2011) examined the volatility linkage between the Islamic and conventional markets and found religion as a relevant factor. Our research shares the ground of explaining culture as a determinant of returns and volatility co-movement. The countries with similar religious traits should exhibit similar risk-taking behaviors, exert systematic biases in the market, and contribute to the integration of the financial markets.

METHODOLOGY

Countries are classified as Muslim-majority if more than 80% of the population believe in Islam. Lucey and Zhang (2010) labeled it as the primary religion of any jurisdiction. The data of religious population are taken from the Association of Religion Data Archives (ARDA), while the data for country indices of selected 9 Muslim, and 3 developed countries were taken from Data Stream for the period of 1996-2016 on a daily basis. Roughly, all the Muslim national markets' data have no accounts prior to 1996; therefore, the study includes data from 1996. This data period has an advantage for the underlying research as the national capital markets started integrating into the global markets from late 90's (Balli, Balli, & Louis, 2013; Yilmaz, 2010). This period also covers the major global crises episodes; global financial crisis, Asian financial crisis, and European sovereign debt crisis.

Developed countries the US, UK, and Japan are taken as the benchmarks followed by the approach of Lucey and Zhang (2010). While the Muslim countries including Pakistan, Turkey, Jordan, Egypt, Indonesia, Kuwait, Lebanon, Morocco, and Tunisia have been studied with their national indices, KSE-100, IDX Composite, ASE, EGS, BIST 100, KWSE, BLOM, MASI, and TUNINDEX.

Returns and Volatility

This study used the measure developed by Diebold and Yilmaz (2009) which uses VAR models. Returns are calculated as a change in the log price monthly. Realized Volatility (RV) is taken as a measure of equity volatility, calculated as the sum of the square of daily returns over trading month. Intraday Data are not available for many countries, so not to lose any country in perspective, this research used daily prices instead of the intraday ones to compute the monthly RVs. Andersen, Bollerslev, Diebold, and Ebens (2001) showed that the realized volatility is an accurate measure of true volatility compared to other estimated measures based on parametric models such as the popular GARCH model. Martens and Zein (2004) demonstrated the strength of realized volatility over implied volatility, as it provides much more accurate forecasts when applied to equity, foreign exchange, and commodity markets. Others have also used this method as one of its advantages is that it is model-free.

For each stock market i , we add the share of its forecast error variances coming from shocks originating from stock market j for all $i \neq j$. Next, we add across all $i = 1, \dots, N$

to obtain a single spillover index. Quantitatively, the spillover index is the sum of all non-diagonal elements of the forecast error variance-covariance matrix.

For simplicity of exposition, the study uses a covariance stationary first-order bivariate VAR given by:

$$y_t = \phi_1 y_{t-1} + \varepsilon_t \tag{1}$$

Where $y_t = (y_{1t}, y_{2t})$, ϕ is a 2×2 parameter matrix, and the vector of error terms ε_t has zero mean. y_t is either a vector of stock returns or volatilities. On the assumption that the VAR has stationary covariance, its moving average exists and is given by:

$$y_t = O(L)\varepsilon_t$$

$$\text{Where } O(L) = (1 - \phi L)^{-1}$$

Using the Cholesky decomposition of the covariance matrix of ε_t , the moving average can be rewritten as:

$$y_t = A(L)\mu_t$$

Where $A(L) = O(L)Q_t^{-1}$, $\mu_t = Q_t\varepsilon_t$, $E(\mu_t\mu_t') = I$, and Q_t^{-1} is the lower triangular Cholesky factor of the covariance matrix of ε_t . As a result, μ_t represents the orthogonalized structural shocks, with zero mean and a matrix of variance-covariance with ones as diagonal elements and zeroes elsewhere.

For the one-step-ahead forecast, the optimal forecast is given by:

$$y_{t+1,t} = \phi_1 y_t \tag{2}$$

With the corresponding one-step-ahead error vector and Covariance matrix, the variance of the one-step-ahead error forecast of y_{1t} is $a_{0,11}^2 + a_{0,12}^2$ and that of y_{2t} is $a_{0,21}^2 + a_{0,22}^2$. Intuitively, we are interested in finding what fraction of the one-step-ahead error variance in forecasting y_1 is due to own shocks (y_1) or spillover shocks from y_2 . Likewise, what fraction of the one-step-ahead error variance in forecasting y_2 is due to own shocks (y_2) or spillover shocks from y_1 . In the bivariate case, the aggregate spillover is $a_{0,12}^2 + a_{0,21}^2$, whereas the total forecast error variation is given by $(A_0A_0') = a_{0,11}^2 + a_{0,12}^2 + a_{0,21}^2 + a_{0,22}^2$. Hence, the spillover index ratio is:

$$S = (a_{0,12}^2 + a_{0,21}^2) / \text{trace}(A_0A_0') * 100$$

By generalizing this process for a one-step-ahead forecast with a p^{th} -order N-variable VAR, the spillover index can be represented as:

$$S = \sum_{i,j=1}^N a_{0,ij}^2 / \text{trace}(A_0A_0') * 100$$

For dynamic analysis, using a rolling window with 200-month span fixed, relevant turmoil period's effect on the returns and volatility spillover is explored by plotting the indices in graphs. The contagion has been tested by plotting instead of creating crises period by pre and post windows.

RESULTS

Descriptive Statistics

The Returns and Volatility monthly data of 9 Muslim countries and 3 developed countries were first checked for unit root stationarity by Im, Pesaran, and Shin (2003) panel method

and it was found that series are stationary at level. Descriptive statistics of series are presented in Table 1 and Table 2. We can see in Table 1 that the highest average returns have been given by Pakistani, Moroccan, and Egyptian markets, and the lowest, even negative return is given by Lebanese Stock Exchange. Developed countries show sizably lower returns than the Muslim countries' markets, even Japan has average negative returns, due to their level of development. The table also reports standard deviations and normal distribution statistics. In line with other studies, almost all the equity markets contain the fat tail structure and are negatively skewed.

TABLE 1
Descriptive statistics, stock market returns, 7/1996-1/2016

	US	UK	JPN	PAK	TUR	JRD	EGPT
Mean	0.001979	0.000203	-0.000358	0.013329	0.003593	0.007560	0.010284
Median	0.010827	0.006229	0.002411	0.027637	-0.005295	0.009952	0.010526
Maximum	0.197519	0.143295	0.218490	0.422491	0.403189	0.377383	0.304625
Minimum	-0.371748	-0.241390	-0.357725	-1.014685	-0.259397	-0.487251	-0.435656
Std. Dev.	0.065065	0.056265	0.073361	0.117616	0.069080	0.104438	0.099570
Skewness	-1.656084	-1.130480	-0.752936	-3.609021	0.717536	-0.579293	-0.446024
Kurtosis	9.986885	5.759510	6.450698	30.96841	8.902282	5.696666	4.784919
	IDN	KUW	LEB	MORC	TUN		
Mean	0.001979	0.000203	-0.000358	0.013329	0.003593		
Median	0.010827	0.006229	0.002411	0.027637	-0.005295		
Maximum	0.197519	0.143295	0.218490	0.422491	0.403189		
Minimum	-0.371748	-0.241390	-0.357725	-1.014685	-0.259397		
Std. Dev.	0.065065	0.056265	0.073361	0.117616	0.069080		
Skewness	-1.656084	-1.130480	-0.752936	-3.609021	0.717536		
Kurtosis	9.986885	5.759510	6.450698	30.96841	8.902282		

Returns are in nominal terms and measured monthly, by end of the month. The sample size is 236.

TABLE 2
Descriptive statistics, stock market volatility, 7/1996-1/2016

	US	UK	JPN	PAK	TUR	JRD	EGPT
Mean	0.007117	0.004834	0.003995	0.004969	0.002318	0.012528	0.028641
Median	0.003533	0.003326	0.002157	0.002736	0.000941	0.006349	0.000853
Maximum	0.043365	0.090231	0.069389	0.061596	0.085019	0.098760	6.253417
Minimum	0.000634	0.000263	0.000345	1.19E-07	6.27E-05	0.000573	0.000000
Std. Dev.	0.008351	0.006989	0.006543	0.006674	0.006081	0.015270	0.407011
Skewness	2.082297	8.593441	6.080268	3.895410	11.02253	2.975357	15.25452
Kurtosis	7.265580	98.76043	51.79196	26.25161	146.8748	14.08896	233.8000
	IDN	KUW	LEB	MORC	TUN		
Mean	0.005082	0.003263	0.007937	0.001219	0.005349		
Median	0.003407	0.001191	0.005580	0.000615	0.002640		
Maximum	0.064967	0.200467	0.058314	0.018439	0.053816		
Minimum	0.000000	0.000000	0.000000	4.32E-06	0.000355		
Std. Dev.	0.006082	0.013354	0.008315	0.001992	0.007165		
Skewness	5.249945	13.77470	2.645563	4.639465	3.395128		
Kurtosis	45.53752	203.3114	12.85834	31.43269	17.95293		

Returns are in nominal terms and measured monthly, by end of the month. The sample size is 236.

Table 2 shows the descriptive statistics of realized volatility, with all the markets being non-normal positively skewed, Egypt has the highest average volatility and the greatest standard deviation.

Static Full-Sample Indices

For static sample analysis, we followed the method of Diebold and Yilmaz (2009) to create Spillover indices for returns in Table 3 and Volatilities in Table 4. The lag length criteria were chosen at lag 1 in both returns and volatility by AIC. Cholesky VAR decompositions were taken which were ten-step ahead, while the market importance was taken to form the order selected (as the order matters in this decomposition). We can explain the tables in framework countries as *i* and *j*, such that it computes the shock in variable *j* coming from *i* through forecast error variance for all *is* and *js*. For the full sample data from 1992-2016, the off-diagonal sum of *ijth* FEVs is categorized as “Contribution from others” and forms the numerator, while the sum of all rows “Contribution Including own” is the denominator of the Index. The Spillover Index is reported in Tables 3 and 4 at the lowest right which represents returns and volatilities. In Table 3, we can note that in the developed countries, the US is the most influential as any shock in the US returns is impacting these countries’ returns by 151.38, with the most impact on Pakistan, Morocco, and Tunisia. The developed countries UK and Japan are more integrated to the US than these Muslim-majority markets. UK and Japan are not shock-giving countries in case of Muslim-majority countries. When taking the case of Muslim countries as a group, Pakistan (66.49) and Jordan (65.39) are transmitting more innovation to other members. While Pakistan is transmitting its shocks to Indonesia, Tunisia, Egypt, and Turkey’s stock returns the most, and interestingly, with no geographical proximity and intra-trade relationship. If we see the other side as to who is the

TABLE 3
Muslim majority countries spillover, stock market returns, 7/1996-1/2016

	US	UK	JPN	PAK	TUR	JRD	EGPT	IDN	KUW	LEB	MORC	TUN	From Others
US	96.32	0.08	0.17	0.18	0.15	0.56	0.11	0.20	0.87	1.19	0.15	0.02	3.68
UK	78.32	17.70	0.46	0.21	0.11	0.06	0.13	0.11	0.21	1.32	1.20	0.17	82.30
JPN	44.15	2.20	49.02	0.17	0.29	0.55	0.11	0.78	0.39	1.20	0.90	0.25	50.98
Pak	6.65	3.91	1.62	83.22	0.38	0.31	1.22	0.66	0.05	1.16	0.71	0.13	16.78
TUR	2.03	1.30	0.41	10.33	82.26	0.40	0.61	0.34	1.30	0.50	0.31	0.21	17.74
JRD	3.71	0.21	0.34	2.83	1.03	88.21	0.70	0.34	2.03	0.03	0.18	0.40	11.79
EGPT	0.92	1.37	0.89	11.83	6.65	14.17	55.99	0.76	5.18	0.18	1.65	0.41	44.01
IDN	2.95	4.71	1.15	21.47	14.55	0.50	2.74	46.79	3.79	0.12	0.41	0.82	53.21
KUW	2.87	1.51	1.53	2.35	1.79	20.76	1.22	5.42	59.47	0.11	0.55	2.41	40.53
LEB	0.56	2.08	0.31	3.76	3.44	20.87	1.92	1.72	2.09	58.03	3.32	1.90	41.97
MORC	4.48	3.05	0.95	0.73	2.18	5.00	2.69	1.34	4.09	0.69	73.80	1.01	26.20
TUN	4.74	2.04	0.73	12.65	2.85	2.21	1.52	15.53	5.65	0.11	0.30	51.67	48.33
Contribution to others	151.38	22.46	8.55	66.49	33.43	65.39	12.97	27.19	25.65	6.60	9.69	7.73	437.53
Contribution including own	247.70	40.16	57.57	149.71	115.69	153.60	68.96	73.97	85.12	64.63	83.48	59.40	36.5%

By using VAR order 1 by AIC criteria and Cholesky factor ordering as in Table’s first column. The *ij-th* reading shows the contribution to the innovations in ten months’ head variance of *j*’s stock returns of the country *i* from the country *j*’s real stock return shocks.

taker or in the table at the contribution from others' side, again the developed countries are more integrated and affected the most; UK and Japan are the takers of shocks in returns. In Muslim countries group, Tunisia (48.33) followed by Egypt (44.01), Lebanon (41.97), and Kuwait (40.53) are the takers/receivers of FEV. The overall Spillover Index is 36.5%, which is more than that found by Diebold and Yilmaz (2009) and Suwanpong (2011) who reported the percentage of FEVs in Spillover Indices of the global and emerging markets sample. This scenario shows more connectedness among the group. Our results are in line with the very first work in terms of culture and cross-border financial linkages of Lucey and Zhang (2010), where religion was found the relevant factor in the emerging market's co-movement, even in thin trading markets.

Table 4 presents the cross-country volatility spillovers. Results are interesting as well as different from the previous studies. 22.4% FEVs in total can be attributed to Spillover, which is less than the returns Spillover Index. In the previous studies like that of Diebold and Yilmaz (2009), the results were approximately the same, while in Suwanpong (2011), the volatilities' spillovers were found much higher than the returns' spillovers. It can be noted that in terms of volatilities, the Japanese stock market is the greatest giver of the volatility (80.12), affecting Egypt, Tunisia, and Lebanon the most. The US is the second giver of volatility (68.16), impacting the stock markets of Turkey and Indonesia mostly. Taking Muslim countries as a group, Turkey (35.49) followed by Egypt (20.58) are the givers/contributors of shocks, whereas Tunisia (48.55), Indonesia (42.89), and Turkey (37.67) are the greatest receivers of shocks from other countries.

Based on the Tables 3 and 4, we can say that both volatility and returns are important in the spillover discussion. Within the Muslim countries group, the individual countries are more connected to the individual developed country, and this connectedness varies in case of returns and volatilities. On the other hand, the countries sharing borders or same region are more connected like Turkey and Egypt, Indonesia and Japan, etc. The low value of connectedness index within the Muslim markets shows that they are less prone to risk transversal from the global market as empirically proved in the case of the Islamic indices (Al-Khazali, Lean, & Samet, 2014; El Mehdi & Mghaieth, 2017; Walkshausl & Lobe, 2012). Islamic indices are Sharī'ah-compliant and hence, we can conjecture that the prohibition of interest and *gharrar* is not only a structural or institutional factor in the financial markets but also a behavior deeply rooted in the Muslim population which translates into risk preferences collectively.

In the previous studies, mostly the value of volatility spillover is more than returns (Balli, Hajhoj, Basher, & Ghassan, 2015; Li & Giles, 2015; Louzis, 2012; Yilmaz, 2010). In our study, the case is different and startling as the returns' spillover is more. By comparing the returns and volatility spillovers, it's imperative that the risk perception from one country to the other does not amplify in the Muslim countries' group, which makes these indices worth investing in the international portfolio diversification scenario.

TABLE 4
Muslim-majority countries' spillover, stock market volatility, 7/1996-1/2016

	US	UK	JPN	Pak	TUR	JRD	EGPT	IDN	KUW	LEB	MORC	TUN	From Others
US	87.01	1.75	0.22	0.15	6.16	0.01	2.10	0.35	0.00	0.03	1.08	1.12	12.99
UK	0.21	98.80	0.19	0.01	0.15	0.09	0.05	0.17	0.16	0.02	0.01	0.14	1.20
JPN	17.50	0.64	75.69	0.07	0.17	1.19	0.06	0.18	0.17	0.87	2.29	1.19	24.31
Pak	2.60	0.04	1.16	88.36	2.52	0.10	0.10	0.93	0.00	0.20	1.57	2.41	11.64
TUR	22.24	0.19	1.80	2.04	62.33	0.03	9.15	1.03	0.00	0.06	0.72	0.42	37.67
JRD	0.65	0.27	7.60	1.22	1.26	85.30	0.14	0.28	0.19	0.74	1.96	0.40	14.70
EGPT	1.67	0.06	1.18	0.66	13.33	0.09	79.02	0.11	0.01	0.06	0.98	2.84	20.98
IDN	7.81	0.51	27.17	0.15	0.29	1.23	0.22	57.11	0.02	0.42	2.62	2.43	42.89
KUW	0.11	0.28	1.15	0.08	0.04	1.10	0.11	1.00	93.91	1.60	0.19	0.43	6.09
LEB	5.55	2.82	15.87	1.08	0.77	0.27	0.53	0.97	0.85	71.16	0.06	0.06	28.84
MORC	0.63	0.20	0.03	1.49	5.48	0.51	7.92	1.46	0.20	0.27	80.89	0.92	19.11
TUN	9.20	0.64	23.75	2.25	5.31	0.19	0.19	6.67	0.04	0.08	0.24	51.45	48.55
Contribution to others	68.16	7.39	80.12	9.19	35.49	4.80	20.58	13.15	1.64	4.35	11.73	12.37	268.97
Contribution including own	155.17	106.18	155.81	97.55	97.81	90.10	99.60	70.26	95.55	75.51	92.62	63.82	22.4%

By using VAR order 1 by AIC criteria and Cholesky-factor ordering as in Table's first column. The *ij*-th reading shows the contribution to the innovations in ten months ahead variance of stock volatilities of the country *i* from the country *j*'s real stock return volatility shocks.

Dynamic Analysis

As described by Diebold and Yilmaz (2009), it's necessary to look into the dynamic analysis. Evidently, for the period 1992-2016, the world is more capitalized, with more trade ties, integration and connectivity, and more electronic trading. Other than globalization, there had been some financial and political crises that affected the world on account of contagion. Moreover, the spillovers of returns and volatility can show different behaviors at the same time.

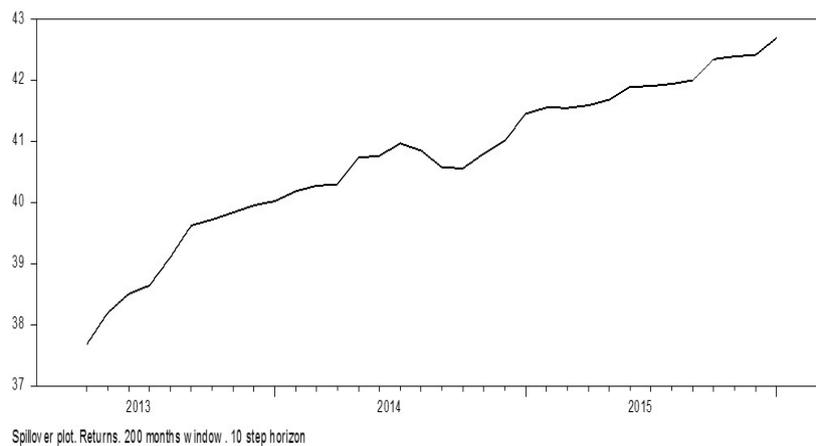


FIGURE 1. Spillover indices for returns and volatility for 200 months

For dynamic analysis, a rolling window of 200 months was taken to get 10 steps ahead FEV of both returns and volatility. The resulting Spillover Indices are reported through the graph in Fig. 1 and Fig. 2. As can be seen in Fig. 1, the recent window of 2012-2016 is showing a gentle and stable increase in integration, and from 36%, it raised to about 42%.

Volatility, which also has a steady increasing trend with time, shows more variation and rose to near 27%. For tapping the variations in further details, the Rolling Sample analysis of volatility spillover is done with 50 months, 5-Step Horizon (Fig. 3), 75-month window along with 6- and 2-step Horizon (Fig. 4).

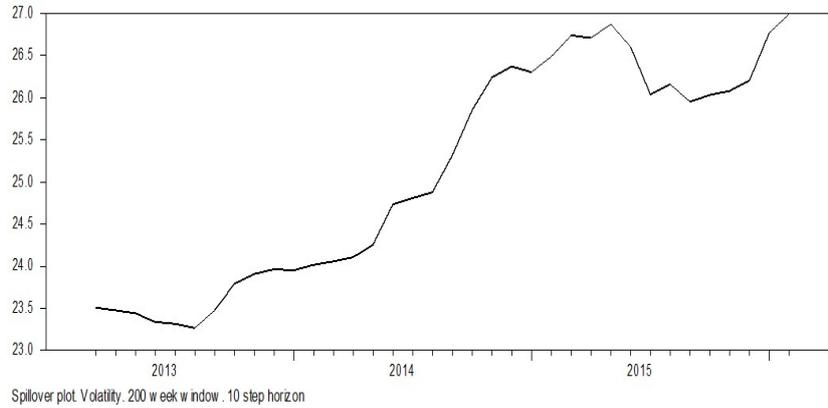


FIGURE 2. Spillover indices for returns and volatility for 200 Weeks

Volatility Spillover can be best explained in 50-month window and 5 steps ahead horizon presented in Fig. 3, as it responds to all the major crises affecting the Muslim world. In 2001, we had a sudden spike in the volatility responding to the global 9/11 shock; in 2006, it responds to currency crises and capital outflow from emerging markets, moreover, the war and political crises in Lebanon. Further, in 2008 and 2009, the US sub-Prime Crises that went global and the European Sovereign Debt Crises are also under consideration. The Uniqueness of this Spillover measure is that it also shows the impact of Arab Spring in 2011 and 2012, the state of War, and the political hype which poses a crisis-like situation, but after 2012, we can see a steady decrease in Volatility Spillover Index.



FIGURE 3. Volatility spillover for 50 months

Fig. 4 presents 75-month window with 3- and 1-step horizon; it does not depict all the fluctuations but shows the spillover gaining with the advent of events along with a stable period as described below.

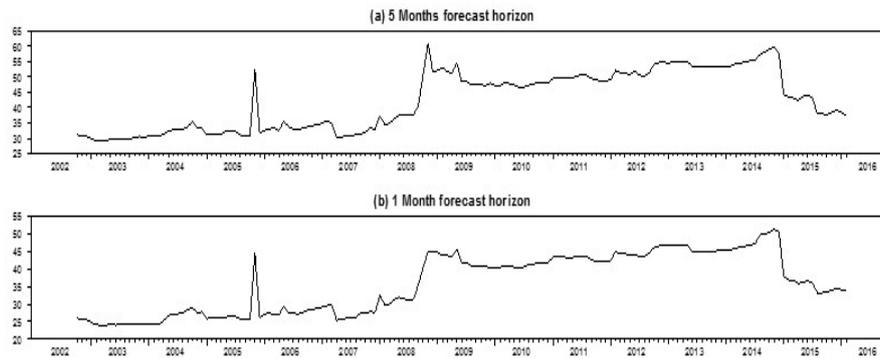


Figure 2 Spillover plot, Global Market Volatility
75 Months Rolling Windows

FIGURE 4. Volatility spillover for 75 months

CONCLUSION

This paper checks the interconnectedness in the financial markets of nine Muslim-majority countries with three developed countries of the world, using Diebold and Yilmaz's (2009) measure of spillover in both returns and volatility context. As financial integration has more benefits than curses, then the key is to find some measures like portfolio diversification or policy coordination to reduce or minimize this effect, if markets integrate more in the advent of crises and turmoil.

The results suggest that the US is still the most influencing market in the group, while Japan is the contributor of volatility to some countries, and the UK has a minimal impact. In terms of the static analysis, the results are quite surprising as the group has more return spillover index (36.5%) and less volatility spillover (22.4%) as explained through FEV. Conclusively, the group can be an attractive opportunity for creating a diversified portfolio keeping in view the individual country's financial spillovers.

By taking the individual cases, we can say that the similarities in religion play a role in the financial market integration due to strong returns and volatility spillovers in many countries with apparently no trade and geographic connectedness. Additionally, there is a two-way or bi-directional relationship between the Muslim countries in forecasting both returns and volatility with the most spillover between developed markets. Our study confirms the results of Lucey and Zhang (2010) and Mobarek, Muradoglu, Mollah, and Hou (2016), that religious similarity is an unwavering factor in cross-border financial transmission mechanism. This finding is in line with the literature on stock market integration and efficiency by Ozer and Ertokatli (2010), pointing towards behavioral factors that can cause inefficiency.

Looking at the dynamic analysis through the Rolling-Window approach, this study found clear differences in the behavior of spillover. The returns spillover shows a continuous and steady increase significant to the globalized connected world. The volatility spillover shows the systematic risk perceived more strongly with a speedy propagation of shocks. In the advent of crises, the Muslim country group is not aloof of the higher volatilities and return shocks, but they do not show spikes and peaks as indicated by Diebold and Yilmaz (2009) and Suwanpong (2011) in emerging and global markets. So it's vital to include Muslim

countries' indices in portfolios to minimize the risk.

The contributions of this study to the recent research on the financial markets are two-fold. First, the results show the level of integration in stocks return and volatility of Muslim countries in the global context and secondly, it provides a way towards the financial diversification in the markets with the same religion.

REFERENCES

- Akhtar, M. F., Ali, K., & Sadaqat, S. (2011). Factors influencing the profitability of Islamic banks of Pakistan. *International Research Journal of Finance and Economics*, 66, 125-132.
- Aggarwal, R., & Goodell, J. W. (2014). Cross-national differences in access to finance: Influence of culture and institutional environments. *Research in International Business and Finance*, 31, 193-211. doi: <https://doi.org/10.1016/j.ribaf.2013.09.004>
- Al-Khazali, O., Lean, H. H., & Samet, A. (2014). Do Islamic stock indexes outperform conventional stock indexes? A stochastic dominance approach. *Pacific-Basin Finance Journal*, 28, 29-46. doi: <https://doi.org/10.1016/j.pacfin.2013.09.003>
- Andersen, T. G., Bollerslev, T., Diebold, F. X., & Ebens, H. (2001). The distribution of realized stock return volatility. *Journal of Financial Economics*, 61(1), 43-76. doi: [https://doi.org/10.1016/S0304-405X\(01\)00055-1](https://doi.org/10.1016/S0304-405X(01)00055-1)
- Antonakakis, N. (2012). Exchange return co-movements and volatility spillovers before and after the introduction of euro. *Journal of International Financial Markets, Institutions and Money*, 22(5), 1091-1109. doi: <https://doi.org/10.1016/j.intfin.2012.05.009>
- Arrunada, B. (2010). Protestants and Catholics: Similar work ethic, different social ethic. *The Economic Journal*, 120(547), 890-918. doi: <https://doi.org/10.1111/j.1468-0297.2009.02325.x>
- Arshanapalli, B., & Doukas, J. (1993). International stock market linkages: Evidence from the pre-and post- October 1987 period. *Journal of Banking & Finance*, 17(1), 193-208. doi: [https://doi.org/10.1016/0378-4266\(93\)90088-U](https://doi.org/10.1016/0378-4266(93)90088-U)
- Baele, L., Bekaert, G., & Inghelbrecht, K. (2010). The determinants of stock and bond return comovements. *The Review of Financial Studies*, 23(6), 2374-2428. doi: <https://doi.org/10.1093/rfs/hhq014>
- Balli, F., Hajhoj, H. R., Basher, S. A., & Ghassan, H. B. (2015). An analysis of returns and volatility spillovers and their determinants in emerging Asian and Middle Eastern countries. *International Review of Economics & Finance*, 39, 311-325. doi: <https://doi.org/10.1016/j.iref.2015.04.013>
- Balli, F., Pericoli, F. M., & Pierucci, E. (2014). Foreign portfolio diversification and risk-sharing. *Economics Letters*, 125(2), 187-190. doi: <https://doi.org/10.1016/j.econlet.2014.08.028>
- Balli, H. O., Balli, F., & Louis, R. J. (2013). Timevarying spillover effects on sectoral equity Returns. *International Review of Finance*, 13(1), 67-91. doi: <https://doi.org/10.1111/j.1468-2443.2011.01143.x>

- Barrett, C. B. (2001). Measuring integration and efficiency in international agricultural markets. *Review of Agricultural Economics*, 23(1), 19-32.
doi: <https://doi.org/10.1111/1058-7195.00043>
- Bartke, S., & Schwarze, R. (2008). *Risk-averse by nation or by religion? Some insights on the determinants of individual risk attitudes* (SOEP Papers on multidisciplinary panel data research no. 131). German Socio-Economic Panel Study (SOEP), Berlin, Germany.
- Bartram, S. M., Brown, G., & Stulz, R. M. (2012). Why are US stocks more volatile? *The Journal of Finance*, 67(4), 1329-1370.
doi: <https://doi.org/10.1111/j.1540-6261.2012.01749.x>
- Baxter, M., & Crucini, M. J. (1993). Explaining saving-investment correlations. *The American Economic Review*, 83(3), 416-436.
- Bekaert, G., Hodrick, R. J., & Zhang, X. (2009). International stock return comovements. *The Journal of Finance*, 64(6), 2591-2626.
doi: <https://doi.org/10.1111/j.1540-6261.2009.01512.x>
- Bikhchandani, S., & Sharma, S. (2000). Herd behavior in financial markets. *IMF Staff Papers*, 47(3), 279-310.
- Budak, C., Agrawal, D., & El Abbadi, A. (2011). Limiting the spread of misinformation in social networks. Paper presented at the *Proceedings of the 20th International Conference on World Wide Web* (pp. 665-674), Hyderabad, India.
doi: <https://doi.org/10.1145/1963405.1963499>
- Cairnes, J. E. (1874). *Some leading principles of political economy newly expounded*. Manhattan, NY: Harper & Brothers.
- Calvo, G. A. (1999). Testimony on full dollarization. Paper presented at the *Joint Hearing of the Subcommittees on Economic Policy and International Trade and Finance*, Washington, DC., WA.
- Candelon, B., Piplack, J., & Straetmans, S. (2008). On measuring synchronization of bulls and bears: The case of East Asia. *Journal of Banking & Finance*, 32(6), 1022-1035.
doi: <https://doi.org/10.1016/j.jbankfin.2007.08.003>
- Cass, D., & Pavlova, A. (2004). On trees and logs. *Journal of Economic Theory*, 116(1), 41-83. doi: <https://doi.org/10.1016/j.jet.2003.05.001>
- Chan, A. W., & Cheung, H. Y. (2012). Cultural dimensions, ethical sensitivity, and corporate governance. *Journal of Business Ethics*, 110(1), 45-59.
doi: <https://doi.org/10.1007/s10551-011-1146-9>
- Christiansen, H., (2000). International Financial Contagion. *Financial Market Trends* 76, 65-108.
- Chui, A. C., Titman, S., & Wei, K. J. (2010). Individualism and momentum around the world. *The Journal of Finance*, 65(1), 361-392.
doi: <https://doi.org/10.1111/j.1540-6261.2009.01532.x>
- Cole, H. L., & Obstfeld, M. (1991). Commodity trade and international risk sharing: How much do financial markets matter? *Journal of Monetary Economics*, 28(1), 3-24.
doi: [https://doi.org/10.1016/0304-3932\(91\)90023-H](https://doi.org/10.1016/0304-3932(91)90023-H)

- Diamandis, P. F. (2009). International stock market linkages: Evidence from Latin America. *Global Finance Journal*, 20(1), 13-30.
doi: <https://doi.org/10.1016/j.gfj.2009.03.005>
- Diebold, F. X., & Yilmaz, K. (2009). Measuring financial asset return and volatility spillovers, with application to global equity markets. *The Economic Journal*, 119(534), 158-171. doi: <https://doi.org/10.1111/j.1468-0297.2008.02208.x>
- Do, H. X., Brooks, R., Treepongkaruna, S., & Wu, E. (2016). Stock and currency market linkages: New evidence from realized spillovers in higher moments. *International Review of Economics & Finance*, 42, 167-185.
doi: <https://doi.org/10.1016/j.iref.2015.11.003>
- Dong, H., Bowers, H. M., & Latham, W. R. (2013). Evidence on the efficient market hypothesis from 44 global financial market indexes. *Economics Research International*, 10, 1-11. doi: <https://doi.org/10.1155/2013/238253>
- Drogendijk, R., & Slangen, A. (2006). Hofstede, Schwartz, or managerial perceptions? The effects of different cultural distance measures on establishment mode choices by multinational enterprises. *International Business Review*, 15(4), 361-380.
doi: <https://doi.org/10.1016/j.ibusrev.2006.05.003>
- Dungey, M., Fry, R., Gonzalez-Hermosillo, B., & Martin, V. L. (2007). Contagion in global equity markets in 1998: The effects of the Russian and LTCM crises. *The North American Journal of Economics and Finance*, 18(2), 155-174.
doi: <https://doi.org/10.1016/j.najef.2007.05.003>
- Durand, R., & Coeurderoy, R. (2001). Age, order of entry, strategic orientation, and organizational performance. *Journal of Business Venturing*, 16(5), 471-494.
doi: [https://doi.org/10.1016/S0883-9026\(99\)00061-0](https://doi.org/10.1016/S0883-9026(99)00061-0)
- El Mehdi, I. K., & Mghaieth, A. (2017). Volatility spillover and hedging strategies between Islamic and conventional stocks in the presence of asymmetry and long memory. *Research in International Business and Finance*, 39, 595-611.
doi: <https://doi.org/10.1016/j.ribaf.2016.04.006>
- Engle, R. (2002). Dynamic conditional correlation: A simple class of multivariate generalized autoregressive conditional heteroskedasticity models. *Journal of Business & Economic Statistics*, 20(3), 339-350. doi: <https://doi.org/10.1198/073500102288618487>
- Eun, C. S., & Shim, S. (1989). International transmission of stock market movements. *Journal of Financial and Quantitative Analysis*, 24(2), 241-256.
doi: <https://doi.org/10.2307/2330774>
- Gait, A. H., & Worthington, A. C. (2007). *A primer on Islamic finance: Definitions, sources, principles and methods* (Working paper). School of Accounting and Finance, University of Wollongong, Wollongong, New Australia.
- Gebka, B., & Serwa, D. (2007). Intra-and inter-regional spillovers between emerging capital markets around the world. *Research in International Business and Finance*, 21(2), 203-221. doi: <https://doi.org/10.1016/j.ribaf.2006.03.005>
- Guiso, L., Sapienza, P., & Zingales, L. (2003). People's opium? Religion and economic attitudes. *Journal of Monetary Economics*, 50(1), 225-282.
doi: [https://doi.org/10.1016/S0304-3932\(02\)00202-7](https://doi.org/10.1016/S0304-3932(02)00202-7)

- Han, S., Kang, T., Salter, S., & Yoo, Y. K. (2010). A cross-country study on the effects of national culture on earnings management. *Journal of International Business Studies*, 41(1), 123-141. doi: <https://doi.org/10.1057/jibs.2008.78>
- Hartmann, P., Straetmans, S., & De Vries, C. G. (2004). Asset market linkages in crisis periods. *The Review of Economics and Statistics*, 86(1), 313-326. doi: <https://doi.org/10.1162/003465304323023831>
- Hernandez, L. F., & Valdes, R. O. (2001). What drives contagion: Trade, Neighborhood, or financial links? *International Review of Financial Analysis*, 10(3), 203-218. doi: [https://doi.org/10.1016/S1057-5219\(01\)00052-7](https://doi.org/10.1016/S1057-5219(01)00052-7)
- Huberman, G. (2001). Familiarity breeds investment. *The Review of Financial Studies*, 14(3), 659-680. doi: <https://doi.org/10.1093/rfs/14.3.659>
- Iannaccone, L. R. (1998). Introduction to the economics of Religion. *Journal of Economic Literature*, 36(3), 1465-1495.
- Ibrahim, M. H. (2005). International linkage of stock prices: The case of Indonesia. *Management Research News*, 28(4), 93-115. doi: <https://doi.org/10.1108/01409170510784823>
- Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115(1), 53-74. doi: [https://doi.org/10.1016/S0304-4076\(03\)00092-7](https://doi.org/10.1016/S0304-4076(03)00092-7)
- Joshi, P. (2011). Return and volatility spillovers among Asian stock markets. *Sage Open Journal*, 1(1), 1-8. doi: <https://doi.org/10.1177/2158244011413474>
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263-291. doi: <https://doi.org/10.2307/1914185>
- King, M. A., & Wadhvani, S. (1990). Transmission of volatility between stock markets. *The Review of Financial Studies*, 3(1), 5-33. doi: <https://doi.org/10.1093/rfs/3.1.5>
- Krugman, P. (1995). Increasing returns, imperfect competition and the positive theory of international trade. In R. W. Jones, P. B. Kenen, G. M. Grossman & K. Rogoff (Eds.), *Handbook of international economics* (Vol. 3) (pp. 1243-1277). Amsterdam, Netherlands: Elsevier. doi: [https://doi.org/10.1016/S1573-4404\(05\)80004-8](https://doi.org/10.1016/S1573-4404(05)80004-8)
- Kumar, A., Page, J. K., & Spalt, O. G. (2011). Religious beliefs, gambling attitudes, and financial market outcomes. *Journal of Financial Economics*, 102(3), 671-708. doi: <https://doi.org/10.1016/j.jfineco.2011.07.001>
- Laopodis, N. T. (2004). Financial market liberalization and stock market efficiency: Evidence from the Athens Stock Exchange. *Global Finance Journal*, 15(2), 103-123. doi: <https://doi.org/10.1016/j.gfj.2004.06.001>
- Lee, C. C., & Hsieh, M. F. (2014). Bank reforms, foreign ownership, and financial stability. *Journal of International Money and Finance*, 40, 204-224. doi: <https://doi.org/10.1016/j.jimonfin.2013.09.001>
- Lee, C. C., Huang, W. L., & Yin, C. H. (2013). The dynamic interactions among the stock, bond and insurance markets. *The North American Journal of Economics and Finance*, 26, 28-52. doi: <https://doi.org/10.1016/j.najef.2013.04.003>

- Levine, R., & Zervos, S. (1998). Capital control liberalization and stock market development. *World Development*, 26(7), 1169-1183.
doi: [https://doi.org/10.1016/S0305-750X\(98\)00046-1](https://doi.org/10.1016/S0305-750X(98)00046-1)
- Li, Y., & Giles, D. E. (2015). Modelling volatility spillover effects between developed stock markets and Asian emerging stock markets. *International Journal of Finance & Economics*, 20(2), 155-177. doi: <https://doi.org/10.1002/ijfe.1506>
- Lin, W. L., Engle, R. F., & Ito, T. (1994). Do bulls and bears move across borders? International transmission of stock returns and volatility. *Review of Financial Studies*, 7(3), 507-538. doi: <https://doi.org/10.1093/rfs/7.3.507>
- Louzis, D. P. (2012). *Measuring return and volatility spillovers in Euro area financial markets* (Working paper no. 154). Bank of Greece, Athens, Greece.
- Lucey, B. M., & Zhang, Q. (2010). Does cultural distance matter in international stock market comovement? Evidence from emerging economies around the world. *Emerging Markets Review*, 11(1), 62-78. doi: <https://doi.org/10.1016/j.ememar.2009.11.003>
- MacDonald, R., & Power, D. M. (1994). An alternative test of stock market efficiency: an analysis of UK share price data. *British Review of Economic Issues*, 16(38), 33-53.
- MacKinnon, R. I. (1973). *Money and capital in economic development*. Washington, DC., WA: Brookings Institution.
- Martens, M., & Zein, J. (2004). Predicting financial volatility: High-frequency time-series forecasts vis-a-vis implied volatility. *Journal of Futures Markets*, 24(11), 1005-1028. doi: <https://doi.org/10.1002/fut.20126>
- Miller, A. S. (2000). Going to hell in Asia: The relationship between risk and religion in a cross cultural setting. *Review of Religious Research*, 42(1), 5-18.
doi: <https://doi.org/10.2307/3512141>
- Miller, A. S., & Hoffmann, J. P. (1995). Risk and religion: An explanation of gender differences in religiosity. *Journal for the Scientific Study of Religion*, 34(1), 63-75. doi: <https://doi.org/10.2307/1386523>
- Mobarek, A., Muradoglu, G., Mollah, S., & Hou, A. J. (2016). Determinants of time varying co-movements among international stock markets during crisis and non-crisis periods. *Journal of Financial Stability*, 24, 1-11.
doi: <https://doi.org/10.1016/j.jfs.2016.03.003>
- Moore, M. (1997). Societies, politics and capitalists in developing countries: A literature survey. *The Journal of Development Studies*, 33(3), 287-363.
doi: <https://doi.org/10.1080/00220389708422469>
- Ng, A. (2000). Volatility spillover effects from Japan and the US to the Pacific-Basin. *Journal of International Money and Finance*, 19(2), 207-233.
doi: [https://doi.org/10.1016/S0261-5606\(00\)00006-1](https://doi.org/10.1016/S0261-5606(00)00006-1)
- Odell, J., & Ali, U. (2016). ESG investing in emerging and frontier markets. *Journal of Applied Corporate Finance*, 28(2), 96-101. doi: <https://doi.org/10.1111/jacf.12181>
- Osoba, B. (2003). *Risk preferences and the practice of religion: Evidence from panel data* (Working paper). West Virginia University, Morgantown, WV.

- Ozer, G., & Ertokatli, C. T. (2010). Chaotic processes of common stock index returns: An empirical examination on Istanbul Stock Exchange (ISE) market. *African Journal of Business Management*, 4(6), 1140-1148.
- Parker, I. (2014). *Discourse dynamics (psychology revivals): Critical analysis for social and individual psychology*. New York, NY: Routledge.
- Roe, M. J. (2003). *Political determinants of corporate governance: Political context, corporate impact*. Oxford, UK: Oxford University Press.
- Schumpeter, J. A. (1911). *The theory of economic development*. Cambridge, MA: Harvard University Press.
- Senior, N. W. (1827). *An introductory lecture on political economy*. London, UK: J. Mawman.
- Shu, T., Sulaeman, J., & Yeung, P. E. (2012). Local religious beliefs and mutual fund risk-taking behaviors. *Management Science*, 58(10), 1779-1796.
doi: <https://doi.org/10.1287/mnsc.1120.1525>
- Stonehill, A., & Stitzel, T. (1969). Financial structure and multinational corporations. *California Management Review*, 12(1), 91-95. doi: <https://doi.org/10.2307/41164210>
- Stulz, R. M., & Williamson, R. (2003). Culture, openness, and finance. *Journal of Financial Economics*, 70(3), 313-349.
doi: [https://doi.org/10.1016/S0304-405X\(03\)00173-9](https://doi.org/10.1016/S0304-405X(03)00173-9)
- Suwanpong, P. (2011). *Measuring return and volatility spillovers in global financial markets* (Working paper). Faculty of Economics, Chulalongkorn University, Bangkok, Thailand.
- Thapa, C., & Poshakwale, S. S. (2012). Country-specific equity market characteristics and foreign equity portfolio allocation. *Journal of International Money and Finance*, 31(2), 189-211. doi: <https://doi.org/10.1016/j.jimonfin.2011.10.011>
- Van Rijckeghem, C., & Weder, B. (2001). Sources of contagion: Is it finance or trade? *Journal of International Economics*, 54(2), 293-308.
doi: [https://doi.org/10.1016/S0022-1996\(00\)00095-7](https://doi.org/10.1016/S0022-1996(00)00095-7)
- Walkshausl, C., & Lobe, S. (2012). Islamic investing. *Review of Financial Economics*, 21(2), 53-62. doi: <https://doi.org/10.1016/j.rfe.2012.03.002>
- Yilmaz, K. (2010). Return and volatility spillovers among the East Asian equity markets. *Journal of Asian Economics*, 21(3), 304-313.
doi: <https://doi.org/10.1016/j.asieco.2009.09.001>
- Zheng, T., & Zuo, H. (2013). Reexamining the time-varying volatility spillover effects: A Markov switching causality approach. *The North American Journal of Economics and Finance*, 26, 643-662. doi: <https://doi.org/10.1016/j.najef.2013.05.001>
