



Testing of Volatility Spillovers Dynamics and Network Connectedness between Islamic Indices of Regional Stock Markets

Vol. IV, No. I (Winter 2019) | Page: 128 – 137 | DOI: 10.31703/grr.2019(IV-I).15

p- ISSN: 2616-955X | e-ISSN: 2663-7030 | ISSN-L: 2616-955X

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Abstract

Volatility spillovers and market network connectedness is the most recent phenomena which prevails among the financial markets. The purpose of this research is to evaluate the volatility spillovers and connectedness among Islamic Stock indices of global (MSCI) and Islamic indices of the regional stock markets i.e., DJMI, FTSE, JKI and KMI during the period 01/07/ 2013 to 30/06/2018. We used EGARCH (Nelson 1991), DCC-GARCH, static and rolling- window analysis to investigate the effects of volatility spillovers and connectedness by Diebold and Yilmaz (2012, 2014) and Mensi et al. (2018) methodology. It is concluded that MSCI and FTSE are the net recipients of shocks whereas; DJMI, JKI and KMI are net transmitters of shocks in a static spillover convention. Shock transmission process is time variant and volatility behaves in an asymmetric manner. The risk of spillover is quite sensitive to the political and economic events and it varies over time.

Key Words: Islamic Indices, EGARCH, DCC-GARCH, Volatility Spillover and Rolling Window Analysis

Introduction

International financial system has become more complicated as a result of ongoing structural changes comprising innovative financial products and technological improvements, which have affected the global financial architecture and economy of the world speedily. The volatility of stock returns has complicated properties of long memory, substantial outliers, regime change and volatility clustering. These properties have made the substantial importance of modern adoption of financial strategies regarding the co-movements and spillovers across the global and regional stock returns. This innovation has aroused from the last decade and the connectedness of cross-market has become very important subject matter in the investment market. Shocks affect the patterns of the equity market returns and volatility as well. In the recent history, Great Crisis (2007-2011) hit the financial system of the world forcefully which has started from the sub-prime mortgage market of U.S. and rolling through many stage lasting from one and half year that have affected the several stock markets of several countries and became a strong cause of a global trade contraction and global recession sharply in 2009. This element aroused within various European countries and such financial crisis created an unprecedented reaction in sense of fiscal and non- conventional monetary policies. Moreover, the lack of a crisis may mitigate the framework and consistent supra-national macro prudential leads to more uncertainty. This background clears the understanding of the financial crises and the evolution of financial crises strongly depends upon the understanding of the financial institution connectedness. Stock prices and its future contract must move simultaneously in a competitive market. This relationship can helpful to predict the prices of stock market in different countries that may enhance portfolio diversification. Emerging economies are endeavoring to become the developed and modern nations in true spirit, the key challenges that are faced by these economies is to resolve the problems of strong dependencies on mature economies for financial transactions. Attention has been accredited to evaluate the relationship among nature of the stock market spillover and uncertainty across countries. For this purpose many studies related to financial market connectedness and spillover effect have been

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have been performed to identify the significant levels. These studies have investigated the existence of co-movements but they reflect different results in different economies in different sub periods. However still there are number of unaddressed issues in various aspects of stock indices. The focus of this study is to test the volatility spillovers dynamics and network connectedness between Islamic Indices of Regional Stock Markets and do the risk spillover is sensitive to political and economic events and varies over time is the question of the day? Moreover, we are looking into the matter to explore that whether the risk spillover intensifies throughout the sample period. These elements are intensifying the large inferences in terms of downside risk and investment diversification for speculators and portfolio managers in developing the risk management portfolios and assets allocation. Global trade liberalization and market connectedness have provided the opportunity to the business parties and investors to make more rational and profitable investment opportunities across the globe and to use new Islamic financial instruments as innovative financial securitization element. First segment of this paper is a brief introduction of the spillovers and volatility and the second component follows the literature review. Third segment elaborates the methodology and fourth component expresses the results and discussion. Last segment of this empirical study has summarized the conclusion.

Literature Review

Diebold and Yilmaz (2009) analyzed the total and directional volatility spillovers by using the GVAR framework to check the daily volatility spillovers among the United States bond, foreign exchange, commodities and stock markets from January 1999 to January 2010. This study showed that during the sample period in all four markets regardless of significant volatility fluctuations, it is seen that cross market volatility spillovers were limited in 2007 due to global financial crisis. Diebold and Yilmaz (2012) have taken the sample of eleven countries from April 1999 to January 2014. For the evaluation of net directional volatility spillovers, they used a dynamic analysis to check that whether peripheral and core markets differences are present or not by applying panel data analysis to evaluate the net directional spillovers determinant as well. Wang (2016) examined the volatility spillover effect and causal relationship among two prices of CSI 300, one in stock market and one in futures market. He identified that different studies on different developed markets indicate that change in stock prices can be predicted by changes in futures prices. However, they (2016) analyzed connectedness of equity return volatility in the major European and American financial institutions network from 2004 to 2014 and also analysed the key aspects of the financial crisis evolution. They found that connectedness direction was clear from the US to Europe during 2007-2008 and in 2008 this connectedness became bidirectional and identified that some particular institutions had important roles in creating connectedness throughout the United States and European financial crises.

The methodology of Diebold and Yilmaz (2012) was again testified as Mensi et al. (2017) identified risk spillovers and time-varying equi-correlations among the gold, crude oil, and the Islamic stock index aggregates. The results of their study revealed that gold offers downside risk reductions and better portfolio diversification benefits than oil. McDonald et al. (2018) studied the potential spillover and cross-co variances effects among the Eurozone financial markets and economies. They employed the financial stress indexes, as a systemic risk metrics. They also completed an empirical finding both between zero to “n” numbers” and “within” Eurozone markets and economies. The findings of this study show a lot of interesting points on country level. The volatility transmission channel is very strong from the heavily hit, from the crisis and economies towards the rest. The role and importance of this transmission from the bond markets and banking is underlined additionally. Opposing to common perception, Greece is not the main transmitter of uncertainty of volatility, but it is among the important receivers of the volatility risk while the importance of money market is also in the “between” empirical approach. Further Dynamic connectedness is tested by Manopimikea (2018) between Asian emerging markets and other international markets. He concluded that international equity markets are integrated tightly. Mensi et al. (2018) investigated the regional stock markets of USA, GIPSI economies and the Global Stock market to analyze the volatility spillovers and market connectedness. They used the methodology of Diebold and Yilmaz (2012, 2014) to conduct a static as well as analysis through rolling-window method to measure the volatility spillovers. They investigated this element at different levels of present crises. Financial contagion effect has been supported the topical intensified crises that has created the strong volatility spillovers across the markets. Moreover, it is

identified that the global stock market, regional markets of USA and the stock markets of Italy, Portugal, and Ireland are the net transmitters of the shocks. However, the stock markets of Greece and Spain are identified as net receiver of the shocks. The results of Ahmad et al. (2013) show that GIPSI countries, Italy Spain and Ireland seem to be more contagious for BRIICS markets as compared to the Greece. This research shows that India, Russia, Brazil, South Africa and China are strongly affected by the contagion shock during the period of Eurozone Crisis. However, South Korea and Indonesia report not contagion and interdependence.

Data and Methodology

The daily returns of five Islamic indices have been taken to identify the volatility spillovers dynamics and network connectedness between Islamic indices. Jakarta Islamic index, Dow Jones Islamic index, MSCI Global Islamic index, KSE Meezan Islamic Index and FTSE Islamic index have been taken to identify the volatility spillovers and network connectedness. The closing price data of Islamic index have been taken from investing.com for the period July 1, 2013 to June 30, 2018. Efficient market theory describes that the stock market responds to new information very quickly, so the market prices consist of sum of all investors' views of stock market at any given time. This theory does not explain that the market is correct always. It explains that the market provides the sum of available information and choices made by investors and traders. Investors and traders can be wrong and information can be wrong. When the stock market is wrong temporarily then best opportunities come. The smart traders of stock markets will find the dissimilarity among the ideal value and the stock market value of a stock earlier than the rest of the crowd does. In this research we employed the EGARCH model Neslon (1991), in first essence which shows that Leverage effects are also captured as well as the impact of news. In the model the conditional variance is given by:

$$\text{Log}\sigma_t^2 = \phi_0 + \omega \log \sigma_{t-1}^2 + \phi_1 \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| + \phi \frac{-\varepsilon_{t-1}}{\sigma_{t-1}} \quad (1)$$

EGARCH model elaborates the concept of positivity of the parameters because it works in the sense of log of the variance. The value of λ indicates the leverage effect but the leverage effect presence is shown only if λ value is negative and significant. We also used the ENGLE ADCC GARCH model. Moreover we used the Diebold and Yilmaz (2014, 2016) variance decomposition matrix and generalized vector auto regression (GVAR) is used to identify directional connectedness among the Islamic indices. The covariance stationary VAR (p) is supposed as followed.

$$a_t = \sum_{i=1}^p b_i a_{t-i} + \varepsilon_t \quad (2)$$

Where:

a_t = n x 1 vector of endogenous variable

b_i = n x n autoregressive coefficient matrix

ε_t = vector of error terms which is supposed to be uncorrelated serially

(GVAR) model is used to elaborate H-step as follow.

$$\hat{\sigma}_{ij}(H) = \frac{\sigma_{jj}^{-1} \sum_{h=0}^{H-1} (\lambda_i A_h \Sigma \lambda_i)^2}{\sum_{h=0}^{H-1} (\lambda_i A_h \Sigma A_h \lambda_i)^2} \quad (3)$$

Where:

Σ = vector of errors ε variance matrix

σ_{jj} = error term standard deviation of the j th equation

λ_i = n x 1 vector along with 1 on the i th element and other wise zero

Every entry is treated as normal in the matrix of variance decomposition, as follows:

$$\hat{\mathcal{O}}_{ij}(H) = \frac{\hat{\mathcal{O}}_{ij}(H)}{\sum_{j=1}^n \hat{\mathcal{O}}_{ij}(H)} \tag{4}$$

with $\sum_{j=1}^n \hat{\mathcal{O}}_{ij}(H) = 1$. $\hat{\mathcal{O}}_{ij}(H)$ is from "j" to "i" at H horizon. However, pairwise connectedness $\mathcal{D}_{i \leftarrow j}(H)$ and the opposite direction $\mathcal{D}_{j \leftarrow i}(H)$ is calculated as to identify the transmission.

$$\mathcal{D}_{ij} = \mathcal{D}_{i \leftarrow j}(H) - \mathcal{D}_{j \leftarrow i}(H) \tag{5}$$

The information transmission among two markets is identified through this index. We aggregated the "total directional connectedness" partially to understand that how the financial markets contribute to only one market in a joint formation. "From" and "to" are the two different versions to reflect the total directional connectedness as i is $\mathcal{D}_{i \leftarrow \cdot}(H)$ from all markets to the i market which is calculated as:

$$\mathcal{D}_{i \leftarrow \cdot}(H) = \frac{\sum_{j=1, j \neq i}^N \hat{\mathcal{O}}_{ij}(H)}{\sum_{i, j=1}^N \hat{\mathcal{O}}_{ij}(H)} \times 100 = \frac{\sum_{j=1, j \neq i}^N \hat{\mathcal{O}}_{ij}(H)}{N} \times 100 \tag{6}$$

In what manner a market i contribute to all other markets shocks? We calculated this contribution with partial aggregation similarly. The notation of "total directional connectedness" from all the markets to market i is $\mathcal{D}_{\cdot \leftarrow i}(H)$, which is calculated as:

$$\mathcal{D}_{\cdot \leftarrow i}(H) = \frac{\sum_{j=1, j \neq i}^N \hat{\mathcal{O}}_{ij}(H)}{\sum_{i, j=1}^N \hat{\mathcal{O}}_{ij}(H)} \times 100 = \frac{\sum_{j=1, j \neq i}^N \hat{\mathcal{O}}_{ij}(H)}{N} \times 100 \tag{7}$$

To elaborate net total directional connectedness the two pair wise directional indices is combined as followed.

$$\mathcal{D}_i(H) = \mathcal{D}_{\cdot \leftarrow i}(H) - \mathcal{D}_{i \leftarrow \cdot}(H) \tag{8}$$

Across all markets the total aggregation of variance decomposition computes the total connectedness index. We calculated the total connectedness of all markets as:

$$\mathcal{D}(H) = \frac{\sum_{i, j=1, i \neq j}^N \hat{\mathcal{O}}_{ij}(H)}{\sum_{i, j=1}^N \hat{\mathcal{O}}_{ij}(H)} \times 100 = \frac{\sum_{i, j=1, i \neq j}^N \hat{\mathcal{O}}_{ij}(H)}{N} \times 100 \tag{9}$$

Further for variance decomposition test we used net pair wise directional connectedness as expressed in Equation 8 and 9

Results and Discussion

Fig1 indicates the trend of daily closing prices of five Islamic indices. Price behavior reflects rising trend.

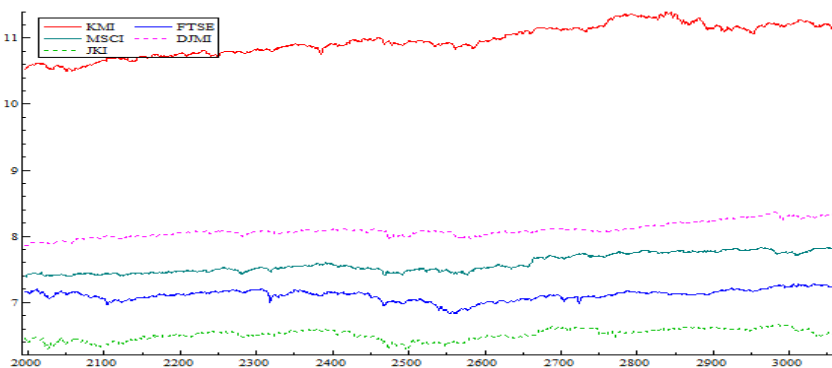


Figure 1: Trend of Islamic Stock Indices of MSCI, DJMI, FTSE, JKI, KMI

Results of Table 1 indicate descriptive statistics for the behavior of returns during the period July 1, 2013 to June 30, 2018. The average returns of all indices are positive. FTSE, JKI and KMI Islamic indices are more volatile than MSCI and DJMI. Skewness, Kurtosis and Jarque –Bera test results show that all returns are deviating minor from Gaussian distribution. However data reflects normal behavior.

Table 1. Summary Descriptive Statistics

	MSCI	DJMI	FTSE	JKI	KMI
Mean	0.000393	0.000437	0.000059	0.000056	0.000602
Median	0.000673	0.000696	0.000656	0.000679	0.000908
Maximum	0.044613	0.039632	0.038272	0.056382	0.047769
Minimum	0.039669	-0.064437	-0.103512	-0.077044	-0.069917
Std. Dev.	0.009002	0.007687	0.010681	0.012858	0.012239
Skewness	0.152299	-0.970681	-1.506318	-0.416048	-0.360694
Kurtosis	5.176204	11.6685	14.50432	6.412529	6.252789
Jarque-Bera	213.8687*	3495.131*	6263.965*	546.4589*	491.6835*
Probability	0	0	0	0	0
Sum	0.417964	0.464036	0.063126	0.060315	0.639543
Sum Sq. Dev.	0.086066	0.062758	0.121158	0.175591	0.159093
Observations	1063	1063	1063	1063	1063

Note: The Returns are continuous Returns. $Returs = \left(\frac{LnP_t}{LnP_{t-1}} \right) - 1$

Results indicate that KMI is producing higher return with higher level of risk as reflected by Table 1, However, secondly DJMI has higher expected return with a certain level of risk. All return series have negative skewness. Jarque-Bera results also confirm non-normality. Further to test the stationarity, ADF test is used. Table 2 shows that times series at first difference got stationary.

Table 2. Unit Root Test

	<u>At Level</u>	DJMI	FTSE	JKI	KMI	MSCI
With Const.	t-Stat	-0.9883	-2.1716	-2.4698	-1.5031	-0.6322
	Probability.	0.7592	0.2170	0.1232	0.5319	0.8608
		No	No	no	no	no
With Const. and Trend	t-Stat	-2.3289	-2.4781	-3.0454	-2.4704	-2.4807
	Probability.	0.4173	0.3390	0.1204	0.3429	0.3378
		No	No	no	no	no
Without Const. and Trend	t-Stat	1.4860	0.0162	-0.0568	0.7686	1.3590
	Probability.	0.9664	0.6877	0.6637	0.8795	0.9567
		No	No	no	no	no
<u>At 1st Difference</u>						
With Const.		d(DJMI)	d(FTSE)	d(JKI)	d(KMI)	d(MSCI)
	t-Stat	-27.9251	-28.1305	-32.8186	-28.4051	-33.8167
	Probability.	0.0000	0.0000	0.0000	0.0000	0.0000
	***	***	***	***	***	
With Const. and Trend	t-Stat	-27.9139	-28.1338	-32.8061	-28.4025	-33.8057
	Probability.	0.0000	0.0000	0.0000	0.0000	0.0000
		***	***	***	***	***
Without Const. and Trend	t-Stat	-27.8580	-28.1426	-32.8326	-28.3790	-33.7584
	Probability.	0.0000	0.0000	0.0000	0.0000	0.0000
		***	***	***	***	***

Notes:

- *Significant at $p < 0.10$
- **Significant at $p < 0.05$
- *** Significant at the 1%
- (no) Not Significant

The lag length is based on SIC

As series meet the condition of stationarity at first difference we deployed EGARCH (1, 1) model and hence results indicates that JKI, KMI and FTSE are more inspired by the shocks of the volatility than the DJMI and MSCI. It is seen that a large change in price create more volatility than small change in price and bad news have more impact than good news.

Table 3. EGARCH Model

Mean Equation					
Parameters	DJMI	FTSE	JKI	KMI	MSCI
A	0.0003	-0.0002	-0.0001	0.0003	0.0002
p-value	0.0909	0.4765	0.7705	0.3586	0.4243
B	0.1655	0.1522	-0.0287	0.1654	-0.0524
p-value	0.0000	0.0000	0.3542	0.0000	0.1309
Significant at $p < 0.01$					
Variance Equation					
Parameters	DJMI	FTSE	JKI	KMI	MSCI
θ_0	-0.6021	-0.5404	-0.1279	-0.8529	-0.9223
p-value	0.0000	0.0000	0.0000	0.0000	0.0000
ω	0.1496	0.2012	0.0423	0.1290	0.2191
p-value	0.0000	0.0000	0.0002	0.0000	0.0000
θ_1	-0.1751	-0.1353	-0.0660	-0.1861	-0.0730
p-value	0.0000	0.0000	0.0000	0.0000	0.0000
φ	0.9512	0.9581	0.9892	0.9153	0.9204
p-value	0.0000	0.0000	0.0000	0.0000	0.0000
Significant at $p < 0.01$ level					
Summery Statistics					
	DJMI	FTSE	JKI	KMI	MSCI
Adjusted R-squared	0.0229	0.0212	-0.0021	0.0169	-0.0016
Durbin-Watson Test	2.0121	1.9772	1.9444	2.0398	1.9335
Diagnostic Test					
	DJMI	FTSE	JKI	KMI	MSCI
AIC	-7.2413	-6.5471	-6.0137	-6.1296	-6.6621
SIC	-7.2132	-6.5191	-5.9856	-6.1015	-6.6340
H-Q C	-7.2307	-6.5365	-6.0030	-6.1190	-6.6515

Static Spillover Analysis

ADCC-GARCH model is used to test and measure the volatility spillover for the returns of Islamic indices. Further this test is used to visualize stylized facts such as asymmetric volatility, volatility clustering, correlation and time variation in conditional volatility in the stock returns.

Table 4 indicates that spillover index matrix in total for all the Islamic indices. In first panel we computed the forecast-error variance contribution of "i" market coming from "j" market innovation. The total directional connectedness are reported in a manner that a column sums "From" and on the other side column sum "To" reports the situation from all other to "i" and all others from "i". The total connectedness is reported in the table as "Total" which exists on the lower right corner of the matrix. On the other side, second panel indicates the net-pairwise directional spillovers. Positive values are shown as Net-Transmitters and the negative values are shown as net recipients in the net-pairwise directional spillovers total sum column. The value of total volatility spillovers is 8.5%. It is seen that the returns of MSCI global Islamic Index has great effect on the remaining Islamic indices returns variance with 19.1% by following the DJMI and FTSE Islamic Indices. Furthermore MSCI global Islamic Index contributes 9.5% on the forecasting variance of the DJMI Islamic index and 4.2% on the FTSE Islamic index. Moreover MSCI contributes 3.6% on the JKI Islamic Index and 1.8% on the Karachi Meezan Index. It is seen that transmission risk from DJMI Islamic index is highest than other. The JKI Islamic index has a nearest same like value of spillovers risk to DJMI Islamic index than other. The net recipient and transmitter of volatility spillovers information is shown by the net-pairwise directional index as computed in this study.

Table 4 indicates MSCI global Islamic Index and FTSE Islamic index are identified as shock net receivers and left are declared as shock net transmitters. Among net transmitters, JKI Islamic index shows the highest shocks to other Islamic indices, followed by DJMI and KMI Islamic indices. The MSCI global Islamic Index is the highest shocks receiver of shocks from other followed by FTSE Islamic index. The results show that DJMI and KMI Islamic indices markets are strongly transmitting the shocks to other market indices. However the MSCI global Islamic Index market is receiving shocks from others market indices spillovers.

It must be noted that KMI and DJMI Islamic indices markets good transmitter of shocks to others.

Table 4. Static Volatility Spillover Index

	MSCI	DJMI	FTSE	JKI	KMI	From
MSCI	93.9	1.3	2.6	1.4	0.8	6.1
DJMI	9.5	86.5	0.9	2.3	0.7	13.5
FTSE	4.2	0.8	94	0.5	0.5	6
JKI	3.6	4.6	2.5	88	1.4	12
KMI	1.8	0.6	2.1	0.3	95.1	4.9
To	19.1	7.3	8.1	4.6	3.4	42.5
All	113	93.8	102.1	92.5	98.5	8.50%

	MSCI	DJMI	FTSE	JKI	KMI	Net	Conclusions
MSCI	0	-8.2	-1.6	-2.2	-1	-13	Net-Recipient
DJMI	8.2	0	0.1	-2.3	0.1	6.1	Net-Transmitter
FTSE	1.6	-0.1	0	-2	-1.6	-2.1	Net-Recipient
JKI	2.2	2.3	2	0	1.1	7.6	Net-Transmitter
KMI	1	-0.1	1.6	-1.1	0	1.4	Net-Transmitter

Rolling Window Analysis

Table 4 indicates that the static spillover index is reflected with only one key point which highlights the constant relationship between the considered Islamic indices of the stock markets during the sample period. In short, static spillovers index may be overlooked the volatility and price jumps that are caused by financial and economics events.

We plotted 200-day rolling sample window of total volatility spillover and use predictive horizon of 10 days for underlying decomposition as reflected in Figure 3. The whole sample of this study is divided into five sub periods. The inspection of this study indicates the time varying of total spillover index and in the range of total spillover index is between 17% and 33% in 2014 and in 2017. The main cause of this variation in the total spillover index is different sub period crises in the sample period (see sub-periods 1, 2, 3, 4 and 5) such as Cyprus bailout, European stock market collapse, Demonetization, Oil Price Market Shocks, election year in Pakistan and US presidential election. Such crises provides a clear prove and the assist to strengthen the financial contagion. On the other hand the index of volatility spillover has a decreasing trend during 2016 and 2017, respectively (see sub-period 4 and 5) due to demonetization and surgical strikes in Pakistan. These consequences show an increasing trend in the portfolio diversification. The speculators and portfolio managers should have a comprehensive study about the dynamic macroeconomic factors and the effect of various crisis periods in developing and managing the risky portfolios and assets allocation. The spillover index is the best parameter to have an inside about the impression of various sentiments on the stock indices across the stock markets.

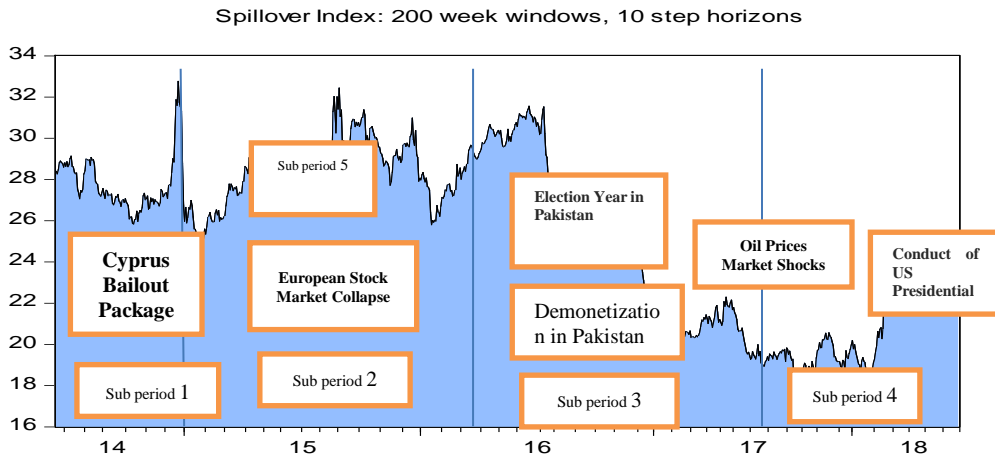


Figure 2: Spill Over Index for Sub Periods

For each Islamic indices stock market, Figure 2 shows the dynamic growth of net volatility spillover index. An inspection of Figure 3 indicates MSCI and FTSE are net receivers of the volatility shocks and JKI is a net transmitter of shocks to other markets with significant impact.

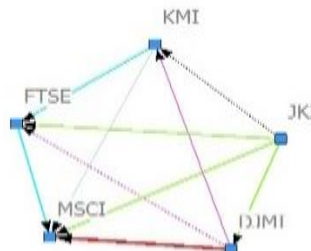


Figure 3: Net-Pairwise Directional Connectedness

Figure 3 indicates the net-pairwise directional connectedness of the considered Islamic indices stock markets. There are five nodes in this figure. Each node shows a single Islamic index stock market. The arrow line color shows connectedness among considered Islamic indices stock market. The red color of arrow line shows the strongest net pairwise connectedness and the green color of arrow line shows the weakest net pairwise

connectedness among the considered Islamic indices stock market. Figure 3 indicates the connectedness of network in a directional manner for five sub-periods for gaining a full view of spillover risk among the said market.

A deep inside of Figure 3 indicates that DJMI and JKI Islamic indices are the net transmitters of shocks. However, the other Islamic indices are net receivers of the shocks. It is inferred from the results that the degree of this contribution differs across all the sub periods.

Conclusion

Results conclude that asymmetric behavior of the returns is reflected by the estimates of the EGARCH (1, 1). However the results of the ADCC-GARCH model show the asymmetric conditional correlations between the considered five Islamic market returns. Moreover, this study also found the significant risk spillovers between the Islamic indices. Further this study indicated that MSCI and FTSE Islamic indices are found net receivers of volatility shocks from the other indices. It is because both of these two markets have the capacity to behave with the inward information. JKI Islamic index is identified as net transmitter of volatility shock. Moreover, it has also enormous impact on other Islamic indices as well. The behavior regarding to net volatility spillovers may rupture in positive or in a negative direction for selected Islamic indexed markets. The risk spillover impact is sensitive to political and economic events and varies over time. Furthermore, we also concluded that the risk spillovers have intensified the impact throughout the sample period on the selected Islamic indices. These intensifications have large inferences in terms of downside risk and investment diversification for speculators and portfolio managers in developing the risk managed portfolios and assets allocation. Our results are in line with the results of Diebold and Yilmaz (2012, 2014, 2016) and Mensi et al (2018), However There is a need of revision of macroeconomic fundamentals and financial reforms regarding the Islamic financial system and composition of Islamic indices to stabilities the mechanism for the purposes in such a manner which can absorb the shock and volatility spillover to reduce the investors' risk in managing the portfolios. However the network connectedness regarding to the transmission and net receiving of the volatility shocks may provide a guiding instrument to the policymakers in identification and evaluation of economic and trade policies.

References

- Adams, M., Andersson, J., Andersson, L.F. & Lindmark, M. (2009). Commercial banking, insurance and economic growth in Sweden between 1830 and 1998. *Accounting, Business & Financial History*, 19, 21-38.
- Ahmad, W., Sehgal, S., & Bhanumurthy, N. R. (2013). Eurozone crisis and BRIICS stock markets: contagion or market interdependence? *Economic Modelling*, 33, 209-225.
- Diebold, F. X. and K. Yilmaz (2009). Measuring financial asset return and volatility spillovers, Diebold, F. X., & Yilmaz, K. (2012). Better to give than to receive: Predictive directional measurement of volatility spillovers. *International Journal of Forecasting*, 28(1), 57-66.
- Diebold, F. X., & Yilmaz, K. (2016). Trans-Atlantic equity volatility connectedness: US and European financial institutions, 2004–2014. *Journal of Financial Econometrics*, 14(1), 81-127.
- Diebold, F.X. and Yilmaz, K. (2014). On the Network Topology of Variance Decompositions: Measuring the Connectedness of Financial Firms. *Journal of Econometrics*, 182, 119-134.
- Fernández-Rodríguez, F., Gómez-Puig, M., & Sosvilla-Rivero, S. (2015). Volatility spillovers in EMU sovereign bond markets. *International Review of Economics & Finance*, 39, 337-352.
- MacDonald, R., Sogiakas, V., & Tsopanakis, A. (2018). Volatility co-movements and spillover effects within the Eurozone economies: A multivariate GARCH approach using the financial stress index. *Journal of International Financial Markets, Institutions and Money*, 52, 17-36.
- Manopimoke, P., Prukumpai, S., & Sethapramote, Y. (2018). Dynamic Connectedness in Emerging Asian Equity Markets. *In Banking and Finance Issues in Emerging Markets (pp. 51-84)*. Emerald Publishing Limited.
- Mensi, W., Boubaker, F. Z., Al-Yahyaee, K. H., & Kang, S. H. (2018). Dynamic volatility spillovers and connectedness between global, regional, and GIPSI stock markets. *Finance Research Letters*, 25, 230-238.
- Mensi, W., Hammoudeh, S., Al-Jarrah, I. M. W., Sensoy, A., & Kang, S. H. (2017). Dynamic risk spillovers between gold, oil prices and conventional, sustainability and Islamic equity aggregates and sectors with portfolio implications. *Energy Economics*, 67, 454-475.
- Nelson, D. B. (1991). Conditional heteroskedasticity in asset returns: A new approach. *Econometrica: Journal of the Econometric Society*, 347-370.
- Wang. L., 2016. Causal Relationship and Volatility Spillover between Chinese CSI 300 Index and Index Futures. Economics Department, University of North Carolina at Chapel Hill.
- Yang, J. Y., Lee, S. H., & Yeo, I. S. (2017). Long and Short-term Volatility Co-movements in the East Asian Stock. *Applied Economics and Finance*, 4(3), 14-29.