



# EFFECT OF SUBPRIME CRISIS ON CO-MOVEMENT BEHAVIOR OF ISLAMIC AND CONVENTIONAL STOCK

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## ABSTRACT

This paper attempts to explore the impact of the global financial crisis, generally named as Subprime crisis, on the degree of integration between conventional and Islamic stock markets. For his purpose, index data (both Islamic and Conventional indexes) from five countries (USA, UK, Canada, Japan and Indonesia) are used. The result from Engle Granger co-integration test pointed that, the financial crisis affected the integration between Islamic and conventional stock market only in Canada and Indonesia, whilst no clear effect could be found on the rest of the countries. On the other hand, the results of Granger Causality presented variations on the causality relationship in each country.

**Keywords:** Co-integration, Causality, Islamic stock market, Conventional stock market.

**JEL-Classification:** G13, G14, G15

## SUBPRIME KRİZİNİN İSLAMİ VE GELENEKSEL HİSSE SENEDİ PİYASALARININ BİRLİKTE HAREKET ETME DAVRANIŞINA ETKİSİ

### ÖZET

Bu çalışma, küresel finansal krizin, genel isimlendirmeye Subprime krizinin, İslami ve geleneksel hisse senedi piyasalarının entegrasyon derecesi üzerindeki etkisini araştırmaktadır. Bu amaçla, beş ülkenin (ABD, UK, Kanada, Japonya ve Endonezya) endeks verileri (İslami ve Geleneksel endeksler) kullanılmıştır. Engle Granger eşbütünleşme testi, küresel finansal krizin sadece Kanada ve Endonezya’da İslami ve geleneksel hisse senedi piyasalarının entegrasyonunu etkilediğini gösterirken; geri kalan ülkelere ilişkin kesin bir etki bulunamamıştır. Diğer taraftan, Granger nedensellik testi sonuçları her ülkede nedensellik ilişkisinde değişiklik olduğunu göstermiştir.

**Anahtar Kelimeler:** Eşbütünleşme, Nedensellik, İslami hisse senedi piyasaları, Geleneksel hisse senedi piyasaları

## 1. INTRODUCTION

The co-movement between various financial markets is a crucial subject in international financial integration. It has strong effects on financial stability. (Kiviaho, Nikkinen, Piljak, & Rothovius, 2014). Moreover, financial integration among economies helps to improve their capacity to absorb shocks and foster development. On the other hand, the cross-border



financial contagion may be found in the increased and strengthened financial linkages which are available in the domain of the rising capital mobility (Yu, Fung, & Tam, 2010).

According to the modern portfolio theory, besides integration, co-movement evaluation is a vital analysis for the investors who are expecting benefits from the well-diversified portfolio. In the same manner Forbes & Rigobon (2002) argued that, co-movement and integration are important issues in the international portfolio diversification literature since they have important effects on asset allocation management. On the other hand, the co-movement relationship of stock returns is subject to change over time, such that the researchers continue to examine its dynamics and it has become more attractive to conduct research in this area. (Kiviahio et al., 2014)

Kim, et al., (2006) stated that general perception of the complex inter-relationships in different financial markets can be embodied by financial market integration. In contrast, specific concept is co-movement among the financial markets if investors want to consider the nature and extent of interdependencies across asset returns. Therefore, co-movement relation between financial markets can be an evidence of financial integration (see, e.g., Bekaert & Harvey, 1995; Piljak, 2013). In order to explore the degree of financial market integration, in this study the co-movement relation among financial markets will be examined.

On the other hand, the Islamic stock markets have become a fundamental part of the international stock markets, and moreover, Islamic finance has been evolved to become an integral part of the global financial system. As the international financial integration starts increasing and strengthening, Islamic stock markets have not only attracted the Muslims but also the non-Muslims investors who desire invest in socially responsible portfolios. As a result, several financial products have been introduced, one of them is the Islamic indexes (like Dow Jones Islamic Market Index (DJMI) and FTSE Global Islamic Index Series). Because of the morality of the Islamic financial system, the products seem to be more attractive to reinsure investors, stabilize financial systems and help to avoid future financial downturns (Jawadi, et al., 2014)

In view of rapid development of Islamic finance, this paper tries to investigate and compare the effect of 2007-2008 financial crisis on both Islamic and conventional stock indexes. Total of five countries, which have both Islamic stock index and conventional stock index, are examined in this study. These countries are USA, UK, Canada, Japan and Indonesia. Specifically, co-movement and integration between Islamic and conventional stock markets will be analyzed by the use of Islamic and conventional indexes.

The analysis in this paper will consist of following tests. The first one is Dikey Fuller and unit root test to examine the stationary of the data and to investigate the integration of indexes. Moreover, the Engel Granger and Granger Causality tests are used to test the co-movement relationship between indexes.

This paper is divided into 4 sections. The first section is the introduction; the second section is review of the literature. Section 3 describes the methodology, and hence, section 4 is the conclusion.



## 2. LITERATURE REVIEW

Enormous growth of the Islamic finance for the last a few decades, Muslims and non-Muslims get more interested in the Islamic capital markets. Despite the rising interest, the empirical studies about Islamic finance are scarce, especially on the subject of the co-movement and integration among stock markets. For instance, various previous studies have investigated the effects of financial crisis and relationship among the stock markets, but there have been, to some extent, a few studies tackling the issue of the co-movement and integration of Islamic stock indexes and their conventional counterparts.

Several studies documented the co-movement and integration of financial markets for pre-crisis period (Kasa, 1992; Roca, 1998; In, et.al., 2002; Bonfiglioli and Favero, 2005). These studies uncovered relation for both developed and developing markets that any dramatic action in one equity market would have an effect on another market.

Similar findings were also presented in the articles for post-crisis periods. Among these studies, Uddin et al., (2013) studied the strength of co-movement relation between Germany markets and international stock markets (US, Canada, Japan, Australia) for 1992-2013 period. The findings pointed that there were co-movements at higher frequencies during 2007-2008 global crisis, however at the different frequency levels, there was a variation in the co-movements of the markets.

In same manner, Gupta and Guidi (2012) explored the impact of financial crisis on the relationship between the stock market of India and three Asian markets (Japan, Hong Kong and Singapore). They found the integration between the mentioned stock markets rose in crisis period, however such increase in integration was not permanent. Kenourgios & Samitas (2011) stated that the financial crisis has influenced the integration of markets from Balkans (five countries), the USA and three European markets. The long-run co-integration is documented between markets; moreover, during the crisis period, the dependence of stock markets was stronger. Likewise, Samarakoon (2011) stated the co-movement and contagion between stock markets during the 2008–2009 financial crisis for 62 emerging and frontier markets. The results suggested the existence of bi-directional relationship and contagion between the emerging markets and USA market. Also, Kassim, et al. (2009) found that during the crisis period, the integration between stock markets may be higher. Neaime (2012) found that the markets that are exposed to the international financial crisis have strong relations with the developed markets (Egypt, UAE, Kuwait, Jordan and Morocco). In contrast, Saudi Arabia and Tunisia markets were not highly affected by the crisis as these markets have a little integration and not fully linked to the global markets.

On the other hand, some studies attempt to investigate the effect of the 2007 global financial crisis on the integration of the Islamic stock markets. Majid & Musnadi (2014) found co-movement and integration among the conventional stock markets during-crisis period, while the co-movement and integration among the Islamic stock markets existed in the pre-crisis period. Also, Albaity & Mudor (2012) have examined the difference of returns, the short dynamics and the long run relationship of Islamic indices in comparison with the conventional markets. The researchers found that the co-integration in the Islamic indices exists in the pre-crisis and post crisis periods; however, there is no co-integration in the conventional indices in the sub-period. In their study, Charles, et al., (2010) tried to discuss co-movement and integration of Islamic indices; they found that during the crisis, both conventional and Islamic



indexes had similar changes to some extent. However, in the other periods, the variances were not alike, Islamic indexes showed more instability than the conventional ones.

With divergence in the result of the previous studies, Kassim & Kamil (2012) studied the impact of recent global crisis on integration and co-movements of Islamic stock markets. Interestingly, they have never found the co-integration among the Islamic stock markets in pre and during crisis. Finally, the study of Kassim (2013) studied integration of 7 Islamic stock markets by using Auto-Regressive Distributed Lag approach and the multi-variate Vector Error Correction Mechanism. The results of the research pointed that the integration level of the Islamic stock market was exposed to many changes due to the global financial crisis. The level of development and the geographical factors, during the times of crisis and non-crisis, affected on the Islamic stock markets integration.

With the above mentioned studies, this paper will add more to the literature on (i) conducting a study of how the co-movement and integration of Islamic stock markets and conventional counterpart is affected by the 2007-2008 global financial crisis, (ii) focusing on different international regions including Western countries and one of emerging countries, (iii) The outcomes of this study may provide decision makers and investors with a vision for investment. More specifically, the outcome of the study focuses on the limits of benefits that the investors attain within investing in the Islamic stock market by accounting the trend of co-movement and the degree of integration of stock returns in designing international portfolios.

### 3. Data and Methodology

In this study 10 indices from 5 countries, USA, UK, Canada, Japan, and Indonesia, are considered, and the indices are presented in Table 1. The monthly data of closing prices for indexes are utilized in the analyses. The analysis carried out by covering 180 months from January 2000 through December 2014. The closing price with local currency of every country is considered to avoid the effects of the currency changes. It is worth to note that the monthly returns, for each Islamic and conventional index, are computed by using the following logarithm of stock prices:

$$R_{i,t} = \log(p_{i,t} / p_{i,t-1})$$

where:  $R_{i,t}$  : denotes stock returns of index  $i$  during the month  $t$ ,  $P_{i,t}$  and is the price of the index  $i$  during the month  $t$  and,  $p_{i,t-1}$  is the price of the index  $i$  during the month  $t-1$

**Table 1 Selected indices for the study**

Country	Name of the index	Symbol	Type
USA	Dow Jones Islamic Market U.S. Index	DJIMUS	Islamic
	S&P 500 Composite Index	S&PCOMP	Conventional
UK	Dow Jones Islamic Market U.K. Index	DJIMUK	Islamic
	FTSE 100 Index	FTSE100	Conventional
Canada	Dow Jones Islamic Market Canada Index	DJIMCN	Islamic
	S&P/TSX Composite Index	S&P/TSX	Conventional
Japan	Dow Jones Islamic Market Japan Index	DJIMJAP	Islamic
	Nikkei 225 stock average index	NIKKEI 225	Conventional
Indonesia	Jakarta Islamic Index	JII	Islamic
	Jakarta Composite Index	JKSE	Conventional



According to Hengchao & Hamid (2015), Moeljadi (2012), Abdul Karim, et al. (2011), the date of the US subprime crisis was July 26, 2007. In order to study, integration among the stock markets covered in this study, the whole sample of 2000-2014 divided into three periods; namely the pre-crisis period (January 2000 to July 2007) and during crisis period (August 2007 to December 2008) and after crisis period from January 2009 to December 2014. Sub-periods are determined by following Abdul Kareem et al., (2010); Moeljadi, (2012) and Arouri & Jawadi (2009).

The analysis in this paper will consist of following tests. The Dikey Fuller unit Root analysis has been employed in order to test the stationarity behavior in data set. Moreover, the Engel Granger co-integration test is used, which common one in studying the linkage among stock markets, that it examines whether the indices are theoretically linked or not. In addition, Granger causality test is used to test the co-movement relationship between each pair of stock indices.

#### 4. EMPIRICAL FINDINGS

Table 2 provides summary statistics for the stock returns for 10 indexes covered in the sample. The descriptive analysis shows that during the pre-crisis period, only conventional index of Canada and both indexes of Indonesia presented positive average monthly returns. On the other hand, during the crisis all indexes, without any exception, realized negative average monthly returns. In contrast, after crisis the picture overturned, all indexes witnessed positive average returns. This explains the obvious effect of the financial crisis on all selected markets.

According to standard deviations, all indexes (Islamic and conventional) showed more volatility during crisis than per-crisis period. However, after crisis all indexes volatility witnessed a decline compared to during crisis period. When the volatilities of the indexes are compared within Islamic and conventional counterparts, for most of the cases volatility in Islamic indexes were higher than conventional counterparts.

**Table 2 Descriptive Statistics**

Period	Type of index	Conventional Index					Islamic stock Index				
	Variables	S&P/TSX	FTSE 100	S&P COMP	NIKKEI 225	JKSE	DJIMCN	DJIMUK	DJIMUS	DJIMJAP	JII
Pre-Crisis	Mean	0,0027	-0,0020	-0,0011	-0,0021	0,0082	-0,0007	-0,0033	-0,0023	-0,0047	0,0142
	Max.	0,1027	0,0652	0,1052	0,1150	0,1588	0,2043	0,0945	0,1440	0,1146	0,1828
	Min.	-0,3353	-0,1996	-0,2100	-0,2800	-0,6201	-0,2848	-0,1755	-0,1938	-0,1519	-0,6267
	Std. Dev	0,0549	0,0437	0,0447	0,0607	0,0932	0,0814	0,0443	0,0524	0,0536	0,0988
	Skewness	-2,8067	-1,6415	-1,2158	-1,0958	-3,4273	-0,8124	-0,8482	-0,7231	-0,4839	-2,9866
	Kurtosis	15,1404	4,4170	4,5365	3,7341	22,0192	1,9418	2,2548	1,8573	0,2049	18,7973
During Crisis	Mean	-0,0217	-0,0184	-0,0257	-0,0341	-0,0249	-0,0162	-0,0092	-0,0189	-0,0243	-0,0254
	Max.	0,0692	0,0907	0,1066	0,0877	0,1272	0,1430	0,1144	0,1015	0,0654	0,1709
	Min.	-0,1702	-0,1148	-0,1677	-0,2455	-0,2618	-0,2806	-0,1039	-0,1522	-0,1503	-0,2837
	Std. Dev	0,0720	0,0580	0,0697	0,0773	0,0955	0,1106	0,0572	0,0661	0,0588	0,1107
	Skewness	-0,9488	-0,1088	-0,4847	-1,1310	-0,6880	-0,5782	0,3160	-0,5229	-0,3783	-0,6231
	Kurtosis	-0,0380	-0,6892	0,5189	2,5586	1,2721	0,4950	0,2753	0,1172	0,0683	0,8735
After Crisis	Mean	0,0078	0,0067	0,0129	0,0115	0,0207	0,0055	0,0061	0,0129	0,0064	0,0181
	Max.	0,1632	0,1231	0,1573	0,1472	0,1832	0,2275	0,1530	0,1438	0,0999	0,1781
	Min.	-0,1141	-0,1108	-0,1510	-0,1217	-0,1283	-0,2046	-0,1419	-0,1314	-0,1173	-0,1270
	Std. Dev	0,0425	0,0440	0,0512	0,0602	0,0584	0,0676	0,0530	0,0491	0,0430	0,0594
	Skewness	0,2301	-0,1765	-0,5157	-0,1473	0,2025	0,2435	-0,1844	-0,4328	-0,5452	0,3153
	Kurtosis	3,0712	0,5041	1,5109	-0,2665	1,2404	2,1904	1,0242	1,0443	0,5385	1,1590



#### 4.1. Unit Root test

In order to detect the integration, the Augmented Dickey–Fuller (ADF) test unit root test (Dickey & Fuller, 1979) is employed. The results of ADF unit root test in Table 3 suggest that the null hypothesis of a unit root is not rejected for all indices in log levels that means all the selected stock price indices in their natural log levels are non-stationary series. However, in first difference form these stock price indices become stationary at the 1% significance level. Thus, this representative stock price indicators are first-order integrated series.

**Table 3 Unit Root test results for series of study**

Country	Variables	Augmented Dickey-Fuller test statistic					
		Pre-Crisis		During Crisis		After Crisis	
		Level	1st Diff	Level	1st Diff	Level	1st Diff
Canada	Log(DJIMCN)	-1.232	-8.923**	-1.705	-6.310**	-3.015*	-8.717**
	Log(S&P/TSX )	0.147	-8.011**	-1.759	-5.223**	-1.012	-7.229**
UK	Log(DJIMUK)	-1.715	-10.678**	-1.470	-6.991**	-2.392	-8.833**
	Log(FTSE100)	-1.296	-10.338**	-1.617	-6.134**	-1.274	-7.588**
USA	Log(DJIMUS)	-1.614	-9.665**	-1.313	-5.930**	-0.287	-7.719**
	Log(S&PCOMP)	-1.034	-9.055**	-1.562	-5.852**	-0.201	-7.630**
Japan	Log(DJIMJAP)	-2.421	-8.616**	-1.767	-5.379**	-1.106	-8.039**
	Log(NIKKEI 225)	-1.173	-8.342**	-2.242	-5.764**	0.096	-5.778**
Indonesia	Log(JII)	0.831	-8.237**	-1.493	-4.597**	-1.592	-6.571**
	Log(JKSE)	1.372	-7.674**	-1.138	-4.395**	-1.297	-6.316**
Average	Log (Islamic)	-1.406	-9.048**	-1.360	-5.826**	-1.264	-8.144**
	Log (Conventional)	-0.277	-7.916**	-2.034	-4.984**	-0.040	-6.299**

□□ Significance at the 1% level. □ Significance at the 5% level.

#### 4.2. Engle-Granger Co-integration Test

The co-integration test is one of the important tests, (which is utilized in several studies like Kanas,1988; Garcia-Pascual, 2003; Phengpis and Apilado, 2004; Kasa, 1992; Choudhary,1994;Arshanapalli and Doukas,1993; Gilmore and McManus, 2002; and Corhay et al.,1993), in studying the linkage among stock markets, that it examines whether the indices are theoretically linked or not. If the indices are co-integrated each other, it means that there is a co-movement among these stock markets in the long term reaching the equilibrium, even they maybe move differently in the short term (Park & Masih, 2015).

Table 4 shows the effect of the crisis on co-movement between closing share price series for Islamic indices and conventional indices, pre-crisis, during crisis and after crisis in each country and in average of all chosen countries. The results of Engle- Granger cointegration test indicate that most of the test P-values are greater than 0.05 in tree periods, except in Canada and Indonesia. The Islamic and conventional Canadian indexes were integrated during the crisis, while the two indexes were not cointegrated before crisis period and after crisis period. In opposite, while there was no integration during crisis period in Indonesia, there was integration in both before and after crisis periods. In sum, it can be said that, the 2007-2008 financial crisis affected the integration between Islamic and conventional stock markets in only Canada and Indonesia, whilst there was no any clear effect on the rest of the chosen countries.



**Table 4 Engle- Granger Co-integration test results.**

Country	Dependent	Pre-Crisis		During Crisis		After Crisis	
		tau-statistic	Prob.*	tau-statistic	Prob.*	tau-statistic	Prob.*
Canada	Log(DJIMCN)	-2.41	0.3274	<b>-4.00</b>	<b>0.0144</b>	-2.59	0.2567
	Log(S&P/TSX )	-1.06	0.8906	<b>-3.78</b>	<b>0.0247</b>	0.25	0.9938
UK	Log(DJIMUK)	-2.76	0.1893	-2.35	0.3607	-2.49	0.2977
	Log(FTSE100)	-2.64	0.2329	-2.42	0.3254	-2.02	0.5243
USA	Log(DJIMUS)	-2.06	0.4988	-1.51	0.7595	-2.14	0.4630
	Log(S&PCOMP)	-1.63	0.7097	-1.74	0.6607	-2.12	0.4723
Japan	Log(DJIMJAP)	-2.56	0.2613	-0.59	0.9554	-2.93	0.1491
	Log(NIKKEI 225)	-1.83	0.6137	-0.89	0.9195	-2.56	0.2725
Indonesia	Log(JII)	<b>-7.97</b>	<b>0.0000</b>	-2.63	0.2421	<b>-3.81</b>	<b>0.0242</b>
	Log(JKSE)	<b>-7.63</b>	<b>0.0000</b>	-0.45	0.9666	<b>-3.62</b>	<b>0.0372</b>
Average	Log (Islamic)	-1.74	0.6604	-2.01	0.5280	-3.09	0.1103
	Log (Normal)	-0.90	0.9181	-2.31	0.3799	-1.98	0.5440

\*Mackinnon (1996) p-values Significance at the 5% level.

- Notes: p-values smaller than 5% are indicated in bold

### 4.3. Granger Causality

The previous results do not show clear evidence about significant cointegration between stock markets. In order to clarify the relation between stock markets, Égert & Kočenda, (2007) propose to utilize Granger Causality. The Granger Causality test can be used to identify the direction of relationship among these markets. Granger Causality is tested at the first two lags for each pair of stock indices in each country.

Table 5 shows the results of Granger Causality; it can be noted that, before crisis period, the Canadian conventional index (S&P/TSX ) causes the Islamic one (DJIMCN). While a strong bidirectional causality is recorded between two indexes in Canada during financial crisis period, which means Islamic and conventional stock markets affect each other.

We also found there is bidirectional causality in after crisis period between both UK indexes (DJIMUK) and (FTSE100); however, there is no Granger causality recorded in USA indexes in any of three periods. For Japan, the direction of strongly causality is from conventional index (NIKKEI 225) to Islamic one (DJIMJAP) during pre-crisis, while after crisis a two-way Granger Causality exists between the former indexes. In Indonesia, the direction of causality is from (JII) to (JKSE); however, there is no reverse causation from (JKSE) to (JII) stock index.

Finally, regarding the average of the stock markets, a two-way Granger Causality exists in both pre-crisis and after period which means Islamic and conventional stock markets affect each other; however, during crisis period, the Granger Causality direction goes from conventional toward Islamic indexes.

**Table 5 Granger Causality results (F-statistic)**

Country	Granger Causality	Granger Causality Test F-Statistic					
		Before Crisis		Crisis		After Crisis	
		Lag1	Lag2	Lag1	Lag2	Lag1	Lag2
Canada	DJIMCN does not Granger Cause S&P/TSX	1.246	1.107	2.592	<b>5.218**</b>	0.264	1.039
	S&P/TSX does not Granger Cause DJIMCN	2.306	<b>3.313*</b>	<b>12.124**</b>	<b>7.631**</b>	0.056	0.905
UK	DJIMUK does not Granger Cause FTSE100	0.472	0.464	0.003	0.244	<b>6.474**</b>	<b>4.373*</b>
	FTSE100 does not Granger Cause DJIMUK	0.408	0.960	0.186	1.113	<b>8.147**</b>	<b>3.766*</b>
USA	DJIMUS does not Granger Cause S&PCOMP	0.279	0.245	0.705	0.131	0.763	0.240
	S&PCOMP does not Granger Cause DJIMUS	0.775	0.512	0.494	0.066	1.186	0.410
Japan	DJIMJAP does not Granger Cause NIKKEI 225	2.426	1.355	0.323	0.289	<b>5.359**</b>	<b>4.692*</b>
	NIKKEI 225 does not Granger Cause DJIMJAP	<b>5.619*</b>	<b>3.895*</b>	1.102	0.343	<b>8.952**</b>	<b>4.145*</b>
Indonesia	JII does not Granger Cause JKSE	<b>11.056**</b>	<b>5.562**</b>	0.244	1.320	0.241	0.273
	JKSE does not Granger Cause JII	0.095	0.477	0.194	0.354	1.277	0.821
Average	Islamic does not Granger Cause Normal	<b>4.302*</b>	2.044	0.029	2.124	<b>6.361*</b>	<b>5.209*</b>
	Normal does not Granger Cause Islamic	<b>4.946*</b>	<b>3.625*</b>	0.015	<b>5.202**</b>	<b>7.906**</b>	<b>5.137*</b>

□ Significance at the 1% level. □ Significance at the 5% level.

## 5. CONCLUSION

This paper attempts to investigate the impact of financial crisis on the co-movement and integration of both Islamic and conventional stock market. The study is conducted on five Islamic indices and five conventional indices in UAS, UK, Canada, Japan and Indonesia.

Considering the stationary of time series, the Augmented Dickey-Fuller (ADF) analysis shows that there is no stationary in log levels, whereas the results support the stationary of series log first differences at 0.05 level. Thus, the unit root test representatives that, stock price indicators are first-order integrated series.

The result from Engle Granger pointed that the 2007-2008 financial crisis affected the integration between Islamic and conventional stock market in only Canada and Indonesia, whilst there was no any clear effect on the rest of the chosen countries.

According to the results of Granger Causality, conspicuous variation was in the impact of the crisis on the Causality relationship (pre-crisis, during crisis and after crisis) in each country, while before crisis period, the Canadian conventional index (S&P/TSX ) causes the Islamic one (DJIMCN). A strong bidirectional causality is recorded between two indexes in Canada during financial crisis period, which means Islamic and conventional stock markets affect each other. We also found there is bidirectional causality in after crisis period between both UK indexes (DJIMUK) and (FTSE100); however, there is no Granger causality recorded in USA indexes in any of three periods. For Japan, the direction of strongly causality is from conventional index (NIKKEI 225) to Islamic one (DJIMJAP) during pre-crisis, while after crisis, a two-way Granger Causality exists between the former indexes. In Indonesia, the





direction of causality is from (JII) to (JKSE); however, there is no reverse causation from (JKSE) to (JII) stock index. Finally, regarding the average of the stock markets, a two-way Granger Causality exists in both pre-crisis and after periods which means Islamic and conventional stock markets affect each other; however, during crisis period the Granger Causality direction goes from conventional toward Islamic indexes. In sum, our study provides strong evidence of the benefits of portfolio diversification among Islamic and conventional stock markets.



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