

**Return performance, Cointegration and short run  
dynamics of Islamic and non-Islamic indices:  
evidence from the US and Malaysia during the  
subprime crisis**

**Mohamed Shikh Albaity**

Department of Banking and Finance. Faculty of Business and Accountancy  
University of Malaya. Kuala Lumpur. Malaysia

[m\\_baity@um.edu.my](mailto:m_baity@um.edu.my)

**Hamdia Mudor**

Faculty of Communication Sciences  
Prince of Songkla University  
Pattani Campus

Email: [anandia@hotmail.com](mailto:anandia@hotmail.com)

## **Abstract**

This paper studies the returns difference, the long run relationship, and the short run dynamics of Islamic indices compared to non-Islamic indices in three sub periods as well as the overall period. The sub periods studied are the pre-, post and during the recent subprime crisis. The results indicate that there is no significant difference in mean returns between the Islamic indices as well as their counterparts. In terms of long run relationship or cointegration it is found that the Islamic indices were cointegrated in the pre-crisis as well as post crisis period. On the other hand the conventional indices were not cointegrated in any of the sub periods. The short run causality between the Islamic indices is a unidirectional from DJIMI towards HJ in all the sub-periods. Similarly, the conventional indices have a unidirectional causality running from DJINA towards KLCI except during the financial crisis where a bidirectional relationship exists. The result here suggests that the screening criteria of Islamic indices eliminate doubtful stocks before they fail is not accurate. In other words, if the Islamic indices screening criteria have any benefit in identifying the failing stocks they would have at least minimized the effect of the financial crisis. Therefore, investing in Islamic indices has no superiority over the conventional index in terms of performance. However, Islamic investment might have the peace of mind some investors are looking for.

## **Resumen**

Este trabajo estudia las diferencias en rentabilidad, la relación a largo plazo, y las dinámicas a corto plazo de los índices islámicos en comparación con los no islámicos en tres subperíodos así como en la totalidad del período. Estos subperíodos se refieren a la reciente crisis “subprime” y a los momentos previos y posteriores. Los resultados muestran que no hay una diferencia significativa en la rentabilidad media entre los índices islámicos y los no islámicos. En cuanto a la relación a largo plazo o cointegración, encontramos que los índices islámicos fueron cointegrados tanto en el período de pre-crisis como en el de post-crisis. Por otra parte, los índices convencionales no fueron cointegrados en ninguno de los subperíodos. La causalidad a corto plazo entre los índices islámicos es unidireccional de DJIMI (Dow Jones Islamic Market Index) a HJ (FTSE Hijrah) en todos los subperíodos. De igual modo, los índices convencionales tienen una causalidad unidireccional que va de DJINA (Dow Jones Industrial Average) a KLCI

(Kuala Lumpur Composite Index) excepto durante la crisis financiera, cuando la relación era bidireccional. El resultado aquí obtenido sugiere que los criterios de “screening” (filtros) por los cuales los índices islámicos eliminan aquellas acciones dudosas antes de que bajen no son precisos. En otras palabras, aunque los criterios de “screening” de los índices islámicos no sirven para identificar con exactitud las acciones que pueden bajar, al menos minimizan el efecto de la crisis financiera. Por lo tanto, invertir en índices islámicos no es mejor opción que la de los índices convencionales en términos de rentabilidad. No obstante, la inversión islámica podría proporcionar la tranquilidad que los inversores están buscando.

## 1. Introduction

Since the last decade or so information has become cheaper to acquire and use. One of the sectors in any economy that rely on information is the stock exchange. The information transmission from one market to another has become clear (Antonioni et al. 2003), Baur and Jung (2006), and Caporale, Pittis and Spagnolo (2006)). Studies investigating the information transmissions between developed as well as developing markets have increased since the last decade. According to Koutmos (1996) studies investigating the information, transmission in the first moment and second moment can be done based on returns and volatility respectively. Most of the earlier studies on the information transmission focused on the developed market especially US and Europe such as Koutmos (1996), Kasibhtla et al. (2006), Antonioni et al. (2003), Koutmos et al. (1993) and Baur et al. (2006). Few studies focused on the emerging markets such as Daly (2003), Lamba et al. (2001), Shachmurove (2005 and 2006), and Soydemir (2000).

Islamic investments are investments that follow the tenets of Islam. Therefore and investment which is restricted by the Islamic law is considered to be an Islamic investment. There has been much development in the conventional banking and finance to produce an Islamic counterpart, which will cater for Muslim population around the globe. One of these developments is the initiation of Islamic indices in many Muslim populous and non-Muslim populous countries alike. In US, Dow Jones Islamic Market Index (DJIMI) was introduced in 1999, and Kuala Lumpur Syariah Index (KLSI) introduced in 1999 however it was replaced by FTSE Bursa Malaysia Hijrah Shariah index (hereafter HJ) in 21 May 2007. The first market covered wide range of countries and stocks while the second market covers only local listed stocks. Many studies have been done on the performance of these markets against their conventional counterparts. However, only one study explored the volatility of few Islamic indices in the pre and during financial crisis (Karim, Kassim and Arip 2010). Therefore this paper adds to the current literature by investigating these two indices with different screening criteria and their counterpart indices.

### 1.1. Rationale of the study

Theoretically, the value of any investment is determined by the present value of the investment's expected future cash flows. Subsequently, a rational investor maximizes his utility by maximizing his wealth and minimizing risk. A rational investor who wants to maximize his utility will choose the highest possible return for a given level of risk that can be achieved by constructing a well-diversified portfolio.

This applies to both screened and non-screened investment. However, Rudd (1981), Teper

(1991), Johnson and Neave (1996), and Langbein and Posner (1980) argued that screened investment brings lower expected return than unscreened investment and might as well incur higher risk due to less diversification. In addition, besides having less diversified portfolio, screened investment is more expensive to administer and monitor than unscreened investment. For example, not all stocks listed on the stock exchanges are permissible for the Muslims to invest. Based on the above argument, it is expected that Islamic indices will yield lower returns, will be exposed to higher risk and will not be compensated for the extra risk incur by screening.

Following the work by Karim et al. (2010) that explores the effects of the current global crisis on Islamic indices in selected Islamic stock markets; in our paper we examine the stock returns in two Islamic stock market indices namely, DJIMI and FTSE Hijrah. This study is different from Karim et al. (2010) study in four folds. First, this study uses two different stock market indices while Karim et al. is studying five related markets namely Dow Jones Islamic indices for Malaysia, Indonesia, the USA, Japan and the UK. The difference between this study and Karim et al. is that the indices used by Karim, Kassim et al. (2010) uses the same criteria set by Dow Jones while this paper uses two indices which follows two different set of criteria. In other words, this study tracks two different criteria specific indices. Second difference is that Malaysian Islamic market index is rather small it contains around 1000 listed companies while DJIMI index contain more than double (2,510 as at 14 June 2011<sup>1</sup>) the listed companies. Third, FTSE Hijrah (hereafter HJ) is list of companies from Malaysia while DJIMI include local and international firms from different countries and regions (54 countries<sup>2</sup>). Forth, the Islamic stock indices in these two markets have distinctive screening criteria. Having different screening criteria might lead to difference in returns. Therefore, the first question of this study is whether there is a significant difference between Dow Jones Islamic Market Index (hereafter DJIMI) and FTSE Hijrah (hereafter HJ) as well as the non-Islamic indices Dow Jones Industrial average hereafter DJINA) and Kuala Lumpur Composite Index (hereafter KLCI).

Besides comparing their returns, we also examine the long term relationship between these indices. If these indices were found to be cointegrated or having long run equilibrium this means that any of them can predict the movement of the other. Therefore, since it is established that conventional indices tend to move together as markets in general do, can the same be said about the Islamic indices. In addition, the short run dynamics between the indices is investigated to find the direction of the causality. It has been argued that if two series are cointegrated this indicates that there is at least one short run causality between the series.

---

<sup>1</sup> <http://finance.yahoo.com/news/Component-Changes-Made-to-Dow-pz-4041775327.html?x=0&.v=1>

<sup>2</sup> <http://press.djindexes.com/index.php/dow-jones-islamic-market-world-index-expands-to-include-12-new-countries/>

Therefore, this study aims at investigating the following questions. Is there any significant difference in returns between Islamic indices and their counterparts before, during, and after the financial crisis? Are the Islamic indices and their counterparts cointegrated? And is there any causality between Islamic and conventional indices?

## 2. Previous studies

Karim, Kassim et al. (2010) examined the effects of the current global crisis on the integration and co-movements of selected Islamic stock markets. Using time series techniques of cointegration they studied the period spanning from February 15, 2006 to December 31, 2008. The sample period was divided into two periods, namely the pre-crisis period February 15, 2006 to July 25, 2007 and during crisis period July 26, 2007-December 31, 2008. They concluded that there was no evidence of cointegration among the Islamic stock markets in both periods. Hence, they suggested that the 2007 subprime crisis did not have any impact on the long-run co-movements among the Islamic stock markets.

Kasa (1992) in investigating common stochastic trends in the equity markets of the U.S., Japan, England, Germany, and Canada monthly and quarterly data from January 1974 through August 1990 were used to test for cointegration. Results indicate the presence of a single cointegration equation among these countries' stock markets. Factor analysis result indicates that this trend is most important for Japanese stock market and least important for Canadian stock market. It was also found that the cointegration is evident between stock prices and their dividend yields.

In, Kim et al. (2002) investigated the dynamic linkages and interactions of Asian stock markets using a VAR model. They found that during the financial crisis the markets became more closely linked, with the exception of Malaysia. In addition, it was found that Singapore and Australia have increased linkages on the other Asian stock markets during the crisis. Finally they concluded that though the US market remained independent during the crisis, it maintained its ties with the Asian markets.

Manning (2002) in studying eight markets in south east Asia found that there are two cointegrating equations among these economies. Similarly, two cointegrating equations were found when the US market was included with the eight South East Asian markets. This indicates that these markets will converge and diverge and converge again in the long run leading to co-movement among these markets.

Ibrahim (2005) in investigating stock market linkages between the United States and three stock markets China, Hong Kong, and Taiwan, pre and post the 1997 Asian financial crisis from 1995 to December 2000 found bidirectional causality between the markets in the post-crisis period. In addition, fewer factors were found to be influencing stock returns post crisis, suggesting market co-movements after the financial crisis. Additionally, results also indicated that stock markets are more sensitive to international fluctuations in the post crisis period. This further strengthens the evidence that stock markets become more interrelated post the 1997 Asian financial crisis. Janakiramanan and Lamba (1998) examined the linkages between the stock markets in the Pacific-Basin region during the period from 1988 to 1996. It was found that the US stock market influences other stock markets in the Pacific-Basin except Indonesia. On the other hand, none of these markets have any significant influence on the US market. In addition, markets which are in the same region and economically close and/or with large numbers of cross-border listings exert significant influence over each other, with markets closing earlier in the day exerting greater influence over markets closing later in the day.

Majid and Kassim (2009) examined the impact of the current financial crisis on the long run relationship between Indonesia and Malaysia found that stock markets tend to show greater degree of integration or increased co-movements during the crisis period. This results in lesser benefit of diversification. Therefore, during the pre-crisis period, the diversification benefit across the emerging equity markets tend to diminish.

In addition, Majid, Meera et al. (2008) examined market cointegration among five selected ASEAN emerging markets and their relationship with the US and Japan. It was found that the ASEAN stock markets are going towards a greater integration either among themselves or with the US and Japan, particularly in the post-1997 financial turmoil. As for the causality between these stock markets with the US and Japan, it was found that Indonesia was relatively independent of both the US and Japan; Malaysia and Singapore were influenced by Japan US although Malaysia is influenced more by Japan than by the US; while the Philippines is more affected by the US than Japan. Thailand on the other hand, was independent of the US, but to some extent influenced by Japan.

Masih and Masih (1999) examined the long- and short-term relationships among international and Asian emerging stock markets with the focus of measuring the extent of how the Asian stock market fluctuates following intra-regional impacts. Globally, it was found that the US leads both the short- and long-term in other markets. In addition, there exist a significant short- and long-term relationship between the established OECD and the emerging Asian markets. Regionally, in Southeast Asia, the results suggest the leading role of Hong Kong and consistent with the 'contagion effect' hypothesis, Asian markets are explained mostly by their regional markets rather than developed markets.

Ng (2002) examined the linkages between the South–East Asian stock markets. There was not supporting evidence of cointegration among their markets. However, correlation analyses indicate that these stock markets are closely linked. The results also show that the stock market of Indonesia, the Philippines and Thailand had all become more closely linked with that of Singapore except Malaysia which start to be closely linked but this link fade away with time.

Mukherjee and Bose (2008) examined whether the Indian stock market co-moves with other markets in Asia and the United States. It was found that the U. S. indices do not co-move with Asian markets, while Japan is found to co-move with Asian markets. Bidirectional causation was found between the U. S. market and most of the major Asian markets. The United States, Japan lead The Indian stock return as well as other Asian markets. In addition, returns on the Indian market are seen to influence stock returns in major Asian markets.

Albaity and Ahmad (2008) provided new evidence on the risk and return performance of the Kuala Lumpur Syariah Index (KLSI) and the Kuala Lumpur Composite Index (KLCI). KLSI selects stocks based on screening criteria design by the Shariah supervisory board, and thus is different from its conventional counterpart, KLCI. Besides a significant short-run presence of bidirectional causality, the long-term equilibrium indicates that both indices move in together in the long run. This suggests that the movement in KLCI gives a good indication as to where KLSI will move in the short-run and long-run. Therefore, prediction of one based on the other is constructive.

### **3. Methodology**

#### *3.1. Unit Root, Cointegration and Causality*

One of the issues that many practitioners face in time series analysis is the problem of unit root. Cointegration refers to a linear combination of non stationary variables. As mentioned above, if a time series was taken in face value and regressed against another time series without taking into consideration the unit root problem, it leads to spurious regression. Spurious regression will tend to lead to misleading conclusion and may be misguided forecasting. This can be avoided by checking if the residual of the estimated regression is stationary. Put differently, if the residual of two time series regressed appears to be stationary; it means that the series are cointegrated. Therefore, if two variables



are cointegrated, they have a long-term relationship, or equilibrium between them. The theory of cointegration developed by Granger (1986) and explained by Engle and Granger (1987) deals with the subject of integrating short term dynamic with long-term relationship<sup>3</sup>. Generally, if two time series are integrated of any degree beyond zero I(q), it indicates that they are drifting together at approximately the same rate. Hence, they are said to be cointegrated. Cointegration can be shown in the following model

$$Y_t = \alpha + \beta X_t + u_t \quad 3.1$$

$$u_t = Y_t - \alpha - \beta X_t \quad 3.2$$

$$Y_t = \delta + \alpha Y_{t-1} + u_t \quad 3.3$$

where  $Y_t$  and  $X_t$  are any two time series variables,  $\alpha$  and  $\beta$  are coefficients and  $u_t$  is white noise error term, running unit root test it is concluded that both  $Y_t$  and  $X_t$  are non-stationary and hence they are stationary at the first difference or integrated of degree one I(1). Consequently, unit root test is employed on  $u_t$  if it is found stationary or integrated of degree zero or I(0), then it is concluded that although  $Y_t$  and  $X_t$  are individually integrated of degree 1, their linear combination in model 3.3 is integrated of degree zero. The test used is Johansen and Juselius (1990) maximum likelihood, which is based on Vector Autoregressive (VAR) approach. It commences with a general form of VAR, which is parameterized as a system of error correction mechanism, therefore it will consist of differenced lags as well as level lags of the series. According to Eun et al. (1999), the Johansen cointegration test following augmented Dickey-Fuller test in VAR system will be as follows:

$$Y_t = \alpha + \sum A_k Y_{t-k} - \beta + \varepsilon_t \quad 3.4$$

Where  $Y_t$  is an  $n \times 1$  vector and  $A_k$  is the estimated matrix. By subtracting  $Y_{t-1}$  from both sides, the following model will be obtained:

$$\Delta Y_t = \alpha + \sum_{k=1}^{p-1} \Gamma_k \Delta Y_{t-k} + \Gamma Y_{t-k} + \varepsilon_t \quad 3.5$$

Where

---

<sup>3</sup> Madala, 2003.

$$\Gamma = \sum_{k=1}^p A_{k-1} \cdot \Gamma_k = - \sum_{j=1}^k A_{j-1} \quad 3.6$$

The Johansen test of cointegration is focused on the rank of estimated matrix  $\Gamma$  and its characteristic roots. If  $\text{rank } \Gamma = 0$ , then there is no cointegration or no long-term relationship between variables. However, if  $\text{rank } \Gamma = r$  when  $r < n$ , where  $n$  represents the number of variables in the system, there exist  $r$  cointegrating vectors. Therefore, this will imply that  $Y_{t,k}$  is the error correction term, which reflects the equilibrium relationship. Subsequently, if there is only one cointegration equation, it means that there is only one long run equilibrium in the system.

The cointegration test applied here is that of Johansen and Juselius (1990). The existence of a cointegration relationship between two variables implies that there is at least one causal effect running from one variable to the other. However, the direction of the causality is not determined by the cointegration test. To determine the direction of the causation, the Granger causality test is employed. The existence of cointegration between the variables will require the Granger causality to be implemented.

## 4. Results and analysis

In this section the result is discussed. The aim of this study is to investigate whether there is a significant difference in returns between Islamic and non-Islamic indices in two distinctive markets US and Malaysia. The difference in returns is done to check the resilience of the Islamic indices that is claimed by some researcher. Therefore the period of the study is divided into three sub samples, pre-crisis period, and post crisis period and during the subprime financial crisis. The first analysis includes the whole period of the study from February 2007 up to May 2011. Secondly, the period before the crisis is discussed; this covers the period from February 2007 to January 2008, followed by the period during the crisis covering the period from January 2008 to march 2009. Finally the period after the crisis covering the period from March 2009 to May 2011 is discussed.

In addition, the long run relationship between Islamic and non-Islamic indices is examined. Previous studies found that Islamic and non-Islamic indices seem to be cointegrated during the financial crisis. These studies concluded that there is no benefit of diversification using these cointegrated markets

during the crisis. The analysis starts with descriptive statistics, a difference in mean returns t-test, cointegration test and finally the Granger causality test. The source of the data is DataStream database.

Figure 4.1 the closing prices of all the indices for the whole period

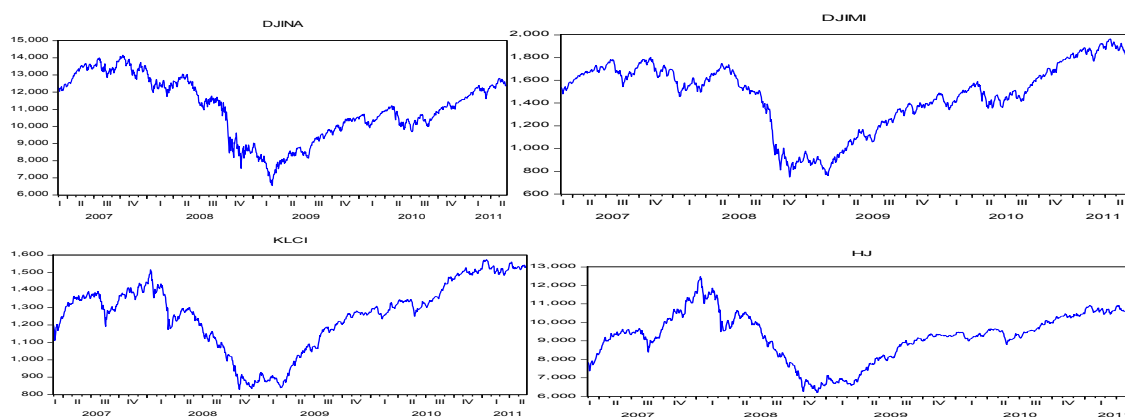


Figure 4.1 shows the closing prices of all the indices for the overall period of the study. It is clear that all these indices moved together during the financial crisis though they might not have started in the same time.

Table 4.1 Descriptive statistics for all indices

		RDJIMI	RDJINA	RHJ	RKLCI
Overall	Mean	0.015	0.0009	0.028	0.023
	Median	0.14	0.04	0.01	0.01
	Std. Dev.	1.50	1.51	1.029	0.94
	Skewness	-0.48	0.04	-1.29	-1.33
	Kurtosis	8.22	10.95	17.92	16.90
	J-B	1301*	2912*	10568*	9230*
Pre-crisis	Mean	0.015	0.01	0.20	0.10
	Median	0.15	0.11	0.14	0.11
	Std. Dev.	0.94	0.96	1.11	1.02
	Skewness	-0.56	-0.49	-0.08	-0.64
	Kurtosis	3.20	3.75	5.66	6.91
	J-B	12*	14*	67*	160*

During the crisis	Mean	-0.19	-0.17	-0.21	-0.19
	Median	-0.04	-0.06	-0.09	-0.14
	Std. Dev.	2.20	2.33	1.45	1.28
	Skewness	-0.27	0.21	-1.40	-1.37
	Kurtosis	5.50	6.38	13.35	14.21
	J-B	84*	149*	1469*	1704*
Post-crisis	Mean	0.12	0.09	0.08	0.11
	Median	0.17	0.07	0.06	0.07
	Std. Dev.	1.16	1.05	0.61	0.62
	Skewness	0.16	0.20	0.49	0.19
	Kurtosis	5.52	6.64	5.72	4.90
	J-B	71*	319*	199*	90*

\* Significant at 1%

Table 4.1 shows that all returns are positive. In addition, the lowest return in the whole period is for DJINA. The highest return is for HJ Islamic index followed by the second highest which is the KLCI and finally DJIMI. This indicates that the Malaysian stock market was doing extremely well in the whole period in general. Risk of these indices is measured by the standard deviation, as reported below the DJINA has the highest standard deviation which means it was the riskiest among all other indices. The lowest standard deviation is for KLCI indicating that is it the least risky index in the group followed by HJ and finally DJIMI. The risk and return relationship which suggest that the higher the risk an investor is willing to take the higher the compensation an investor should get or higher the returns.

According to the results reported in table 4.1, DJINA incurs the higher risk but yield the lowest returns too while KLCI incurs the lowest risk but does not yield the lowest return. In contrast HJ has a lower standard deviation than DJIMI and DJINA but higher than KLCI and yielded the highest returns. All indices are negatively skewed except DJINA, which is positively skewed. The negative (positive) skewness indicates that there is a greater probability of large decrease (increase) in returns than increase (decrease). All the stock market indices have kurtosis more than three indicating leptokurtic distribution.

In the pre-crisis period all returns are positive. Additionally, the lowest return in the whole period is for DJINA followed by DJIMI by 0.01% and 0.015% respectively. The highest return is for HJ Islamic index followed by the second highest which is the KLCI. This indicates that the Malaysian stock market was doing extremely well in the period before the crisis started. Risk of these indices is measured by the

standard deviation, as reported the DJINA has the lowest standard deviation which means it was the least risky among all other indices. The highest standard deviation is for HJ indicating that is it the most risky index in the group followed by KLCI and finally DJIMI. The risk and return relationship which suggest that the higher the risk an investor is willing to take the higher the compensation an investor should get or higher the returns. According to the results reported in table 4.1, this seems to be the case in the pre-crisis period. All indices are negatively skewed. The negative skewness indicates that there is a greater probability of large decrease in returns than increase.

Moreover, for the period during the subprime crisis, the returns for all the indices are negative. The lowest is HJ at -0.21% followed by -0.19% for both DJIMI and KLCI and lastly by DJINA at -0.17%. It is clear that the most affected indices are the Islamic indices this indicate that the screening criteria in both markets (US and Malaysia) did not cause these indices to avoid or minimize the effect of the crisis. Hussein and Omran 2005 claimed that the screening criteria of DJIMI led it to exclude many firms that later on failed and went bankrupt. It is obvious here that in this study this is not the case. The DJIMI and HJ have the lowest returns than non-Islamic indices. In terms of risk the highest risk index is DJINA followed by DJIMI, HJ and finally KLCI.

All the indices are negatively skewed except DJINA which is positively skewed. During the crisis a negative skewness indicate that the probability of negative returns for DJIMI, HJ, and KLCI are higher than positive return while DJINA show signs that positive return will follow negative returns. Again the kurtosis of all indices indicates that the indices have leptokurtic distribution.

For the post crisis period, the highest mean return is for DJIMI at 0.12 followed by KLCI 0.11, DJINA at 0.09 and finally HJ at 0.08. Comparatively, the risk is the highest for DJIMI followed by DJINA, KLCI and HJ. Here it is seen that the higher risk is compensated by higher returns as predicted by the modern portfolio theory.

Skewness is positive for all indices indicating positive returns in the future though the probability is low for KLCI, DJIMI and DJINA but very high for HJ. Finally all the stock market indices have positive kurtosis more than three indicating leptokurtic distribution in all periods. In addition, The J-B test of normality indicates that all indices are not normally distributed.

Table 4.2 Correlation of all the indices

		RDJINA	RDJIMI	RHJ
Overall	RDJIMI	0.81*		
	RHJ	0.10*	0.35*	
	RKLCI	0.12*	0.39*	0.93*
Pre-crisis	RDJIMI	0.74*		
	RHJ	-0.043	0.31*	
	RKLCI	0.015	0.42*	0.92*
During	RDJIMI	0.81*		
	RHJ	0.074	0.34*	
	RKLCI	0.079	0.35*	0.95*
Post crisis	RDJIMI	0.82*		
	RHJ	0.26*	0.43*	
	RKLCI	0.26*	0.47*	0.89*

\* Significant at 1%

Table 4.2 reports the results of the simple correlation of all the indices. It is clear that the correlation between DJINA and DJIMI is 0.81, 0.74, 0.81 and 0.82 in all the periods respectively which is considered strong. Similarly, the correlation between HJ and KLCI is 0.93, 0.92, 0.95 and 0.89 for all the periods respectively. On the other hand, the correlation between DJINA with HJ and KLCI is 0.10 and 0.12, the overall period, -0.043 and 0.15 for the pre-crisis period, 0.074 and 0.079 for the crisis period, and 0.26 and 0.26 for the post crisis period. This result indicates that there is a benefit of diversification in constructing portfolios with these three indices. Moreover, the correlation between DJIMI with HJ and KLCI is 0.35 and 0.39 the overall period, 0.31 and 0.42 for pre-crisis period, 0.34 and 0.35 during the crisis and 0.43 and 0.47 in the post crisis period. Again the benefit of diversification is high if these three indices are used in constructing portfolios.

Table 4.3 t-test for difference of mean return for all indices

Returns difference	Overall period	Pre-crisis	During	Post crisis
DJINA – KLCI	0.682	0.322	0.906	0.765
DJIMI – HIJRAH	0.816	0.050	0.890	0.469

Table 4.3 displays the results for the difference in mean returns t-test. It is clear that there is no significant difference between the Islamic and non Islamic indices for the overall period as well as the sub periods of the study.

Table 4.4 Cointegration results for all the indices

Cointegration	Overall period		Pre-crisis		During		Post crisis	
	Max. Eigen	Trace	Max. Eigen	Trace	Max. Eigen	Trace	Max. Eigen	Trace
DJIMI & HJ	14.82**	15.27***	9.91	17.01**	11.44	11.94	16.72*	23.1*
DJINA & KLCI	6.06	6.99	10.25	10.28	12.38	12.38	10.56	15.6

\*, \*\* and \*\*\* Significant at 1%, 5% and 10%. Lag 4 was used for both Islamic and non-Islamic indices.

Table 4.4 shows the results of the cointegration results between Islamic and non-Islamic indices. The result suggests that there is at least one cointegration equation between the Islamic indices in all periods except during the financial crisis. However, there is no cointegration between the non-Islamic indices in all periods. In other words, there is a long run relationship between DJIMI in the US and HJ in Malaysia except during the financial crisis. On the other hand, the cointegration between DJINA and KLCI is non-existent. This indicates that Islamic indices move together in the long run which means that one index can be predicted by the other. In other words, the Islamic stock indices were not affected before and after the financial crisis. However, during the crisis these two Islamic indices seem to have drifted apart from each other.

This could explain why Malaysia was not affected by the financial crisis when it happened. It reflects that when the DJIMI was declining the HJ index did not react in the same manner due to market fundamentals. Another explanation is that DJIMI consist of many local and international stocks while HJ consist of local stocks only and it is not exposed directly to the failure of international stocks. This might explain why DJIMI and HJ did not move together during the financial crisis. This also imply that the benefit of diversification increases during the financial crisis, Majid and Kassim (2009) found that when Malaysian and Indonesian stock market are cointegrated during the financial crisis this indicate that the benefit of diversification decreases.

Similar results were found by Majid, Meera et al. (2008) who investigated the ASEAN emerging markets. Based on the result reported in table 4.4 it is shown that there is no cointegration between DJIMI and HJ as well as DJINA and KLCI leading to the conclusion that the benefit of diversification increased during the crisis.

Table 4.5 Granger Causality for all the indices

Granger causality	Overall period	Pre-crisis	During	Post crisis
DJINA $\neq$ →KLCI	187.1*(3)	81.43*(1)	50.08(2)*	73.6(2)*
KLCI $\neq$ →DJINA	15.97*	2.74	19.01*	1.03
DJIMI $\neq$ →HIJRAH	65.04* (6)	43.91*(1)	34.24*(5)	57.58* (9)
HIJRAH $\neq$ →DJIMI	3.42	1.43	1.16	14

\* Significant at 1

Table 4.5 report the Granger causality result between all the indices. It is clear that over the whole period there is bidirectional causality between non-Islamic indices but not Islamic indices. In other words one market can be predicted by the movement of the other market. It can be seen that although there is no cointegration between the non-Islamic indices however there is causality in the short run between these indices. During the pre-crisis and the post crisis period only unidirectional causality was found between the Islamic as well as non-Islamic indices from DJIMI towards HJ and DJINA towards KLCI. This suggests that the US indices are causing the Malaysian indices in the short run but not the opposite. However, during the crisis Islamic indices have unidirectional causality from DJIMI towards HJ while non-Islamic indices have bidirectional causation.

## 5. Conclusion

The aim of this paper is to investigate returns difference, long run as well as short run relationship between two Islamic indices with different screening criteria in three sub periods namely, pre-crisis, during the crisis and post crisis. Since these two indices have different screening criteria they might have some difference in returns as well as their movement in the long and the short run. The result indicates that there is no significant difference in mean returns between the Islamic indices as well as their counterparts (i.e. conventional indices). In terms of long run relationship or cointegration it is found that the Islamic indices were cointegrated in the pre-crisis as well as post crisis period. This means that one index can be used to predict the other.

The cointegration means that the screening criteria of each index do not eliminate the co-movement in the long run. On the other hand the conventional indices were not cointegrated in any of the sub periods. The short run causality between the Islamic indices is a unidirectional from DJIMI towards HJ in all the sub-periods. Similarly, the conventional indices have a unidirectional causality running from DJINA towards KLCI except during the financial crisis where a bidirectional relationship exists. In short,



investors looking for ethical investment can diversify by investing in these Islamic indices since their correlation is very low. Though they still move together in the long run only DJIMI, which is the one with more stringent screening criteria, cause HJ to fluctuate. The result here suggests that the claim by Hussein and Omran 2005 some research that the screening criteria of Islamic indices eliminate doubtful stocks before they fail is not accurate.

In other words, if the Islamic indices screening criteria have any benefit in identifying the failing stocks they would have at least minimized the effect of the financial crisis. Therefore, investing in Islamic indices has no superiority over the conventional index in terms of performance. However, Islamic investment might have the peace of mind some investors are looking for.

## References

- Antoniou, A., Pescetto, G., & Violaris, A. (2003). *Modeling international price relationships and interdependencies between the stock index and stock index futures of three EU countries: a multivariate analysis*. *Journal of Business Finance and Accounting* 30(5/6), 645-667.
- Baur, D., & Jung, R. C. (2006). Return and volatility linkages between the US and the German stock market. *Journal of International Money and Finance*, 25(4), 598-613.
- Caporale, G. M., Pittis, N., & Spagnolo, N. (2006). *Volatility transmission and financial crises*. *Journal of Economics and Finance*, 30(3), 376-390.
- Koutmos, G. (1996). *Modeling the dynamic interdependence of major European stock markets*. *Journal of Business Finance & Accounting*, 23(7), 975-988.
- Kasibhatla, K. M., Stewart, D., Sen, S., & Malindretos, J. (2006). *Are daily stock price indices in the major European equity markets cointegrated? Tests and evidence*. *American Economist*, 50(1), 47-57.
- Daly, K. J. (2003). *Southeast Asian stock market linkages evidence from pre- and post October 1997*. *Asean Economics Bulletin*, 20(1), 73-85.
- Lamba, A. S., & Otchere, I. (2001). *An analysis of the dynamic relationships between the South African equity market and major world equity markets*. *Multinational Finance Journal*, 5(3), 201-224.
- Shachmurove, Y. (2005). *Dynamic linkages among the emerging Middle Eastern and the United States stock markets*. *International Journal of Business and Management*, 10(1), 104-132.

Soydemir, G. (2000). *International transmission mechanism of stock market movements: evidence from emerging equity markets*. Journal of Forecasting, 19(3), 149-172.

Rudd, A. (1981). *Social responsibility and portfolio performance*. California Management Review, 23(4), 55-61.

Teper, J. A. (1991, May 13). *The cost of social criteria*. Pensions and investment, 34.

Johnson, L., & Neave, E. (1996). *Efficiency and effectiveness of Islamic financing: the cost of orthodoxy*. Working Paper # 96-26, Queen's School of Business, Queen's University, Canada.

Langbein, J. H., & Posner, R. A. (1980). *Social investing and the law of trusts*. Michigan Law Review, 79(1), 72-112.

In, F., S. Kim, & Yoon, J. H. (2002). *"International Stock Market Linkages: Evidence from the Asian Financial Crisis."* Journal of Emerging Market Finance 1(1): 1-29.

Karim, B. A., Kassim, N. A. M. & Arip, M. A. (2010). *"The subprime crisis and Islamic stock markets integration."* International Journal of Islamic and Middle Eastern Finance and Management 3(4): 363-371.

Ibrahim, M.H. (2005), *"International linkage of stock prices: the case of Indonesia"*, Management Research News, Vol. 28(4), pp.93-115.

Janakiramanan, S., Lamba, S.A. (1998), *"An empirical examination of linkages between Pacific-Basin*

- stock markets*", Journal of International Financial Markets, Institutions and Money, Vol. 8 pp.155-73.
- Majid, A. M. S. and Kassim, S. H. (2009). *Impact of the 2007 US financial crisis on the emerging equity markets*. International Journal of Emerging Markets, 4(4): 341-357.
- Majid, A. M. S., Meera, A. K. M., Mohd. Omar, A., Abdul Aziz, H., (2009) *"Dynamic linkages among ASEAN-5 emerging stock markets"*, International Journal of Emerging Markets, Vol. 4 Iss: 2, pp.160 - 184.
- Mukherjee, P. and S. Bose (2008). *"Does the Stock Market in India Move with Asia?: A Multivariate Cointegration-Vector Autoregression Approach."* Emerging Markets Finance and Trade 44(5): 5-22.
- Ng, H. (2002). *"Stock Market Linkages in South–East Asia."* Asian Economic Journal 16(4): 353-377.
- Albaity, M. and R. Ahmad (2008). *"Performance of Syariah and Composite Indices: Evidence From Bursa Malaysia."* Asian Academy of Management Journal of Accounting and Finance 4(1): 23–43.
- Gujarati, D. N. (2003) *Basic Econometrics*, New York, McGraw Hill.
- Engle, R. F., & Granger, C. W. J. (1987). *"Co-integration and error correction: Representation, estimation and testing."* Econometrica, 55, 251-276.
- Johansen, S. and K. Juselius (1990). *"Maximum likelihood estimation and inference on cointegration— with applications to the demand for money."* Oxford Bulletin of Economics and Statistics 52(2): 169-210.

Eun, C. S., & Jong, J. G. (1999). "*International price linkages: evidence from the post Bretton Woods era.*" Pacific-Basin Finance Journal, 7, 331-349.

Masih, A. M. M. & Masih, R. (1999). "*Is a significant socio-economic structural change a pre-requisite for 'initial' fertility decline in the LDCs? Evidence from Thailand based on a multivariate cointegration/vector error correction mode,*" Journal of Population Economics, vol. 12(3), 463-487.

Hussein, K. & Omran, M. (2005). "*Ethical Investment Revisited: Evidence from Dow Jones Islamic Indexes*". The Journal of Investing, Vol. 14(3), 105-126

Kasa, K. (1992). "*Common stochastic trends in the international stock markets*". Journal of Monetary Economics, Vol. 29(1), 95–124.

Manning N. (2002). "*Common trends and convergence? South East Asian equity markets, 1988-1999*". Journal of International Money and Finance, Vol. 21(2), 183-202