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Hela Miniaoui

*University of Wollongong, [hela@uow.edu.au](mailto:hela@uow.edu.au)*

Hameedah Syani

*Middlesex University Dubai, [H.Sayani@mdx.ac](mailto:H.Sayani@mdx.ac)*

Anissa Chaibi

*IPAG Business School*

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# The Impact Of Financial Crisis On Islamic And Conventional Indices Of The GCC Countries

Hela Miniaoui, University of Wollongong in Dubai, UAE  
Hameedah Sayani, Middlesex University, UAE  
Anissa Chaibi, IPAG Business School, France

## ABSTRACT

*We study performance of Islamic and conventional indices of the Gulf Cooperation Council (GCC) countries in the wake of financial crisis of 2008 and test whether Islamic indices were less risky than conventional indices. We make use of data of the six GCC markets as well as the Dow Jones Islamic Market Index GCC. The mean and variance of each of the indices are analyzed based on augmented GARCH models. The results show that the financial crisis impacted on the mean returns of Bahrain, the other indices remained unaffected. The financial crisis, however, impacted volatility in three GCC markets (Kuwait, Bahrain, and the UAE), while the impact on the remaining markets (Saudi Arabia, Oman, and Qatar) and the Islamic index was insignificant. More interestingly, we show that the Islamic index did not exhibit lower volatility than its conventional counterparts.*

**Keywords:** Islamic Investment; Financial Crisis; GARCH Models; GCC Markets

## 1. INTRODUCTION

In the GCC region, the interest for Islamic investments has grown in the last decades. Subsequently, there is today an urgent need for tools to measure the performance of these Shariah compliant investments. An Islamic or Shariah compliant index tracks the performance of companies that abide by Shariah principles and pass through the screens for industry, financial ratios, and liquidity (Hakim and Rashidian, 2002; Nisar and Khatkhatay, 2006; Derigs and Marzban, 2009). Indices complying with Shariah principles have become popular with the launch of Dow Jones Global Islamic Indexes (DJGI) in December 1995, followed by the FTSE Global Islamic Series (GIIS) in 1998.

Investors in GCC countries have demonstrated increasing preference for Shariah-compliant products, which is evident from the increasing numbers of Islamic banks in the region. In fact, according to Wilson (2009) beyond banking the GCC states have played the leading role in the development of Islamic finance and insurance. Given the importance and peculiar traits of the region (Hamilton (2003), the DJ GCC Islamic index was introduced to measure the performance of Shariah compliant listed companies in the GCC region.

Our article contributes to the literature by comparing the effects of the 2008 financial crisis on conventional and Islamic indices of the GCC countries. Besides the DJ GCC Islamic index (GCC Islamic index hereafter), the study includes conventional indices of the six GCC countries: Saudi Arabia, Bahrain, Oman, Kuwait, Qatar and the United Arab Emirates (UAE). The details of the indices included in the study are summarized in Table 1.

**Table 1: Indices And Their Methodology**

Country	Index	Symbol	Methodology
Islamic Index	Dow Jones Islamic Market Index GCC	DJ GCC	Float-adjusted market capitalization weighted
Bahrain	Bahrain Brouse All Share Index	BHESI	Capitalization-weighted
Oman	Muscat Securities MSM 30 Index	MSM30	Capitalization-weighted
Kuwait	Kuwait Stock Exchange Index	KWSEI	Price-weighted index
Qatar	Qatar Exchange Index	QSM	Capitalization-weighted
Saudi Arabia	Tadawul All Share TASI Index	SASEI	Capitalization-weighted
UAE	Abu Dhabi Securities Market General Index	ADSM	Float-adjusted market capitalization weighted

Note: Information on methodology extracted from www.bloomberg.com

According to the Dow Jones Islamic Market GCC Index Fact sheet (October, 2013), the GCC Islamic index was introduced in August 2009, however the estimated historical daily prices are available from December 2003. Table 2 and Table 3 provide the country and sector allocation for the GCC Islamic index according to Dow Jones Islamic Market GCC Index, end of October 2013.

**Table 2: Country Allocation For Dow Jones Islamic Market GCC Index**

Country Allocation	Country Allocation
Saudi Arabia	Saudi Arabia
Kuwait	Kuwait
Qatar	Qatar
UAE	UAE
Oman	Oman
Bahrain	Bahrain
Country Allocation	Country Allocation

**Table 3: Sector Allocation For Dow Jones Islamic Market GCC Index**

Sector Allocations	
Financial	34.33%
Basic Material	21.37%
Industrials	18.14%
Telecommunications	12.99%
Consumer Goods	6.43%
Consumer Services	4.42%
Utilities	0.85%
Health Care	0.84%
Oil & Gas	0.62%

There is a widely spread belief that Shariah compliant investments are relatively less risky than their conventional counterparts as compliance with Shariah principles makes them forgo activities which might be considered risky like leverage. Given these arguments it might be anticipated that the Islamic investments are comparatively insulated from shocks that would impact most investments. On the other hand, it is widely cited in literature that the recent financial crisis that emerged in the US has grappled most countries around the world though the impact has been asymmetric (for example see Cheung et al., 2008; Diebold and Yilmaz, 2009; Dooley and Hutchison, 2009 amongst many others). This study will attempt to investigate if the financial crisis had a long lasting impact on the Islamic index in the GCC and if its volatility dynamics were different from those of conventional indices of the GCC. To achieve the objectives of the study, we shall compare the mean and variance of Dow Jones (DJ) GCC Islamic Index and its conventional counterparts in GCC with and without the treatment for financial crisis using a conventional and modified GARCH model for a period of seven years (2006-2012), the mean and volatility in both Islamic and conventional indices will be evaluated to understand the impact of financial crisis on GCC indices in general and GCC Islamic index in particular.

The paper is organized as follows. Section 2 provides a concise literature review of existing studies on Islamic and Socially Responsible Investments in general and comparative performance of Islamic and conventional indices in particular, section 3 explains the data and methodology, section 4 reports the findings and discusses the implications of findings. Conclusion, limitations of the study and avenues for future research are discussed in section 5.

## **2. LITERATURE REVIEW ON ISLAMIC INDICES PERFORMANCE**

The literature on Islamic investing is still at its infancy according to Hassan and Girard (2010). Given this limitation, an attempt has been made to review some literature not only on Islamic investments but also on Socially Responsible Investments (henceforth SRIs). Some studies have examined the performance of Islamic funds or socially responsible investing and compare that with conventional funds' performance. This includes (Mallin et al., 1995; Ludwig, 2005; Geczy et al., 2005; Elfakhani et al., 2005; Abdullah, 2007; Abderrezak, 2008; Hayat and Kraeussl, 2011; Mansor and Bhatti, 2009; Hoepner et al., 2009; Raphie and Roman, 2011, El Khamlichi et al., 2014).

Besides the above comparative studies on Islamic investments and SRIs, some authors have compared the performance of Islamic indices with their conventional counterparts' performance using measures like Jensen Alpha, Sharpe index, Treynor ratio, Modigliani and Modigliani measure as well as the Capital Asset Pricing Model (CAPM) model.

The relevant literature on comparison of performance of Islamic stock market indices to their counterparts is summarized in the following studies.

Hassan (2002) examined the phenomenon of market efficiency and the time-varying risk return relationship for the Dow Jones Islamic Market Index (DJIMI) over the 1996-2000. Several econometrics tests, such as serial correlation; variance ratio; and Dickey-Fuller tests, were employed. The results document that DJIMI returns are normally distributed and the DJIMI has remarkable market efficiency. The results show that there is still operational inefficiency in DJIMI that needs to be corrected to make the risk behaviour of DJIMI stable overtime. Utilizing a GARCH framework, the author also tested the volatility of the DJIMI returns and found significant positive relationship between conditional volatility and DJIM equity index returns.

Hakim and Rashidian (2002) used the cointegration technique to examine the relationship between DJIM, Wilshire 5000 index and risk-free rate (three-month Treasury bill) over the 1999-2002 period. They found that an Islamic index with unique risk-return characteristics unaffected by the broad equity market.

In another work, Hakim and Rashidian (2004) used the CAPM model during the period January 5, 2000 to August 30, 2004 to compare the Dow Jones Islamic Market Index (DJI) to the Dow Jones World Index (DJW) and the Dow Jones Sustainability World Index (DJS) or Green index. The authors found that DJI has done relatively well compared to the DJW but has underperformed in relation to the DJS. They concluded that investors in Muslim index are not suffering a discernible cost for complying with the sharia restriction.

Hussein (2004) compared FTSE Global Islamic Index' performance with its conventional counterpart FTSE all World Index using Sharpe ratio, Treynor index, Jensen ratio and CAPM. The study comprised of bull period (July 1996-March 2000) and bear period (April 2000-August 2003). The results suggested that the performance of the Islamic index was comparable to the performance of FTSE all World Index during overall period. However, the Islamic index over-performed during bull period and under-performed during bear period. The authors concluded that the application of ethical screens does not have an adverse impact on the performance of FTSE Global Islamic index. The results of Hussein (2004) are in line with Hassan et al. (2005) who examined the potential impact of Islamic Shariah screening on investment performance diversified Islamic portfolio found that the application of Islamic ethical screens did not adversely affect the performance of Islamic portfolio.

Hussein and Omran (2005) analysed the performance of the Dow Jones Islamic Market Index (DJIMI) that accounts for the effects of industry, size, and economic conditions. The study revealed that Islamic indexes provide investors with positive abnormal returns over 1996-2003, but underperformed over the bear market "subperiod". In order to track the behaviour of Islamic indexes under bull and bear market conditions, the authors divided the sample period into two sub periods, January 1996-March 2000 and April 2000-July 2003. The authors found that Islamic indexes outperform their conventional counterparts in bull markets, but underperform in bear markets.

Khathatay and Nisar (2007) reviewed and compared the Shariah screening rules used by three organizations such as Dow Jones Islamic Indices of USA, Securities and Exchange Commission (SEC) of Malaysia, and Meezan Bank of Pakistan by employing Bombay Stock Exchange 500 stocks as at end March 2005. The authors concluded that on the whole the SEC's criteria appear to be the most liberal and that of Dow Jones the most conservative. Based on the empirical results, they proposed an independent set of norms that better reflect the objectives of formulating Shariah compliance. They argued that the use of market capitalization in the screening ratios is inappropriate and should be replaced by other relevant balance sheet items, notably total assets.

Abdullah et al. (2007) examined the differences in terms of performance between Islamic and conventional mutual fund in the context of Malaysian stock market from January 1992 to December 2001. The basic finding was that Islamic funds performed better than the conventional funds during bearish economic trends while, conventional funds showed better performance than Islamic funds during bullish economic conditions.

Al-Zoubi and Magheyreh (2007) examined the relative risk-performance of the Dow Jones Islamic Index (DJIS) from 1 January 1996 to 20 May 2005 using the most recent Value-at-Risk (VaR) methodologies (RiskMetrics, Student-*t* APARCH, and skewed Student-*t* APARCH) and found that the Islamic index presents unique risk characteristics. The examinations reflect a risk level that is significantly less than the board market basket of stocks. According to the authors filtering criteria adopted to eliminate Shari'ah-non-compliant companies does not lead to loss, and Muslim investors are not worse off in investing in a basket of Islamic stocks in comparison to a much larger basket.

Albaity and Ahmad (2008) analysed the risk and return performance of the Kuala Lumpur Syariah Index (KLSI) and the Kuala Lumpur Composite Index (KLCI) during 1999–2005. Results revealed that Islamic indices do not significantly underperform conventional indices. Using cointegration tests, they showed that both series are cointegrated in a long-term. Moreover, the Granger bivariate test indicates the presence of short-run bidirectional causality between the indices.

Sadeghi (2008) examined the impact of the introduction of Shariah-compliant Index (SI) by Bursa Malaysia on the performance and liquidity of included shares. Using an event study to estimate mean cumulative abnormal returns (MCARs) in the days surrounding the event, the results showed that, overall, introduction of SI had a positive impact on the financial performance of included shares and their liquidity over a longer period.

Hassan and Girard (2010) examined seven indexes from the Dow Jones Islamic Market Index (DJIM) vis-à-vis their non-Islamic counterparts using a variety of methods such as Sharpe, Treynor, Jensen and Fama's selectivity, net selectivity and diversification, during two sub-periods January 1996-December 2000 and January 2001 to December 2006. The results showed that there is no difference between Islamic and non-Islamic indexes. The Dow Jones Islamic indexes outperformed their conventional counterparts in the first sub-period and underperformed them in the second sub-period. Overall, similar reward to risk and diversification benefits exist for both types of indexes.

In a recent study, Boujelbene-Abbes (2012) analysed the return and volatility characteristics of a large set of international data including 35 Islamic stock market indices and their conventional counterparts of developed markets, emerging markets, Arab and GCC markets over the period of June 2002 to April 2012. Using differences in Sharpe ratio test and the CAPM model to study the risk adjusted performances of Islamic stock market indices versus their conventional counterpart indices, the author showed that in the entire period as well as in the crisis period there is no difference between performance the types of indices in risk adjusted return basis. Consequently, Muslim investors can pursue passive stock investments in conformity to their religious beliefs without sacrificing financial performance.

### **3. DATA AND METHODOLOGY**

Weekly data is used for analysis for the period 4 January 2006 to 26 December 2012, with a sample size of 364 observations. The study uses Wednesdays' closing prices of the indices to avoid the weekend effect. In the scenario of market being closed on Wednesday, the closing prices of previous day are taken into account. Use of

weekly data resolves the problem of non-synchronous and non-available data. Additionally, it helps to avoid the short-term serial correlations between the consecutive data points that lead to noisy data (for example see Aggarwal et al., 1999; Brooks and Henry, 2000; Ng, 2000; Theodossiou et al., 1997). All the data is extracted from Thomson Reuters and the data analysis is performed using Eviews 7.

The period of analysis entails both tranquil and volatile periods. World markets experienced episodes of extreme volatility at the onset of ongoing financial crisis. To analyze the impact of financial crisis on the chosen indices, a dummy variable D1 is introduced in the model. The beginning week for the crisis is chosen in line with the bankruptcy filing of Lehman brothers on 15 September 2008. On this day, the Dow Jones experiences a decline of more than 500 points; it's largest after 9/11 and after that the financial crisis was unleash forcefully, bringing turmoil to many markets around the world (Frank and Hesse, 2009). Bartram and Bodner (2009) provide a chronological list of events during the time of crisis and according to their study, the crisis mellowed down in October 2009. Hence, in line with their study, the end date of the crisis is taken as the last week of October 2009.

Log normal returns are calculated for each time series in the sample. Natural log of the price on time  $t$  divided by price on time  $t-1$  is calculated and the result is then multiplied by 100 to convert the returns into percentage:

$$R_t = \text{LOG} (P_t / P_{t-1}) \times 100$$

Where  $R_t$  is the return on time  $t$  and  $P_t$  and  $P_{t-1}$  are the prices at time  $t$  and  $t-1$  respectively.

The resultant time series for each index is then used to plot on graphs and is used to produce descriptive statistics that are reported in Table 4. Descriptive statistics provide preliminary insight on the attributes of the time series in terms of mean returns, standard deviation, and other characteristics like skewness and kurtosis. Jarque-Bera test is performed to identify if the time series are normally distributed. Furthermore, correlations are calculated to estimate the strength and direction of relationship of GCC Islamic index with its conventional GCC counterparts and are reported in Table 5. Besides descriptive statistics, the log returns are plotted on graphs in Figure 1 showing the volatility clusters.

This study further uses GARCH (1,1) with Gaussian error distribution to evaluate mean and volatility dynamics of the candidate markets with and without the inclusion of a dummy variable for the financial crisis. Application of GARCH (1,1) is relevant as visual inspection of the return series plotted on graphs suggests that that some periods are more volatile than others. During the volatile periods the value of error terms are greater than tranquil periods. Volatility has a tendency to persist and exhibit a degree of autocorrelation over the period of time. ARCH (Autoregressive Conditional Heteroskedasticity) and GARCH (Generalized ARCH) models are widely used in literature and practice to model unequal variances or heteroskedasticity in time financial time series. These models provide a volatility measure that facilitates risk analysis, portfolio selection and derivative pricing. The most widely used specification is the GARCH (1,1) model introduced by Bollerslev (1986) as a generalization of Engle (1982). GARCH (1,1) model for variance is written as:

$$\sigma_t^2 = c + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2$$

This model estimates the variance of return at time  $t$  as a weighted average of a constant, variance of return in the previous period, and last period's squared residual return. Thus the GARCH models are conditionally heteroskedastic but have a constant unconditional variance.

To evaluate the impact of the financial crisis, application of conventional GARCH (1,1) is followed by application of modified version of GARCH (1,1). The impact of financial crisis is incorporated in the model using a dummy variable D1 which assumes a value of 1 during the crisis (10 September 2008 to 26 October 2009) and a value of 0 otherwise. This technique has been widely used in literature to evaluate the impact of structural changes in the time series (for example see Aggarwal et al., 1999; Karunanayake et al., 2010). Previous studies have documented that inclusion of dummy variables in the mean and variance equation provide better estimates of

volatility and also decrease the volatility persistence denoted by the sum of  $\alpha$  and  $\beta$  in the variance equation (Aggarwal et al., 1999; Malik et al., 2005; Hammoudeh and Li, 2008). Use of both conventional and modified GARCH (1,1) will provide evidence if the impact of financial crisis was significant on the GCC Islamic Index and its conventional counterparts in GCC.

#### **4. FINDINGS**

Log returns for all the indices in the sample are plotted on the graph. All the indices, including the GCC Islamic index, seem to display volatility throughout the period of analysis. Furthermore, all the indices have exhibited augmented volatility in 2008-2009, signifying the onset of ongoing financial crisis and its spillover to markets around the world. Majority of the GCC indices have also demonstrated increased volatility in 2006. In the beginning of 2006, Saudi bourse lost approximately 50% of its value in couple of months, causing panic amongst domestic and regional investors (FT, 2012). Furthermore, the UAE, Kuwait, and Bahrain indices have reacted to the Dubai's debt crisis, which initiated in the end of 2009 (BBC, 2012). These periods are punctuated with exaggerated volatility. Beyond 2011, the UAE, Oman, Saudi Arabia, Kuwait and the GCC Islamic index seem to enjoy relatively tranquil period as the returns seem to be oscillating very close to zero.

Descriptive statistics for the all the indices exhibit typical characteristics of financial time series. All the indices except Oman have negative returns, which range between 3.12% (Oman) to -25.70% (Saudi Arabia). The minimum and maximum values suggest large dispersion of returns, which is confirmed by high standard deviation. Saudi Arabia has the highest standard deviation of 4.45 and Bahrain has the lowest standard deviation of 1.56. All the returns are skewed to the left, indicating negative skewness of returns. Furthermore, the kurtosis is greater than 3.0 for all of the return series, confirming typical leptokurtic distributions, with the return series having high peaks around the mean with thicker tails as compared to the normal distribution. Oman has the highest kurtosis of 18.94, followed by Saudi Arabia (12.81) and the UAE (12.43) respectively, which is indicative of extreme returns in the time series (Poon and Granger, 2003).

The sample Kurtosis and the Jarque-Bera normality test statistics show that the weekly returns are not normally distributed at 5% significance level. As a result, the return distributions in all markets are considered to have fat tails.

The GCC Islamic index returns display similar stylized facts as the conventional indices.

It also exhibits negative mean returns of -14% with highly dispersed values and standard deviation of 3.8. Additionally, the returns are negatively skewed and leptokurtic with the kurtosis of 9.9.

The correlations between GCC Islamic Index and the GCC conventional indices are presented in Table 5 and are positive. The GCC Islamic index has the highest correlation with the Saudi index. This is understandable as Saudi Arabia has more than 80% country allocation in the GCC Islamic index. The lowest correlation is between GCC Islamic index and Bahrain, whereby the maximum correlation between the two indices is 0.46.

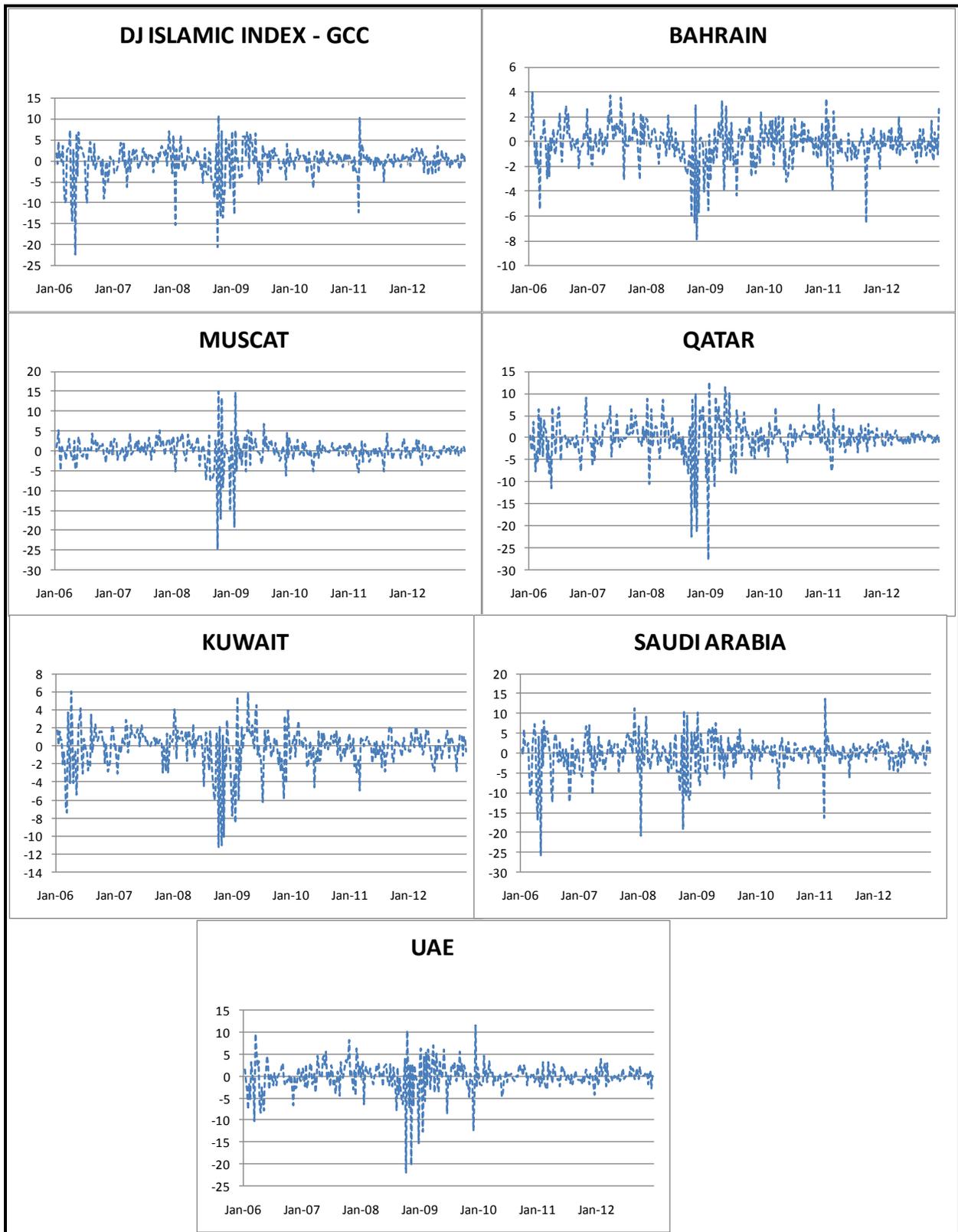


Figure 1: Weekly Returns Of Indices

Table 4: Descriptive Statistics

	GCC ISLAMIC INDEX	BAHRAIN	KUWAIT	OMAN	QATAR	SAUDI ARABIA	UAE
<b>Observations</b>	364	364	364	364	364	364	364
<b>Mean</b>	-0.1404	-0.1975	-0.1799	0.0312	-0.0671	-0.2570	-0.1863
<b>Maximum</b>	10.9280	3.9821	5.9974	14.8815	12.6445	13.7621	11.5034
<b>Minimum</b>	-22.3674	-7.9390	-11.2602	-24.8165	-27.7337	-25.9024	-21.9497
<b>Std. Dev.</b>	3.8266	1.5660	2.2325	3.3102	4.1254	4.4463	3.3961
<b>Skewness</b>	-1.7393	-1.0504	-1.5346	-1.8558	-1.6118	-1.4250	-1.6842
<b>Kurtosis</b>	9.9447	6.6995	8.1098	18.9401	12.8123	8.7361	12.4337
<b>Jarque-Bera</b>	914.9942	274.5089	538.8780	4062.5930	1617.8470	622.2230	1521.8290

Table 5: Correlations

	GCC ISLAMIC INDEX	BAHRAIN	KUWAIT	OMAN	QATAR	SAUDI ARABIA	UAE
<b>GCC ISLAMIC INDEX</b>	1.00000						
<b>BAHRAIN</b>	0.46442	1.00000					
<b>KUWAIT</b>	0.58525	0.53631	1.00000				
<b>OMAN</b>	0.58532	0.52772	0.49938	1.00000			
<b>QATAR</b>	0.58882	0.46432	0.51742	0.62947	1.00000		
<b>SAUDI ARABIA</b>	0.95784	0.37508	0.43663	0.47515	0.46271	1.00000	
<b>UAE</b>	0.63230	0.46764	0.50426	0.62698	0.55336	0.51392	1.00000

The results of GARCH (1,1), variance equation for all the indices, with and without dummy variables is presented in Table 6. In the mean equations, the coefficients of dummy variable D1, incorporating the financial crisis, are insignificant for all the indices except Bahrain. This indicates that the financial crisis did not impact the mean of the GCC conventional as well as Islamic indices. Bahrain, however, is an exception as the coefficient for D1 is significant and negative suggesting that the financial crisis had a negative impact on the mean returns of Bahrain index. The coefficients of  $\alpha$  (ARCH effect) and  $\beta$  (GARCH effect) are significant in all indices, under both conventional and modified GARCH. The variance equations without the dummy variable suggest highest persistence of volatility in all indices, whereby the sum of  $\alpha$  and  $\beta$  is approaching unity. The sum of  $\alpha$  and  $\beta$  without D1 is the lowest for Bahrain, indicating relatively low persistence of volatility in Bahrain index. The impact of financial crisis is trifling for GCC Islamic index, Oman, Qatar, and Saudi Arabia, as the coefficients of D1 are insignificant. Furthermore, the impact on volatility persistence is negligible even with the inclusion of dummy variable. This suggests that the volatility persistence only decreases if the coefficients of dummy variables are statistically significant. On the other hand, the effect of financial crisis is significant on Bahrain, Kuwait, and the UAE as asserted by significant coefficient of D1. This asserts that the financial crisis had an impact on the volatility of these indices. Additionally, with the inclusion of D1, the volatility persistence estimates denoted by  $\alpha+\beta$  have decreased substantially. It is evident the volatility persistence estimates decreased substantially when the coefficient associated with the financial crisis is statistically significant. For example, volatility persistence decreased by more than 20% with the inclusion of significant D1, suggesting major shock to the volatility associated with the financial crisis. In contrast, the maximum difference in volatility estimates for indices with negligible impact of the financial crisis is 1.16% (Oman).

Diagnostics checks for all candidate markets for reveal lack of serial correlation in the residuals. This is also evident from the Durbin-Watson statistics for serial correlation, which is close to 2 in all cases. Additionally ARCH-LM test reveals that there is no additional ARCH effect in the standardized residuals. The results of ARCH-LM test are presented in Table 7.

The results highlight that the GCC Islamic index exhibits similar attributes of the conventional indices in all the periods of analysis. Volatility persistence is evident in both Islamic and conventional indices, whereby,  $\alpha+\beta$  is close to unity. This affirms that the GCC Islamic index has similar risk profile as its conventional counterparts.

Table 6: Variance Equations

<b>Indices with statistically significant D1</b>				
<b>BAHRAIN</b>				
	Excluding the crisis effects (D1)	p-value	Including the crisis effect (D1)	p-value
C	0.309	0.000	0.546	0.001
$\alpha$	0.210	0.000	0.187	0.002
$\beta$	0.676	0.000	0.510	0.000
D1	-		1.259	0.031
$\alpha + \beta$	0.8858		0.6971	
Durbin-Watson	1.7905		1.8771	
<b>KUWAIT</b>				
C	0.270	0.000	0.466	0.001
$\alpha$	0.233	0.000	0.227	0.000
$\beta$	0.717	0.000	0.609	0.000
D1	-		2.085	0.035
$\alpha + \beta$	0.9497		0.8359	
Durbin-Watson	1.878922		1.9325	
<b>UAE</b>				
C	0.181	0.022	0.293	0.002
$\alpha$	0.210	0.000	0.176	0.000
$\beta$	0.781	0.000	0.767	0.000
D1	-		4.489	0.001
$\alpha + \beta$	0.9911		0.9430	
Durbin-Watson	2.154351		2.1612	
<b>Indices with statistically insignificant D1</b>				
<b>DJ ISLAMIC INDEX GCC</b>				
C	0.593	0.000	0.604	0.000
$\alpha$	0.407	0.000	0.403	0.000
$\beta$	0.592	0.000	0.590	0.000
D1	-		0.308	0.798
$\alpha + \beta$	0.9985		0.9922	
Durbin-Watson	1.959937		1.9512	
<b>OMAN</b>				
C	0.159	0.017	0.196	0.031
$\alpha$	0.177	0.000	0.191	0.000
$\beta$	0.817	0.000	0.791	0.000
D1	-		0.548	0.355
$\alpha + \beta$	0.9936		0.9820	
Durbin-Watson	2.292841		2.1462	
<b>SAUDI ARABIA</b>				
C	1.187	0.000	1.202	0.000
$\alpha$	0.412	0.000	0.410	0.000
$\beta$	0.586	0.000	0.581	0.000
D1	-		0.717	0.656
$\alpha + \beta$	0.9936		0.9820	
Durbin-Watson	1.9141		1.9121	
<b>QATAR</b>				
C	0.015	0.729	0.036	0.447
$\alpha$	0.142	0.000	0.139	0.000
$\beta$	0.850	0.000	0.844	0.000
D1	-		1.071	0.149
$\alpha + \beta$	0.9916		0.9827	
Durbin-Watson	2.062701		2.0666	

Table 7: Results for ARCH-LM Test at 5% Significance Level

<b>GCC ISLAMIC INDEX</b>			
<b>Without Dummy Variable</b>		<b>With Dummy Variable</b>	
F-statistic	0.2145	F-statistic	0.1977
Obs*R-squared	0.2156	Obs*R-squared	0.1987
Prob. F(1,361)	0.6435	Prob. F(1,361)	0.6568
Prob. Chi-Square(1)	0.6424	Prob. Chi-Square(1)	0.6558
<b>BAHRAIN</b>			
<b>Without Dummy Variable</b>		<b>With Dummy Variable</b>	
F-statistic	0.6182	F-statistic	0.2226
Obs*R-squared	0.6205	Obs*R-squared	0.2237
Prob. F(1,361)	0.4322	Prob. F(1,361)	0.6373
Prob. Chi-Square(1)	0.4309	Prob. Chi-Square(1)	0.6362
<b>OMAN</b>			
<b>Without Dummy Variable</b>		<b>With Dummy Variable</b>	
F-statistic	0.5795	F-statistic	0.4398
Obs*R-squared	0.5818	Obs*R-squared	0.4417
Prob. F(1,361)	0.4470	Prob. F(1,361)	0.5077
Prob. Chi-Square(1)	0.4456	Prob. Chi-Square(1)	0.5063
<b>KUWAIT</b>			
<b>Without Dummy Variable</b>		<b>With Dummy Variable</b>	
F-statistic	0.0741	F-statistic	0.1927
Obs*R-squared	0.0745	Obs*R-squared	0.1937
Prob. F(1,361)	0.7856	Prob. F(1,361)	0.6609
Prob. Chi-Square(1)	0.7849	Prob. Chi-Square(1)	0.6599
<b>QATAR</b>			
<b>Without Dummy Variable</b>		<b>With Dummy Variable</b>	
F-statistic	0.4628	F-statistic	0.4147
Obs*R-squared	0.4648	Obs*R-squared	0.4165
Prob. F(1,361)	0.4967	Prob. F(1,361)	0.5200
Prob. Chi-Square(1)	0.4954	Prob. Chi-Square(1)	0.5187
<b>SAUDI ARABIA</b>			
<b>Without Dummy Variable</b>		<b>With Dummy Variable</b>	
F-statistic	0.0381	F-statistic	0.0269
Obs*R-squared	0.0383	Obs*R-squared	0.0271
Prob. F(1,361)	0.8453	Prob. F(1,361)	0.8697
Prob. Chi-Square(1)	0.8448	Prob. Chi-Square(1)	0.8693
<b>UAE</b>			
<b>Without Dummy Variable</b>		<b>With Dummy Variable</b>	
F-statistic	0.1800	F-statistic	0.0699
Obs*R-squared	0.1809	Obs*R-squared	0.0703
Prob. F(1,361)	0.6717	Prob. F(1,361)	0.7917
Prob. Chi-Square(1)	0.6706	Prob. Chi-Square(1)	0.791

## 5. DISCUSSION

The results for the GCC Islamic index do not differ considerably from the conventional GCC indices. Though it is evident that it was not impacted by the financial crisis of 2008 but some other GCC markets like Saudi Arabia, Oman, and Qatar were also not impacted by the financial crisis. Volatility estimates as measured by the standard deviation and then by the GARCH (1,1) model suggest that some of the GCC indices, conventional and Islamic, are inherently volatile and the financial crisis has not lead to exaggerated volatility in these markets. These results are in agreement with Nekhili and Muhammad (2010) who found evidence of high own-volatility spillovers and a high degree of own-volatility persistence in all GCC markets. Khalifa et al. (2012) also suggest that the changes in the oil price can be an underlying cause of volatility in the oil-based GCC markets. The results of this study are partially in line with Marshdeh and Shrestha (2010) and Ravichandran and Maloain (2010) who suggest that find that the GCC stock markets are not integrated with the developed markets of US and Europe; hence the impact of financial crisis is negligible on some GCC markets. On the other hand, Hammoudeh and Li (2008) find

that most of the GCC Arab stock markets are more sensitive to major global events than to local and regional factors. This is partially confirmed with the financial crisis effecting Bahrain, Kuwait and the UAE. The impact of financial crisis on the UAE is understandable as the UAE has attracted a lot of foreign investments in the past decade and has integrated increasingly with the developed markets (Khalifa et al., 2012).

With respect to the GCC Islamic index, the volatility estimates are not very different from that of the conventional indices. The Islamic index also has negative mean returns, high standard deviation, negative skewness and high kurtosis. The volatility persistence is also evident in both conventional and modified GARCH. Hence it could be concluded that in terms of volatility, the GCC Islamic index does not provide a respite to the investors. Though the index seems to be unaffected by the financial crisis of 2008, but there are other GCC markets that also remained unaffected. The results of the study are in line with Hayat and Kraeussl (2011) who also found that the Islamic investments do not provide superior returns as compared to conventional investments. These findings are contrary to the study conducted by Abdullah et al. (2007) who found that the Islamic equity funds perform better in bear markets as compared to bull markets. However, the results of this study suggest that in terms of volatility of Islamic index, there is negligible difference in both bear and bull periods. The results are also in contrast to Al-Zoubi and Maghyereh (2007), which suggests that the DJ Islamic index is less risk than the conventional DJ World Index.

## 6. CONCLUSION

This study examines the performance of the Islamic and conventional indices of the GCC countries in the wake of financial crisis of 2008. The primary objective is to understand whether the volatility in Islamic index was lower than the conventional indices during the financial crisis.

The estimation results reveal that the financial crisis, impacted volatility in some GCC markets (Kuwait, Bahrain, and the UAE), while the impact on the remaining markets (Saudi Arabia, Oman, and Qatar) and the Islamic index was insignificant.

Moreover, our findings indicate that the GCC Islamic index exhibits similar attributes of the conventional indices in all the periods of analysis. In fact, the results show that the GCC Islamic index has similar risk profile as its conventional counterparts. Consequently, GCC investors in Shariah-complaint stocks will not sacrifice financial performance. It remains to be explored if the factors impacting the volatility of the Islamic and conventional indices in the GCC are similar or different.

## AUTHOR INFORMATION

**Hela Miniaoui**, Faculty of Business, University of Wollongong in Dubai, UAE.  
Email: [HelaMiniaoui@uowdubai.ac.ae](mailto:HelaMiniaoui@uowdubai.ac.ae)

**Hameedah Sayani**, Business School, Middlesex University Dubai.  
Email: [h.sayani@mdx.ac](mailto:h.sayani@mdx.ac)

**Anissa Chaibi**, IPAG Business School, Paris, France.  
Email: [Anissa.Chaibi@ipag.fr](mailto:Anissa.Chaibi@ipag.fr)

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**NOTES**