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SHARIAH COMPLIANT STOCK INDEXES: A LONG-TERM PERSPECTIVE

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ABSTRACT

This study considers the performance of U.S. shariah compliant share indexes over the long-term. Despite their relatively short empirical history, we re-construct shariah compliant index returns by mapping their monthly performance to well recognised systematic risk factors from 1927-2011. The findings reveal that these indices are exposed to moderate market beta, large cap and growth stock risk factors. The long-term analysis suggests there are no significant performance differences between the returns from shariah stock indices and the broad U.S. market, even across different U.S. economic and monetary conditions. The findings suggest that shariah compliant investors can deliver similar return and risk characteristics as broad U.S. stocks without compromising their faith based beliefs.

Keywords: Asset pricing; Islamic finance; Investment decisions; Risk exposure.

JEL classification: G11, G12, G14, G17.

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INTRODUCTION

In recent years, the emergence of shariah compliant stock market indexes has allowed investors to allocate capital to listed stocks across various global equity markets whilst conforming with established religious injunctions within the Islamic faith. The norms associated with shariah law is the permissibility of any financial investment provided they do not transgress the injunctions (Kamali, 2004). This compliance regime comprises of various stock screening processes that identify and exclude companies that do not subscribe to shariah norms via the use of specialized financial ratios (DeLorenzo, 2004). The seminal ruling (known as 'fatwa') by Islamic scholars Usmani, Tug and al-Najjar in 1987 effectively opened the global equities market and enabled index sponsors to establish tailor made equity indexes for Islamic investors (see Usmani, 1998). Over the years, Islamic equity funds have proliferated, especially in the Middle and Far East. Ernst and Young (2011) estimate the Islamic investment universe at US$500 billion and the amount of shariah sensitive assets at US$360-US$480 billion. The Pew Research Center (2011) estimates the Muslim population at 1.6 billion or 23% of the world's population. Given the demographic standing of this emerging investor base, it is imperative that the broader finance industry better understands the return and risk behavior of these types of stock investments over the long-term.

One of the first shariah compliant stock indexes developed was the Dow Jones Islamic Market World Index (DJIM World) in 1999. Subsequent shariah compliant stock indexes have been developed by MSCI, Standard and Poor's and other index providers. The relatively short empirical history of these shariah compliant stock indexes makes it difficult to evaluate the investment characteristics of these indexes over the long-term. This information content is critically important in order to understand the similarities and differences in the performance between 'traditional' or 'broad' stock indexes and their shariah compliant counterparts. We consider this issue by employing the methodology of Agarwal and Naik (2004) to model the underlying risk factors of various U.S. shariah compliant stock indexes and to re-construct the monthly returns of these indexes from 1927-2010. This methodological approach was employed in Agarwal and Naik (2004) to model long-term hedge fund returns whilst Bianchi, Bornholt, Drew and Howard (2014) used the technique to construct long-term infrastructure returns. We employ this methodology in this study to provide investors with a long-term perspective of the returns and risks associated with U.S. shariah compliant stock indexes. To our knowledge, this is the first study to construct U.S. shariah compliant stock returns over the long-term using this methodological approach.

Our findings reveal that shariah compliant stock index returns in the U.S. exhibit moderate market beta, large-cap and growth stock risk factors. A preliminary analysis suggests that the

stock screening process of these returns exhibits 'excess return', however, a closer examination demonstrates that these excess returns can be easily explained by one of the 25 Fama and French (1993) SMB and HML breakpoint matching portfolios. The long-term analysis shows that the return and risk characteristics of shariah compliant stock indices are commensurate with a broad index of U.S. stocks. We also compare shariah stock indexes versus broad U.S. stocks under different economic and monetary conditions and the findings reveal no significant performance differences between these respective indexes.

The remainder of this study is organized as follows. The following section introduces the principles and terminology of shariah compliant investing. This is then followed by a discussion of the empirical literature to date. The paper then proceeds to outline the data and methodology. The study then provides the long-term performance under varying U.S. business and monetary conditions. The study then concludes with closing remarks and discussion.

PRELIMINARIES OF SHARIAH INVESTING

Shariah based investment vehicles are relatively new to Islamic finance and are underpinned by legal doctrines established under the Islamic law of financial practices (*fiqh muamalat*). This is evident in the 1987 fatwa where Islamic jurists issued guidance on direct investment in equity markets. While the fatwa set out legal tolerable parameters when dealing with equities and investment practices, it was left largely to market participants, including financial institutions and the mutual fund industry, to design market solutions to facilitate the investment in shariah compliant stocks. The most significant mechanism was the development of shariah stock screening methodologies designed to avoid 'tainted' stocks from an otherwise unconstrained stock universe. Stocks that satisfy the stock screening process are then employed by index providers to construct shariah compliant indexes.

The screening methodology comprises of a number of rules that index providers have standardized to provide clarity and ensure consistency in application. The rules are based on shariah norms determined by Islamic scholars through an extensive process of debate and analogical deductions, after which a scholarly consensual position is expressed through fatwas, shariah standards and practice statements.[1] As a consequence, shariah accepted norms premised on opinions from different juristic schools range in spectrum from conservative to more liberal interpretations of shariah compliance. From a finance perspective, these variations in acceptable

[1] These statements are issued by the Accounting and Auditing Organisation for Islamic Financial Institutions (AAOIFI) and the Malaysian Securities Commission. Shariah Standard No.27 issued by AAOIFI deals specifically with Islamic indexes, their legal character and the basis of use of these indexes.

Table 1
Summary of Investment Screens in U.S. Shariah Compliant Stock Indices

Table 1 presents the stock selection screens of the three U.S. shariah compliant stock indices investigated in this study. The first column details that name and source of the stock index provider. Column 2 details the types of businesses which are permitted or not permitted for shariah compliance. Column 3 details the debt based screens for each index. Column 4 summarizes the tradability ration screens employed in every index. The fifth and final column summarizes the 'cleansing and purification' procedures of each index.

Index	Nature of Business	Debt Based Ratios	Tradability Ratios	Purification
Source: Dow Jones	Avoid alcohol, pork-related products, conventional financial services, entertainment, tobacco, weapons and defense.	Total debt divided by trailing 24 average of the market capitalization must be less than 33%.	* The sum of a company's cash and interest bearing securities divided by trailing 24 month average market capitalization must be less than 33%. * Accounts receivables divided by trailing 24-month average market capitalization must be less than 33%.	No information is available.
Source: MSCI	Not permissible to invest in businesses that derive 5% or more if their cumulative revenue from alcohol, tobacco, pork related products, financial services, defence/weapons, gambling/casino, music, hotels, cinema and adult entertainment.	Total debt over total assets may not exceed 33.33%. Note that shariah compliant debt is excluded from the above ratio.	* The sum of cash and interest bear securities over total assets may not exceed 33.33%. * The sum of accounts receivables and cash over total assets may not exceed 33.33%. * Note that shariah compliant debt is excluded from the above ratios.	Apply "dividend adjusted factor" to all reinvested dividends. Total earnings – [{income from prohibited activities + interest income}] / total earnings. Total earnings = gross income Interest income = operating and non-operating interests.
Source: S&P	Excludes businesses related to the following: pork, alcohol, gambling, financials, advertising and media, pornography, tobacco, trading of gold and silver as cash on a deferred basis.	***Leverage Compliance:*** Debt / Market Value of Equity (12 month average) may not exceed 33%.	***Cash Compliance:*** (i) Accounts Receivables / Market value of Equity (12 month average) may not exceed 49%. (ii) (Cash + interest Bearing Securities) / Market Value of Equity (12 Month Average) may not exceed 33%. ***Revenue Share From non-Compliant Activities:*** (Non-Permissable Income other than Interest Income)/Revenue may not exceed 5%.	The Dividend Purification Ratio is provided to investors for purification purposes and is calculated as: Dividends * (Non Permissable Revenue / Total Revenue) Where non-compliant revenue is earned, 'purification' can be achieving by donating this portion of income to charity.

investment practices reflects the challenge of interpreting historical shariah principles within today's modern world of financial instruments, investment techniques, derivatives and risk management tools. (Khatkhatay and Nisar, 2007)

This variation in the interpretation of shariah compliance has wide and varying effects on investment decision making in the design, construction and implementation of stock indexes and other investments. To address this issue of interpretation, almost all Islamic investment institutions and products operate in conjunction with a shariah advisory board, which provides guidance on the permissible investment universe (Girard and Hassan, 2008).

In principle, the stock selection screens ensure shariah compliance and the various processes for three well-known index providers are summarised in Table 1. The first process screens stocks based on the nature of their business. For example, companies engaged in alcohol and gambling activities are specifically excluded. The next process follows the application of financial screens designed to exclude companies exceeding the bounds of certain financial ratios. Generally, companies whose debts exceed 33% of their total assets (eg. the MSCI index) or market capitalization (eg. DJ and S&P) are also excluded. Tradability ratios screen out companies whose cash and near-cash holdings exceed certain thresholds; and companies whose revenue from interest exceed certain total revenue thresholds. Finally, a 'purification' process is followed whereby the onus is placed on investors to determine the quantum of tainted income from dividends and capital gains and such income is expected to be distributed to charities.

The recent growth in shariah compliant investments has seen the evolution of various stock indexes in the United States and globally. Every stock index has its own shariah advisory board and legally interpretive differences between Islamic scholars results in variations in the stock selection process of every shariah compliant index (Dar Al Isthithmar, 2009). For example, Table 1 shows that S&P and Dow Jones employ financial ratios based on market capitalization while MSCI construct their financial ratios based on the total assets of each firm. The shariah advisory boards of these index providers have developed their own financial ratios in order to screen companies without incurring excessive portfolio turnover and transaction costs in order to observe shariah compliance. For example, the Dow Jones based index calculates the 24 month trailing average of market capitalization. The S&P Index calculates the 12 month trailing average of market capitalization. Alternately, the MSCI Index uses total assets as the measure rather than the market capitalization, which naturally reduces the volatility of the denominator in the calculations, thereby reducing portfolio turnover and frequent changes in the constituents of the index.

EMPIRICAL LITERATURE

Given the commonalities and variations of current shariah stock selection screens (see Derigs and Marzban, 2008), it is important that investors understand the behavior of Islamic stock index returns from previous studies. From an asset pricing perspective, Hussein (2004) employs the single-factor Capital Asset Pricing Model (CAPM) to show that global Islamic stock index returns exhibit a marginally higher beta than world stocks. The subsequent work by Girard and Hassan (2008) employ the Carhart (1997) four-factor model to reveal that global Islamic stock returns exhibit a negative global HML factor loading (ie. the focus towards growth stocks) and a positive SMB factor loading in their returns. In terms of performance evaluation, studies such as Hussein (2004) uses the Jensen (1968) model and Girard and Hassan (2008) employs the Carhart (1997) model to find no significant performance differences between global Islamic stock returns versus world stocks. Overall, the literature suggests that the performance and behavior of global Islamic stock returns are similar to global equity index returns.

Given the importance of minimizing financial leverage in the firms that are included in shariah compliant stock indexes (see the debt based ratios in Table 1), investors need to understand the implications of this stock selection process. Myers (1993) shows that the empirical literature regarding the relationship between returns and financial leverage is mixed. Opler and Titman (1994) show that U.S. stock returns of less leveraged firms in distressed industries are significantly higher than their more leveraged competitors. Empirical studies by Fama and French (1998, 2002), Rajan and Zingales (1995), Shyam-Sunder and Myers (1999), Titman and Wessels (1988), and George and Hwang (2010) demonstrate a negative relationship between corporate leverage and firm profitability (ie. more profitable firms are less levered). George and Hwang (2010) attribute the negative relationship between corporate leverage and firm profitability to U.S. firms with high costs who therefore choose lower levels of leverage and therefore exhibit lower probabilities of default. George and Hwang (2010) also find that low leverage firms exhibit lower probabilities of financial distress and greater exposure to systematic risk in comparison to high leverage firms. This finding explains the negative relationship between expected returns and (i) leverage and (ii) the probability of distress. Given these findings, we would expect that shariah compliant stock indexes would exhibit behavior akin to indexes with firms with limited leverage in their capital structure.

Table 2
Summary Statistics and Time Series Diagnostics

This table presents the summary statistics and time series diagnostics of the data employed in this study for the period to 31st December 2011. We report the results for the U.S. shariah compliant stock indexes which are the Dow Jones Islamic Market U.S. Total Return Index (DJIMUSTRI), MSCI U.S. Islamic Index (MSCIUSII) and the S&P500 Shariah U.S. Total Return Index (SPSUSTRI). We also report the statistics of the Fama and French (1992, 1993) U.S. Stock returns (Rm), SMB and HML risk factors and the U.S. 1 month Treasury-bill which is the proxy for the risk-free rate. Panel A presents the commencement month and year of the time series, number of monthly data observations, monthly mean, monthly standard deviation (SD), median, skewness (Skew), kurtosis (Kurt), maximum (Max) and minimum (Min) returns for each data series. Panel B reports the autocorrelation of monthly returns from one month (AC1) to six months (AC6). Panel C presents the autocorrelation of squared returns from one to six months. Panel D reports a variety of stationarity tests including the Augmented Dickey Fuller (ADF) test, the nonparametric Phillips-Perron (PP) test and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. All stationarity tests include an individual intercept (Int.) and an individual intercept and trend (Int. & T.) in the test equation. * and ** denote statistical significance at the 5% and 1% levels, respectively.

	Islamic Finance U.S. Stock Indices			*Assets and Risk Factors*			
	DJIMUSTRI	MSCIUSII	SPSUSTRI	U.S. Stocks	SMB	HML	T-Bills
Panel A: Descriptive Statistics							
Date	01-1996	06-2002	09-2007	01-1927	01-1927	01-1927	01-1927
No. of Obs.	192	115	52	1020	1020	1020	1020
Mean	0.76	0.54	0.26	0.91	0.24	0.39	0.29
Std. Dev.	5.14	4.37	5.29	5.45	3.32	3.57	0.25
Median	1.28	1.06	0.91	1.25	0.07	0.22	0.26
Skew	-0.51	-0.66	-0.50	0.14	2.17	1.84	1.03
Kurt.	3.20	4.15	3.02	10.21	24.98	18.60	4.23
Max.	11.50	11.40	10.75	37.87	39.04	35.48	1.35
Min.	-15.63	-15.25	-14.84	-28.95	-16.39	-13.45	-0.06
Panel B: Autocorrelation (First Moment)							
AC1	0.06	0.13	0.18	0.11**	0.30**	0.19**	0.97**
AC2	0.00	0.01	-0.03	-0.02	0.17**	-0.01	0.96**
AC3	0.09	0.09	0.14	-0.09	0.23**	-0.04	0.95**
AC6	0.02	-0.05	-0.27	-0.04	0.11**	-0.01	0.92**
Panel C: Autocorrelation (Second Moment)							
AC1	0.22**	0.28**	0.15	0.30**	0.10**	0.39**	0.94**
AC2	0.13	0.02	-0.13	0.17**	0.03	0.08*	0.90**
AC3	0.12	0.09	-0.11	0.23**	0.05	0.11*	0.88**
AC6	0.15*	0.11	0.00	0.11**	0.02	0.13**	0.85**
Panel D: Stationarity Tests							
ADF(Int.)	-13.02**	-9.46**	-5.87**	-28.53**	-29.71**	-26.39**	-2.34
ADF(Int. & T.)	-13.07**	-9.41**	-5.99**	-28.52**	-29.70**	-26.37**	-2.39
PP(Int.)	-13.06**	-9.46**	-5.85**	-28.41**	-29.69**	-26.02**	-2.72
PP (Int. & T.)	-13.09**	-9.41**	-5.99**	-28.40**	-29.68**	-26.00**	-2.82
KPSS(Int.)	0.23	0.06	0.18	0.04	0.08	0.04	1.48**
KPSS (Int. & T.)	0.12	0.06	0.08	0.04	0.05	0.03	0.56**

As we are interested in the long-term characteristics of shariah compliant stock returns, it is also important to understand their behavior across the U.S. business cycle. Studies by Fama (1990), Schwert (1990) and Choi, Hauser and Kopecky (1999) suggest a relationship between industrial production and lagged real stock returns. To date, there is no knowledge of the likely performance of shariah compliant stock performance over the U.S. business cycle. The aversion towards financial leverage suggests that shariah compliant stock indexes are likely to outperform broad U.S. stocks during economic downturns. We attempt to measure this likely outperformance in this study.

Finally, we are interested in the long-term behavior of shariah compliant indexes during changes in U.S. monetary conditions. This is especially interesting for shariah based investments as they are less likely exhibit sensitivities to interest rate changes due to the exposure to lower levels of financial leverage. The voluminous studies in this area including Patelis (1997), Thorbecke (1997), Rapach (2001) and Lastrapes (1998) suggest that expansionary monetary conditions increases stock prices. Again, there is no known study that measures the performance of shariah compliant stock returns during changes in U.S. monetary conditions. We aim to provide some insights to this question.

DATA

We employ three of the most popular shariah compliant stock indexes employed by investors. The U.S. The Dow Jones Islamic Market U.S. Total Return Index (DJIMUS) provides the returns with the longest history dating back to January 1996. As a comparison, we also employ the MSCI U.S. Islamic Index (MSCIUSII) and the S&P500 Shariah Total Return Index (SPSTRI) with return histories commencing in June 2002 and September 2007, respectively.

Table 2 presents the summary statistics of the respective shariah compliant stock index returns and the systematic risk factors employed in the Fama and French (1993) three-factor asset pricing model, namely, the market beta (the U.S. market return less the risk-free rate), the zero-cost portfolio mimicking the size premium (SMB) and the zero-cost portfolio mimicking the value premium (HML). Panel A shows that shariah compliant stock indexes exhibit lower return and risk characteristics than broad U.S. stocks, however, the comparison is difficult due to the short empirical history of these new investments. Panels B and C reveal that a large proportion of the variables employed in this study exhibit autocorrelation and heteroskedasticity, and therefore, we need to be cognizant of these empirical characteristics in the data when performing our analysis in the latter sections of this study. Panel D reports both parametric and

Table 3
Fama and French Model (Full-Sample) Regression Estimates

This table presents the Fama and French (1993) three-factor model regression results for the various shariah compliant stock index excess returns for their full sample periods to 31st December 2011. Panel A presents the regression estimates for the Dow Jones Islamic Market U.S. Total Return Index (DJIMUSTRI). Panel B reports the MSCI U.S. Islamic Index (MSCIUSII). Panel C presents the S&P500 Shariah U.S. Total Return Index (SPSUSTRI). The table presents the regression estimates with the intercept (C), Fama-French excess return (Rm-Rf), Fama-French Small-Minus-Big zero financing portfolio risk factor (SMB), Fama-French High-Minus-Low book value to market ratio zero financing portfolio risk factor (HML) and the respective adjusted R^2. The table reports the regression coefficients, Newey and West (1987) heteroskedasticity and autocorrelation-consistent (HAC) standard errors, *t*-statistics and *p*-values. Various regression diagnostics include the Godfrey (1978) LM Test for no residual autocorrelation up to the 2nd order, ie. $\chi^2(2)$; Engle (1982) F-Statistic ARCH Test with a lag order of 2; White (1980) F-Statistic Test for heteroskedasticity; Ramsey (1969) RESET Test for the linear functional form (original regressors plus the squared fitted values) and the Chow (1960) F-Statistic with the breakpoint selected at the midpoint of each sample. * and ** denote statistical significance at the 5% and 1% levels, respectively.

Variables	C	Rm-Rf	SMB	HML	Adj R^2	Regression Diagnostics
Panel A: DJIMUSTRI excess returns – January 1996 to December 2011 (192 obs.)						
Coefficient	0.002	0.983	-0.060	-0.287	0.965	
Standard Error	0.001	0.018	0.028	0.018		
t-statistic	2.794**	56.318**	-2.162*	-15.619**		
p-value	0.006**	0.000**	0.032*	0.000**		
Godfrey LM Test						1.370
Engle F-Statistic						1.441
White F-Statistic						1.427
Ramsey RESET						0.638
Chow F-Statistic						1.370
Panel B: MSCIUSII excess returns – June 2002 to December 2011 (115 obs.)						
Coefficient	0.001	0.954	-0.138	-0.199	0.961	
Standard Error	0.001	0.021	0.034	0.030		
t-statistic	1.725	46.468**	-4.065**	-6.728**		
p-value	0.087	0.000**	0.000**	0.000**		
Godfrey LM Test						0.049
Engle F-Statistic						0.075
White F-Statistic						1.092
Ramsey RESET						1.266
Chow F-Statistic						2.186
Panel C: SPSUSTRI excess returns – Sep 2007 to December 2011 (52 obs.)						
Coefficient	0.002	0.960	-0.141	-0.225	0.979	
Standard Error	0.001	0.018	0.035	0.027		
t-statistic	1.371	53.545**	-4.009**	-8.421**		
p-value	0.177	0.000**	0.000**	0.000**		
Godfrey LM Test						0.129
Engle F-Statistic						2.662
White F-Statistic						1.527
Ramsey RESET						0.366
Chow F-Statistic						1.780

nonparametric tests of stationarity which show that all assets in this study are stationary (with no unit root) with the exception of the Treasury-Bills. The U.S. Government 1 month T-Bill is the proxy for the risk-free rate in our study which exhibits nonstationarity due to its positive and persistent monthly returns. Whilst the risk-free rate is used to calculate excess returns, it is important to note that the U.S. stock excess returns in our analysis remains stationary.

It is clear from Table 2 that the descriptive statistics of the data are sufficiently different; however, it is difficult to make a direct comparison because the shariah index returns exhibit a relatively short empirical history in comparison to the long-term data for U.S. stocks, the SMB and HML systematic risk factors. We address this empirical challenge in the following sections of this paper.

ASSET PRICING CHARACTERISTICS

To understand the systematic risk factors that potentially explain U.S. shariah compliant stock index returns, Table 3 reports the regressions derived from the Fama and French (1993) three-factor model. Given the empirical features of autocorrelation and heteroskedasticity in our data (previously reported in Table 2), we employ Newey and West (1987) heteroskedasticity and autocorrelation consistent (HAC) standard errors in all of the regressions in this study. Table 3 shows that all U.S. shariah compliant stock indexes exhibit significantly moderate market beta, large market capitalization and growth risk factor characteristics with very high adjusted-R^2 estimates. The finding of a large cap risk premium in U.S. shariah stock indexes differs to Girard and Hassan (2008) who estimate a small cap risk premium in FTSE global shariah stock indexes by using global Fama-French risk factors. Research by Griffin (2002) shows that country-specific (domestic) versions of the Fama and French (1993) three-factor model are more useful at explaining the time-series variation in portfolio stock returns (such as shariah compliant stock indexes) than a world or global three-factor model. Griffin (2002) finds a considerable difference between domestic versus global three-factor models of 8.41% per year, on average. The subsequent work of Hou, Karolyi and Kho (2011) further supports this finding. Given this evidence, we are confident that our findings are more reliable than Girard and Hassan (2008) given that we are employing U.S. domestic Fama and French (1993) risk factors on U.S. shariah compliant stock index excess returns.

The regression diagnostics reported in Table 3 allow us to examine the level of model misspecification between the independent variables (ie. the Fama and French (1993) systematic risk factors) and their explanatory power of the various U.S. shariah compliant stock indexes. The Godfrey (1978) Lagrange Multiplier (LM) test statistics (with a lag order of two months),

Engle (1982) and White (1980) test statistics are insignificant which suggests that the issues of autocorrelation and heteroskedasticity are not a significant problem as initially mentioned in the preliminary results from Table 2 Panel C. Nevertheless, we employ Newey and West (1987) standard errors in the regression analysis which minimizes any effects relating to autocorrelation and heteroskedasticity. The Ramsey (1969) RESET tests for linear functional form and the Chow (1960) test for structural stability both indicate that the Fama and French (1993) three-factor model employed in this study is well specified at explaining U.S. shariah compliant stock index returns across the full sample. Overall, the regression results and explanatory power reported in Table 3 gives us confidence that the well known systematic risk factors from Fama and French (1993) can explain shariah compliant stock index returns.

Table 4
Excess Performance to a Matched FF Size and Book-to-Market Portfolio

This table presents the regression results of the U.S. shariah compliant stock index excess returns matched to one of the 25 Fama and French (1993) ("FF") size and book-to-market breakpoint portfolios. The closest matched portfolio is estimated by minimizing the mean squared deviations between the U.S. shariah compliant excess returns (ie. dependent variables) and one of the 25 FF portfolios returns (ie. the independent variable candidate). The FF portfolio with the smallest mean squared deviation is selected as the matched FF portfolio. Every U.S. shariah compliant stock index in this Table was matched to the FF Portfolio No.21, which represents a large market-capitalization and low book-to-market ratio portfolio. We report the regression coefficients, standard errors, *t*-statistics and *p*-values. The regression employs Newey and West (1987) heteroskedasticity and autocorrelation-consistent (HAC) standard errors. * and ** denote statistical significance at the 5% and 1% levels, respectively.

Index Name	Variable of Interest	Alpha	FF Portfolio Matched Beta	Adj. R^2
Panel A: DJIMUSTRI				
	Regression Coefficient	-0.002	1.008	0.930
	Standard Error	0.001	0.022	
	t-statistic	-1.742	45.441**	
	p-value	0.083	0.000**	
Panel B: MSCIUSII				
	Regression Coefficient	-0.000	0.951	0.912
	Standard Error	0.001	0.031	
	t-statistic	-0.032	30.729**	
	p-value	0.975	0.000**	
Panel C: SPSUSTRI				
	Regression Coefficient	-0.001	0.961	0.951
	Standard Error	0.002	0.034	
	t-statistic	-0.535	27.998**	
	p-value	0.595	0.0000**	

RISK-ADJUSTED PERFORMANCE

The findings in Table 3 suggest that the Fama and French (1993) three-factor model in the U.S. is efficient at explaining the variation of U.S. shariah compliant stock index excess returns. The excess returns or alphas (ie. the intercept terms) in Table 3 are not statistically significant with the exception of the DJIMUSTRI in Panel A. To more accurately measure the possibility of abnormal excess returns, we follow the approach of Chan, Dimmock and Lakonishok (2009) and de Souza and Lynch (2011) by matching the performance of the shariah compliant stock indexes to one of the 25 Fama-French (hereafter 'FF') size and book-to-market ratio breakpoint portfolios.[2] The aim of this analysis is to evaluate whether the intercept terms in Table 3 are a function of the stock screening process of these U.S. shariah compliant stock indexes or whether the excess return is attributable to the underlying stocks held in the shariah compliant stock indexes. We calculate the mean-squared deviation between the factor loading of the shariah compliant stock index and the FF portfolios as a matching criterion. We seek the FF portfolio with the lowest mean-squared deviation. When the indexes are matched to their respective FF portfolio, we re-estimate the excess return by using the matched FF portfolio as the market beta in a single-factor regression. Table 4 presents the regression results of these matching portfolios.

Table 4 reports no statistically significant excess returns (alpha) when the three U.S. shariah compliant stock indexes are matched to their respective FF size and book-to-market portfolios. This performance evaluation method informs us that the excess return previously reported in Table 3 is not a function of the stock selection process of the shariah compliant stock indexes, but rather, it is a function of the composition of the underlying stocks held in these indexes. Overall, the findings in Table 4 demonstrate that these indexes are comprised of firms that exhibit large market capitalization and low book-to-market ratios (ie. growth stocks).

[2] The data for the breakpoint portfolios are available at the Professor Kenneth French Data Library website.

Table 5
Fama and French Model Regression Estimates (In-Sample Period)

This table presents the Fama and French (1993) three-factor model regressions for the various shariah compliant stock index excess returns for the first half of their respective sample periods. Panel A presents the regression estimates for the Dow Jones Islamic Market U.S. Total Return Index (DJIMUSTRI) for the in-sample period from January 1996 to December 2003 consisting of 96 monthly observations. Panel B reports the MSCI U.S. Islamic Index (MSCIUSII) for the in-sample period from June 2002 to March 2007 consisting of 58 monthly observations. Panel C shows the S&P500 shariah U.S. Total Return Index (SPSUSTRI) for the in-sample period from September 2007 to October 2009 consisting of 26 monthly observations. The table reports the regression intercept term (C), Fama-French excess return (Rm-Rf), Fama-French Small-Minus-Big zero financing portfolio risk factor (SMB), Fama-French High-Minus-Low book value to equity ratio zero financing portfolio risk factor (HML) and the respective adjusted R^2. The table reports the regression coefficients, Newey and West (1987) heteroskedasticity and autocorrelation-consistent (HAC) standard errors, *t*-statistics and *p*-values. * and ** denote statistical significance at the 5% and 1% levels, respectively.

Variables	C	Rm-Rf	SMB	HML	Adj R^2
Panel A:					
DJIMUSTRI excess returns – January 1996 to December 2003 (96 obs)					
Regression Coefficient	0.0033	0.9541	-0.0860	-0.3354	0.9635
Standard Error	0.0013	0.0347	0.0345	0.0382	
t-statistic	2.5933*	27.4572**	-2.4921*	-8.7854**	
p-value	0.0111*	0.0000**	0.0145*	0.0000**	
Panel B:					
MSCIUSII excess returns – June 2002 to Mar 2007 (58 obs.)					
Regression Coefficient	-0.0004	1.0181	-0.1473	-0.0728	0.9592
Standard Error	0.0008	0.0334	0.0436	0.0591	
t-statistic	-0.4946	30.4773**	-3.3749**	-1.2329	
p-value	0.6229	0.0000**	0.0014**	0.2229	
Panel C:					
SPSUSTRI excess returns – Sep 2007-Oct 2009 (26 obs.)					
Regression Coefficient	0.0044	0.9460	-0.1553	-0.2408	0.9719
Standard Error	0.0020	0.0263	0.0680	0.0523	
t-statistic	2.2192*	35.9822**	-2.2848*	-4.6037**	
p-value	0.0371*	0.0000**	0.0323*	0.0001**	

Table 6
Out-of-Sample *t*-test, Wilcoxon signed-rank and F-test Statistics

This table presents the parametric *t*-test for difference in means, the nonparametric Wilcoxon signed-rank test for difference in medians and the parametric *F*-test for difference in variances. The two time series employed in each hypothesis test are (i) the out-of-sample empirical returns of the each U.S. shariah compliant stock index and (ii) the modelled returns for each index constructed by using the regression coefficient estimates in Table 5. For the DJIM U.S. Total Return Index, the out-of-sample period is from January 2004 to December 2011 comprising of 96 monthly observations. The out-of-sample period for the MSCI U.S. Islamic Index is from April 2007 to December 2011 consisting of 57 monthly observations. The out-of-sample period for the S&P500 Shariah U.S. Total Return Index is from November 2009 to December 2011 consisting of 26 monthly observations.

Index Name		t-test	Sign test	F-test
DJIM U.S. Total Return Index	test statistic	-0.3150	0.2507	1.1427
	p-value	0.7531	0.8021	0.5170
MSCI U.S. Islamic Index	test statistic	-0.2978	0.3344	1.2060
	p-value	0.7664	0.7381	0.4857
S&P500 Shariah U.S. TR. Index	test statistic	-0.3358	0.2837	1.1610
	p-value	0.7384	0.7767	0.7120

Table 7
Long-Term Measures of Excess Return and Risk

This table reports the mean, standard deviation (SD), median, minimum (Min), maximum (Max), empirical Value-at-Risk (VaR) and empirical Expected Tail Loss (ETL) reported as a percentage at the 95% and 99% confidence levels for the monthly excess returns of the DJIM U.S. Total Return Index and the U.S. Composite stock market Index. Panels A and C report the statistics for the January 1927 to December 1995 sample period. Panels B and D summarize the statistics for the January 1996 to December 2011 sample period.

Mean	SD	Median	Min.	Max.	VaR 95%	VaR 99%	ETL 95%	ETL 99%
Panel A: DJIM U.S. Total Return Index Excess Return (Jan 1927 to Dec 1995)								
0.80	5.00	1.12	-25.10	29.73	-7.12	-13.05	-11.30	-19.09
Panel B: DJIM U.S. Total Return Index Excess Return (Jan 1996 to Dec 2011)								
0.52	5.13	1.13	-15.71	11.50	-8.33	-14.13	-11.49	-15.01
Panel C: U.S. Composite Market Excess Return (Jan 1927 to Dec 1995)								
0.66	5.59	0.95	-28.98	37.77	-8.00	-14.56	-12.63	-20.82
Panel D: U.S. Composite Market Excess Return (Jan 1996 to Dec 2011)								
0.41	4.85	1.14	-17.23	11.34	-8.15	-11.21	-10.97	-16.66

MODELLING MONTHLY RETURNS

We now seek to understand the behavior of U.S. shariah compliant stock index returns over the long-term. To achieve this, we employ the Agarwal and Naik (2004) methodology which involves regressing the U.S. shariah index returns against the Fama and French (1993) three-factor model on the first half of the empirical returns (in-sample) of the shariah indexes. We then employ the regression coefficients from this OLS estimation to construct a set of hypothetical shariah compliant index returns by using the Fama and French (1993) systematic risk factors over the second half (out-of-sample) of the data sample. We then run a variety of hypothesis tests to calculate whether the *empirical* out-of-sample shariah compliant index excess returns are statistically similar to the *modelled* out-of-sample shariah compliant index excess returns. This procedure tests whether the Fama and French (1993) regressions coefficients in the in-sample data period are efficient at modelling the empirical shariah compliant stock index excess returns during the out-of-sample period.

Table 5 presents the results of the U.S. shariah compliant stock index excess returns regressed against the Fama and French (1993) three-factor model during the in-sample period for each index. Table 5 reveals that all three U.S. shariah compliant stock index returns exhibit statistically significant market betas (Rm-Rf) and negative loadings for the HML risk factor. The very high adjusted-R^2s in Table 5 suggest that the Fama and French (1993) three-factor model is efficient at explaining the variation of U.S. shariah compliant stock index excess returns. Finally, two of three intercept terms in Table 5 are significant, however, the FF characteristic matching portfolio test previously reported in Table 4 reveals that these excess returns are not due to abnormal performance.

We now evaluate whether the in-sample regression coefficients estimated in Table 5 are effective at explaining the out-of-sample performance of the U.S. shariah compliant stock indexes. Table 6 presents the hypothesis tests that compare the statistical differences between the out-of-sample *empirical* returns and the out-of-sample *modeled* returns. Table 6 reports that all hypothesis tests are not significant meaning that the mean, median and variances of the *empirical* and *modelled* returns are statistically similar. The results in Table 6 gives us confidence in employing the in-sample regression coefficients from Table 5 to re-construct U.S. shariah compliant stock index returns going back in history as far back as the availability of data for the Fama and French (1993) systematic risk factors.

LONG-TERM RETURN AND RISK

The findings in Tables 5 and 6 allow us to employ the Fama and French (1993) factor loadings and construct the hypothetical excess returns of the DJIMUSTRI over the long-term. In the interest of brevity, we limit this analysis to one U.S. shariah compliant stock index only as the findings for the other indexes corroborate with the findings from the DJIMUSTRI. Table 7 compares the long-term modelled returns versus the short-term empirical returns of the DJIMUSTRI and broad U.S. stocks from January 1927 onwards, representing more than 83 years of monthly returns.

Panel A of Table 7 reports the long-term returns of the DJIMUSTRI which exhibit minimum and maximum monthly returns that are almost two to three times the magnitude of the short-term returns in Panel B. Furthermore, the 99% Expected Tail Loss (ETL) for the long-term returns in Panel A are estimated to be -19.73% which is one-third larger than the tail loss being observed in the short-term returns in Panel B. In summary, the return and risk measures of the DJIMUSTRI are greater in the long-term than in the short-term.

To better understand the return behavior, Panels C and D of Table 7 report the empirical returns of the U.S. composite value weighted stock market index from 1927-2010 and is divided into the same sub-sample periods as Panels A and B. Panel C shows that the returns and risks of the broad U.S market from 1927-1995 are larger in magnitude in comparison to the shorter sample period in Panel D. These findings for broad U.S. stocks are consistent and directly comparable with the variations of risk and return of the DJIMUSTRI in Panels A and B.

Overall, Table 7 reveals that the DJIMUSTRI and the broad U.S. market exhibit higher levels of return and risk (standard deviation, minimum monthly returns and tail-risk) over the long-term compared with those in the recent past. The evidence suggests that long-term investors in the DJIMUSTRI are likely to experience more extreme positive/negative monthly returns and tail-risk losses than those empirically observed in recent years.

Table 8
Performance in U.S. Business Cycles

This table presents the monthly and annualized mean returns and standard deviation of excess returns of the Dow Jones Islamic Market U.S. Total Return Index (DJIMUSTRI) and the U.S. Composite Index from 1927-2011. The first two columns of data report the monthly statistics and the annualized equivalents are in parentheses. The column header Obs. denotes the number of monthly observations. The column header Eq.(Mean) denotes the equality of mean test. The column header Eq.(Median) denotes the nonparametric Wilcoxon signed ranks test which is an equality of median test. The column header Eq.(Variance) denotes the *F*-test which measures the equality of variance between two groups. Panel A reports the statistics during months of economic contraction as defined by the National Bureau of Economic Research (NBER). Panel B reports the statistics during months of economic expansion as defined by NBER.

	DJIMUSTRI	U.S. Composite	Obs.	Eq.(Mean)	Eq.(Median)	Eq.(Variance)
Panel A: Economic Contraction Periods						
Mean	-0.52% (-6.24%)	-0.29% (-3.43%)	197	-0.3002	0.4468	1.2650
Std. Dev.	8.25% (28.58%)	7.33% (25.39%)				
Panel B: Economic Expansion Periods						
Mean	0.89% (10.68%)	0.97% (11.64%)	823	-0.3922	0.5491	1.1078
Std. Dev.	4.53% (15.69%)	4.30% (14.90%)				

PERFORMANCE OVER THE U.S. BUSINESS CYCLE

The long-term monthly returns of U.S. shariah compliant stock indexes allow us to evaluate their performance across the U.S. business cycle. This knowledge is important for long-term investors given the emphasis of low financial leverage within the universe of U.S. shariah compliant stocks. We expect U.S. shariah compliant stock indexes to outperform the broad U.S. market during periods of economic downturn due to the lower levels of financial leverage associated with these indexes.

Table 8 presents the performance of the DJIM U.S. Total Return Index versus the broad U.S. market during months of U.S. economic contractions and expansions as defined by the National Bureau of Economic Research (NBER). Panels A and B report no significant performance differences between the two indexes during months of U.S. economic contraction and expansion. Overall, the findings in Table 8 suggest that there are no significant performance differences in owning shariah compliant stocks relative to the broad U.S. market despite their exposure to moderate beta, large cap and growth risk factors that are inherent in shariah compliant stock index returns. The evidence suggests that the emphasis on low financial leverage in shariah stock indexes does not translate into significant performance differences compared to broad U.S. market across the U.S. business cycle.

PERFORMANCE DURING CHANGES IN U.S. MONETARY CONDITIONS

Finally, we are motivated to compare the performance of the shariah compliant stock index versus the broad U.S. market during changes in U.S. monetary conditions. Waud (1970) and Laurent (1988) suggest that the U.S. discount rate provides a strong monetary indicator that signals changes in monetary developments and real output in the U.S. economy. The emphasis of low financial leverage in shariah compliant stock indexes provides the motivation to examine whether changes in U.S. monetary conditions cause significant performance differences between shariah compliant stock returns versus the broad U.S. market.

Table 9
Performance in U.S. Monetary Conditions, 1971-2011

This table presents the performance of the excess returns of the Dow Jones Islamic Market U.S. Total Return Index (DJIMUSTRI) versus the U.S. value-weighted composite stock index (U.S. Composite) over various U.S. monetary conditions. Panel A reports the performance of the two stock indexes during months when U.S. monetary conditions changed. Panel B reports the performance of the two stock indexes for all months during the expansionary or contractionary monetary phases. Eq.(Mean) denotes the parametric equality of means test. Eq.(Median) denotes the nonparametric Wilcoxon signed ranks test for equality of median. Eq.(Variance) denotes the *F*-test which measures the equality of variance.

	Expansive Environment			Restrictive Environment		
Index Name	Monthly Return	Monthly Std. Dev.	Test Statistic	Monthly Return	Monthly Std. Dev.	Test Statistic
Panel A: Months during changes in monetary conditions						
DJIMUSTRI	1.93%	5.73%		0.51%	4.11%	
U.S. Composite	1.69%	5.61%		0.22%	3.82%	
Eq.(Mean)			0.2244			0.3716
Eq.(Median)			0.3168			0.2623
Eq.(Variance)			1.0426			1.1559
Panel B: All months during expansionary/contractionary phases						
DJIMUSTRI	0.91%	4.81%		0.26%	4.86%	
U.S. Composite	0.80%	4.63%		0.13%	4.69%	
Eq.(Mean)			0.2762			0.2937
Eq.(Median)			0.3242			0.2597
Eq.(Variance)			1.0791			1.0742

To measure U.S. monetary conditions, we employ data sourced from the Federal Reserve Bank of New York, which contains the historical changes in the U.S. Federal Reserve discount rate from 1971-2010. We classify the months when U.S. monetary conditions change as either expansive or restrictive depending upon whether the change in the discount rate exhibits a positive (ie. restrictive) or negative (ie. expansive) sign.

Panel A of Table 9 reports the short-term performance of the indexes during months when U.S. monetary conditions changed and Panel B presents the performance over multiple months during expansionary and restrictive monetary phases. As expected, Panels A and B show that the performance for both indexes are higher when experiencing expansive monetary conditions than during restrictive policy signals. The analysis in Table 9 suggests that there are no significant performance differences between the two indexes during expansive and restrictive phases in U.S. monetary conditions. These results suggest that the sensitivity to interest rates by shariah stock indexes is similar to those experienced in broad U.S. stocks.

CONCLUDING REMARKS

Shariah law shapes the financial decision-making of investors willing to adhere to their faith-based beliefs in the world of modern investing. The principles of shariah-compliant stock investments are built around the aversion of excessive financial leverage, no earning of interest, cash valued at par, and the inclusion of lawful businesses that operate in compliant industries.

This study examined the short-term empirical history of U.S. shariah stock index returns and employed the Agarwal and Naik (2004) procedure to construct long-term monthly returns from January 1927 through December 2010. This procedure allowed us to examine the performance characteristics of U.S. shariah stock indexes over the long-term across various business cycles and monetary conditions.

The study showed that shariah compliant stock indexes exhibit characteristics associated with moderate beta, large-cap and growth risk factors. A conventional Fama and French (1993) performance evaluation did not clearly reveal whether U.S. shariah compliant stock indexes exhibit excess returns. To address this, we employed a characteristic matching portfolio approach and revealed that these indexes do not provide alpha to investors.

We then analyzed the long-term returns of the U.S. shariah compliant stock indexes and revealed that these indexes can potentially exhibit larger magnitudes of return and risk. The long-term analysis also revealed that these long-term measures of risk associated with shariah compliant stock indexes are commensurate with the risks associated with the broad U.S. market. The long-term performance of U.S. shariah compliant stock returns over the U.S. business cycle was also considered. Our results suggest that there are no significant performance differences between shariah compliant indexes and broad U.S. stocks. Finally, we explored the long-term performance of shariah compliant stock returns during changes in U.S. monetary conditions. Again, we found no significant differences in performance between U.S. shariah compliant stock indexes and broad U.S. stocks.

We draw a number of implications from this analysis. First, our findings suggest that investors holding portfolios that mimic popular shariah-compliant stock indexes receive an investment exposure that delivers similar rewards and risks as broad U.S. stocks. This is significant as investors who adhere to shariah-based principles can employ these indexes to earn the U.S. equity risk premium over the long-term whilst remaining true to their faith. Finally, this long-term study increases investor confidence in the behavior of U.S. shariah compliant stock indexes. A deeper understanding of the long-term returns of this faith-based product innovation builds a bridge for finance industry professionals to further engage with this growing segment of the market.

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Comparative Analysis of Customer Satisfaction on *Takaful* and Conventional Insurance in Malaysia

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Abstract

Customer satisfaction is essential for insurance and *takaful* companies to stay competitive as the customer is the key source of revenue for such organizations. Because *takaful* and conventional insurance are considered competitors within the insurance industry, *takaful* operators must offer products and services that customers would be highly satisfied with so as to compete effectively with conventional insurance. For both *takaful* and conventional insurance, customer satisfaction would increase profits as well as increase frequency of purchases, increased loyalty, and retention of the customer. This study examines the level of customer satisfaction on *takaful* operators as well as conventional insurance companies in Malaysia. A sample of 575 respondents from various cities representing different states in Malaysia was selected. The results in this study suggest that customers are mostly satisfied with the products and services offered by *takaful* and insurance companies which include the quality of agents and staff; easy access to customer service; ease of transaction and online service; product range; and claim procedures. However, the results show that insurance companies provide better services to customers than *takaful* companies assessed based on the last time service received. In terms of overall satisfaction on claim procedures, *takaful* companies are found to provide more efficient procedure compared to insurance companies.

Keywords: Customer satisfaction, *takaful*, insurance, Islamic insurance, Malaysia

JEL Classification Code: G22

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1. INTRODUCTION

Takaful is an Islamic alternative to conventional insurance. It is a form of mutual help (*ta'awun*) in advancing good or virtue through risk sharing where society members safeguard each other from perils and misfortunes. The history of Islamic insurance can be traced back during Prophet Muhammad's lifetime where he established the principle of shared responsibility called "*Aqilah*" for every tribe of Madinah. Under this system, in the event of disaster, everyone would contribute until the disaster was relieved. This system embodies element of shared responsibility, common benefit and mutual solidarity among the society. In the modern *takaful* or Islamic insurance, *takaful* participants contribute to a *takaful* fund based on the concept of mutual assistance – guaranteeing each other from specific losses. Contribution is done via reciprocal or mutual donation (*tabarru'at*) and does not represent a commercial "sale of coverage". By many accounts, the development of modern *takaful* was initiated in Sudan in 1979 due, in part, to the growth of Islamic banking and the objective to provide *Shariah* compliant insurance. Today, Sudan has the largest *takaful* market outside of the Gulf Cooperation Council countries and Malaysia, whose Islamic financial knowledge has been leveraged out properly for others to benefit from.

In the case of Malaysia, its *takaful* industry was commenced through the *Takaful* Act of 1984and was further supported when the Islamic Fiqh Academy of Organization of Islamic Countries (OIC) issued a *fatwa* (Islamic ruling) in 1985. In its ruling, OIC Fiqh Academy declared that conventional insurance was *haram* (forbidden), while insurance based on cooperative principles, *Shariah* compliance, and charitable donations are permitted and should be pursued (Lim, Idris, and Carissa, 2010). In regards to regulations, Bank Negara Malaysia (The Central Bank of Malaysia) has been given the authority to issue licenses for companies to operate *takaful* business in Malaysia. In 2013, Bank Negara Malaysia introduced new reform by establishing Islamic Financial Services Act (IFSA), a more comprehensive regulation and guideline to govern the *takaful* industry of which essentially replaced the *Takaful* Act 1984. The development of *takaful* industry in Malaysia has indeed shown a remarkable performance and transformation. For example, financial sector liberalization plans announced by the government

of Malaysia in April 2009 to encourage more foreign involvement reflect Malaysia's intention to speed up the rate of growth of its financial services industry. The *takaful* sector, not only had achieved a phenomenal 17.5% average annual contributions growth between the period 2007-2011, but also saw its total net *takaful* contributions reaching RM4.8 billion (USD1.6 billion) in 2011 (Annual Takaful Statistics, 2011). In fact, Enrst and Young Global Takaful Insight (2013) reported that Malaysia has emerged as the world's largest family *takaful* market, currently holding 71% share ASEAN *takaful* contributions an in which Malaysia's *takaful* industry grew at a robust rate of 21% in 2012. Report also highlighted that with a proven model and strengthened regulation, Malaysia is well placed in further building its leadership position.

According to industry experts, customer satisfaction is very important for *takaful* operators to stay competitive as the customer is the key source of revenue. Here *takaful* system and conventional insurance system are considered as rival systems, operating in the insurance industry. To be sure, conventional insurance companies have been established much earlier in Malaysia compared to *takaful* operators. Consequently, *takaful* operators have had to compete with conventional insurance companies. In order for *takaful* operators to compete successfully with conventional insurance companies, *takaful* operators must be responsive to the needs and considerations of their primary customers. For both *takaful* operators and conventional insurance companies, success depends upon the customer satisfaction towards products or services that they provide. This study examines the level of customer satisfaction on *takaful* operators as well as conventional insurance companies. The objectives of this study are as follows:

1) to evaluate customer satisfaction on *takaful* operators and conventional insurance companies in Malaysia;

2) and to make comparisons on the customer satisfaction level of *takaful* operators and conventional insurance companies operating in Malaysia.

This paper is organized as follows. A literature review is provided of which is followed by a discussion on the methodology of the study. Then, the findings of the research is analyzed of which is followed by the paper's conclusion.

2. LITERATURE REVIEW

Insurance and *takaful* are part of service industry, although conventional insurance appears to contradict or is not in harmony with the Islamic belief system that sees insurance as shared responsibility. That is, conventional insurance has elements in which individuals can take financial advantage at the cost of other individuals, and elements of uncertainty are not addressed through the spirit of cooperation. In Malaysia, conventional insurance remained as the single insurance service provider until 1985 when the OIC Islamic Fiqh Academy suggested that *Shariah* compliance insurance known as *takaful* should be pursued and declared conventional insurance as illegitimate for Muslims (Abdul Hamid, Nik Ab Rahman and Nor, 2012).

According to Pfeffer (1956), insurance is "a device for the reduction of risk of one party, called the insured, through the transfer of particular risks to another party, called the insurer, who offers a restoration, at least in part, of economic losses suffered by the insured" (cited in Hussain and Pasha, 2011). By contrast, *takaful* is an Islamic version of insurance established on the basis of team spirit, support and joint indemnification of losses among the agreed members. Therefore, *takaful* is an accord between individuals to indemnify loss or damage jointly based on agreement that may wreck on any of the parties involved out of the fund being donated collectively (Maysami, Golriz and Hedayati, 1997).

Recently, a number of studies have been conducted to examine the factors that drive consumers to participate in takaful scheme. Sherif and Shaairi (2013) demonstrated that income, Islamic banking development, education, dependency ratio and Muslim population are the factors that have positive relationship with the demand on takaful in Malaysia. Additional determinants of takaful identified by Md Husin and Ab Rahman (2013) are consumer knowledge, situational factors, and consumer level of religiosity. Moreover, conventional insurance and *takaful* differ significantly in their respective objectives. For *takaful*, the central objective is to help participant through bad time while bringing equity to all parties involved (Maysami and Kwon, 1999). The differences in objective among the two divergent systems affect products and services availability that may subsequently affect customer's satisfaction. Here, Hansemark and Albinson

(2004) defined satisfaction as "an overall customer attitude towards a service provider, or an emotional reaction to the difference between what customers anticipate and what they receive, regarding the fulfillment of some needs, goals or desire".

It is widely believed that customer satisfaction has effects on profits of the organisation (Angelova and Zekiri, 2011) as well as increase frequency of purchases, increased loyalty and retention of the customer (Zairi, 2000). When customers get satisfaction from a product or service being offered, the better the success of the organisation as satisfied customers may continue to purchase the products or services. In fact, customer satisfaction is central to insurance and *takaful* companies, particularly with increased competition which is one of the characteristics of business environment today. Thus, customer satisfaction remains an important focus as it affects market and customer retention (Ooi, Abdurrahman, Lin and Yee-Loong, 2011) which are key elements in organisational success. Antecedents of customers satisfaction are many, according to Hokanson (1995). For instance, customer satisfaction is influenced by friendly, courteous, knowledgeable, helpful employees. Other factors such as accuracy, timeliness and clarity of billing; competitive pricing, quality of service, speedy and good value also bring about satisfaction to the customers. However, Zeithaml and Bitner (2003) maintain that service quality play a vital role in providing customer satisfaction; they see service quality as an appraisal specifically based to portray sensitivity regarding service in the area of reliability, responsiveness, assurance, empathy and tangibility dimensions (cited in Jajaee and Sheikh Ahmad, 2012).

Similarly, customer relationship management is equally another powerful instrument in meeting customer satisfaction (Mushtaq, 2011) and to ensure loyalty of the customers (Angelova and Zekiri, 2011). As insurance companies deal with high order research involving customer, customer relationship management makes it easier for insurance companies to remain competitive during harsh economic climate through the use of existing customer data in improving the profitability level and customer relationship based on uniqueness of the customer requirement. In the relationship between service quality and customer satisfaction, perceived service quality and expectations are regarded as the main antecedents of satisfaction, according to Tsoukatos and Rand (2007). Meeting the needs of customer remains essential source of

income and the success of organizations depends squarely on customer satisfaction (Kumar and Pany, 2012). Today, competition increases in the service industry as service quality, customer satisfaction and customer value have appeared to be the main issue among the service organizations.

A case study of India by Kumar and Pany (2012) shows that the country's annual growth rate of 15-20% and its substantial number of life insurance policies are not only illustrative of the degree in customer satisfaction but also the colossal potential for the insurance industry. Kumar and Pany (2012) also show that interpersonal relationship services is the main factor that promote satisfaction among insurance customers. In particular, Indian culture recognizes relationship as an important element, thus, despite the technological advancement, customers show their impression that technology should be integrated with interpersonal relationships and not to replace the former with later. Overall, technology should be used to solve problems and establish customer conviction and satisfaction. In another study by Mushtaq (2011), focusing on attitudes of consumers and its effect over the business in life insurance companies in India, finds that out of 150 customers of insurance, 49 are satisfied by the claim settlement services; only 3 customers indicate satisfaction on the policy status notification and loan received on the insurance policy services while services like alterations, editing in the policy, disclosures of new plans, and receiving premium notices on time are given low rating by the customers. In regards to customer relationship management in India, Biswamohan and Bidhubhusa (2012) discover that brand popularity, innovation, response, relationship and security are among factors responsible for sustaining the level of satisfaction among the customers in both private and government sectors. Similarly, Jain and Lodha (2012) indicate that quality services, IT structure, transparency in transactions, and convenience as contributing factors to customer satisfaction.

3. RESEARCH METHODOLOGY

In this study, a total of 575 respondents were selected from various cities representing different states in Malaysia. The data for this study were obtained through survey questionnaires

distributed to respondents who are customers of *takaful* and conventional insurance in different states in Malaysia. Among 575 respondents, 306 are customers of *takaful* and 269 are customers of conventional insurance. We have targeted respondents from different level of education. The total numbers of male and female respondents are 311 and 264, respectively. The questionnaire is divided into six sections. The first section includes the demographic information of the respondent (age, gender, race, religion, marriage status, and level of education). In the second section, respondents were asked to indicate the reasons for choosing *takaful* or insurance company. In the remaining sections, respondents were requested to rate the level of satisfaction on (i) satisfaction on customer service staff, (ii) servicing agents, (iii) products and services, (iv) claims of a particular *takaful* or insurance company based on a five-point Likert-type scale, ranging from "excellent" to "very poor". Most of the variables included in the questionnaire have been adapted from previous studies on customer satisfaction in insurance (Upadhyaya and Badlani, 2011; Mushtaq 2011). The total time period taken to conduct the survey was three months (September 2011 to December 2011). The questionnaires were distributed with the help of enumerators.

4. RESEARCH FINDINGS

This study measures customer satisfaction towards the *takaful* and conventional insurance services. Customer responses obtained from the survey were analyzed using SPSS. Table 1 displays the demographic profile of the respondents. The respondents of the study comprise of both genders with male having a frequency of 311 or 54.1 percent while female account for frequency of 264 or 45.9 percent depicting that male constitutes the majority of insurance and *takaful* customers. The age category of respondents ranges from 20-29 with frequency of 253 or 44 percent; 30-39 with frequency of 147 or 25.6 percent; 40-49 with frequency of 105 or 18 percent; and lastly, respondents within the age of 50-and above years with frequency of 70 or 12.2 percent. Here respondents within 20-29 age category are the major customers of insurance and *takaful*, while the least likely customers are respondents who are 50 and above. The religion of respondents shows that Muslims have frequency of 505 or 87.8 percent; Buddhists with frequency of 29 or 5 percent; Hindus with frequency of 23 or 4 percent; Christians with frequency of 10 or 1.7 percent and other religions with frequency of 4 or .7 percent.

Besides religions of insurance and *takaful* users, educational attainment has also been examined in which customers with primary certificate have frequency of 6 or 1 percent; secondary education 46 or 8 percent; certificate 42 or 7.3 percent; diploma 84 or 14.6 percent; bachelor's degree 287 or 49.9 percent; master's degree 88 or 15.3 percent and PhD degree with frequency of 22 or 3.8 percent. Here, customers with bachelor's degree constitute the major customers of insurance and *takaful* companies. The results further implied that educated people are major customers of insurance and *takaful* with varying educational attainment ranging from bachelor's degree to PhD, which account for almost 75 percent of the total customers. However, in terms of income of insurance and *takaful* users, customers with income below RM 1000 account for the frequency of 82 or 14.3 percent; RM1001-1500 with frequency of 61 or 10.6 percent; RM15001-1999 with frequency of 71 or 13.3 percent. Similarly, customers with income of RM2000-2999 account for the frequency of 134 or 23.3 percent; RM3000-3999 has a frequency of 106 or 18.4 percent; RM4000-RM4999 with frequency of 56 or 9.7 percent while customers with 5000; and above account for 63 or 11 percent. The results show that middle income earners within income of RM2000-2999 are major customers of insurance and *takaful* followed by customers with income of RM3000-3999; meanwhile, customers with income of RM4000-4999 are the least likely users.

Moreover, in terms of occupation of insurance and *takaful* users, customers that are self-employed accounts for the frequency of 135 or 23.5 percent; private sector employees have frequency of 259 or 45 percent; government servants have frequency of 158 or 27.5 percent; and customers that are retired from service account for frequency of 19 or 3.3 percent. With regards to the name of insurance, customers that indicate insurance account for frequency of 269 or 46.8 percent, while customers that prefer *takaful* have frequency of 306 or 53.2 percent. The results indicate that customers with preference of insurance tagged *'takaful'* outnumbered those with preference of insurance tagged 'insurance'. Finally, customers' opinions regarding size of insurance company depicts that customers with opinion that size of insurance is the most important have frequency of 230 or 40 percent; customers with opinion that size of insurance company is the second most important issue account for 248 or 43.1 percent and customers that regard insurance company size as the third most important issue have frequency of 85 or 14.8 percent. The results show that customers that consider size as the second most important issue

are the highest followed by customers that believe size of the insurance company is the most important factor.

TABLE 1. Demographic Profile of the Respondents

Variable	Frequency	Percentage
Gender		
Male	311	54.1
Female	264	45.9
Age		
20-29	253	44.0
30-39	147	25.6
40-49	105	18.3
50 and above	70	12.2
Religion		
Islam	505	87.8
Buddhist	29	5.0
Hindu	23	4.0
Christian	10	1.7
Other	4	.7
Academic qualification		
Primary Education	6	1.0
Secondary Education	46	8.0
Certificate	42	7.3
Diploma	84	14.6
Bachelor's Degree	287	49.9
Master's Degree	88	15.3
PhD	22	3.8
Income		
Below RM1000	82	14.3
RM1001-RM1500	61	10.6
RM15001-RM1999	71	12.3
RM2000-RM2999	134	23.3
RM3000-RM3999	106	18.4
RM4000-RM4999	56	9.7
RM5000 and above	63	11.0
Occupation		
Self Employed	135	23.5
Private Sector	259	45.0
Government Servant	158	27.5
Retiree	19	3.3
Insurance name		
Insurance	269	46.8
Takaful	306	53.2

For the level of service satisfaction among respondents, an independent t-test was computed for the difference in insurance and *takaful* services among gender. In Table 2, a significant difference was found in which male perceive better services over their female counterpart - in efficient agents, and last time service received. By contrast, female perceives better services over male in staff quick response on visit, staff friendliness, overall level satisfaction on staff, agent quick response to queries, agent effectiveness, overall satisfaction with agents and overall satisfaction on claim settlement services. However, there are no significant differences among gender in cheapest product; Islamic principles; staff quick response on phone; knowledgeable staff; staff communication; knowledgeable agents; easy access to customer service; easy transaction and wide range of products ($p > .05$). The above, indicate that both genders perceive equal degree of services provided by insurance and *takaful* in these dimensions. An independent t-test was also computed for the difference in insurance and *takaful* services. As displayed in Table 3, a significant difference was found in the last time service received $t(546) = 2.32$, $p < .05$ and overall satisfaction on claim procedures $t(413) = -2.34$, $p < .05$. That is, insurance companies provide better services to customers than *takaful* assessed based on the last time service received ($m = 4.11$ and 3.74; $SD = 1.95$ and 1.86). While in terms of the overall satisfaction on claim procedures, *takaful* provides more efficient claim procedure compared to insurance ($m = 5.38$ and 5.09; $SD = 1.16$ and 1.30). There was no significant difference found between insurance and *takaful* in cheapest product; efficient agents; staff quick response on phone; staff quick response on visit; staff friendliness; staff effectiveness; staff knowledge; staff communication skills; overall level of satisfaction on staff; agent quick response to queries; agents effectiveness; agents knowledge; overall satisfaction with agents; easy access to customer service; easy transaction; and wide range of products ($p > .05$). This shows that insurance and *takaful* companies do not differ in these dimensions.

TABLE 2. Mean, Standard Deviation, t-test and P values

	Gender	N	Mean	Std. Dev	t	p
Cheapest product	Male	308	1.7760	.70720	-.549	.583
	Female	262	1.8092	.73359		
Efficient agents	Male	306	1.7157	.73833	2.73	**.007**
	Female	261	1.5517	.68093		
Staff quick response on phone	Male	311	3.9646	.99452	-.910	.363
	Female	264	4.0379	.92210		
Staff quick response on visit	Male	311	3.9646	.94461	-1.93	.053
	Female	264	4.1136	.88629		
Staff friendliness	Male	311	3.9968	.87436	-2.01	**.044**
	Female	264	4.1364	.76792		
Staff effectiveness	Male	311	4.0193	.83063	-1.93	.054
	Female	264	4.1515	.80384		
Knowledgeable staff	Male	311	4.1254	.84263	-1.36	.174
	Female	264	4.2197	.81165		
Staff communication	Male	311	4.0611	.92604	-1.73	.084
	Female	263	4.1901	.84369		
Last time service received	Male	311	4.0868	1.86881	2.17	**.030**
	Female	264	3.7386	1.96061		
Overall level satisfaction on staff	Male	311	5.2251	1.25755	-2.26	**.024**
	Female	263	5.4601	1.21274		
Agent quick response to queries	Male	310	3.9419	.87570	-2.46	**.014**
	Female	262	4.1145	.78434		
Agents effectiveness	Male	310	3.9871	.87012	-2.04	**.042**
	Female	263	4.1293	.78050		
Knowledgeable agents	Male	310	4.1484	.82276	-1.47	.140
	Female	262	4.2481	.78020		
Overall satisfaction with agents	Male	310	5.2194	1.23734	-2.60	**.009**
	Female	262	5.4809	1.14705		
Easy access to customer service	Male	310	4.0194	.78391	.115	.909
	Female	262	4.0115	.85984		
Easy transaction	Male	309	3.9935	.79770	-.912	.362
	Female	262	4.0573	.87130		
Wide range of products	Male	309	3.8608	1.08863	-1.58	.114
	Female	262	4.0000	.99808		
Overall satisfaction on claim settlement	Male	239	5.1004	1.33409	-2.70	**.007**
	Female	176	5.4318	1.08807		

Means of each service dimension were also computed for insurance and *takaful*. As shown in Table 4, the results indicate that insurance companies are better than *takaful* in cheapest product; efficient agents; and the last time service received by the customers. On the other hand, Takaful are slightly better than insurance in overall satisfaction on claim procedures; wide range of products; level of easiness on online service; company website ease of use; depth of

information on website; level of satisfaction on products; and duration to get claim paid. Both insurance and *takaful* have similar results in staff quick response on phone; staff quick response on visit; staff friendliness; staff effectiveness; staff knowledge; staff communication; overall level satisfaction on staff; agent quick response to queries; agents effectiveness; agents knowledge; overall satisfaction with agents; easy access to customer service; easy transaction; and level of satisfaction on products.

TABLE 3. Comparison on Customer Service Satisfaction

	Insurance name	N	Mean	Std. Dev	t	p
Cheapest product	Insurance	259	1.8456	.73089	1.62	.105
	Takaful	304	1.7467	.71175		
Efficient agents	Insurance	258	1.6628	.71576	.606	.544
	Takaful	302	1.6258	.72157		
Staff quick response on phone	Insurance	262	3.9771	.98623	-.484	.628
	Takaful	306	4.0163	.94247		
Staff quick response on visit	Insurance	262	4.0534	.90814	.478	.632
	Takaful	306	4.0163	.93198		
Staff friendliness	Insurance	262	4.0802	.86507	.353	.724
	Takaful	306	4.0556	.79353		
Staff effectiveness	Insurance	262	4.0687	.84137	-.330	.742
	Takaful	306	4.0915	.80457		
Knowledgeable staff	Insurance	262	4.1489	.82859	-.728	.467
	Takaful	306	4.1993	.81952		
Staff communication	Insurance	261	4.1188	.92262	-.115	.908
	Takaful	306	4.1275	.86466		
Last time service received	Insurance	262	4.1183	1.95479	2.32	**.021**
	Takaful	306	3.7451	1.86962		
Overall level satisfaction on staff	Insurance	262	5.3015	1.19894	-.662	.508
	Takaful	305	5.3705	1.26846		
Agent quick response to queries	Insurance	262	4.0458	.82919	.745	.457
	Takaful	303	3.9934	.83782		
Agents effectiveness	Insurance	262	4.0382	.86573	-.349	.727
	Takaful	304	4.0625	.79148		
Knowledgeable agents	Insurance	262	4.2252	.84806	.791	.429
	Takaful	303	4.1716	.76139		
Overall satisfaction with agents	Insurance	262	5.3130	1.20716	-.624	.533
	Takaful	303	5.3762	1.19755		
Easy access to customer service	Insurance	262	4.0382	.78691	.459	.646
	Takaful	303	4.0066	.83782		
Easy transaction	Insurance	262	3.9962	.84644	-.812	.417
	Takaful	302	4.0530	.81341		
Wide range of products	Insurance	262	3.8435	1.06239	-1.74	.082
	Takaful	302	3.9967	1.02299		
Overall satisfaction on claim settlement	Insurance	201	5.0995	1.30386	-2.34	**.020**
	Takaful	210	5.3857	1.16930		

TABLE 4. Mean and Standard Deviation of Service Dimension

	Insurance		Takaful	
Service dimensions	**Mean**	**SD**	**Mean**	**SD**
Cheapest product	1.8456	.73089	1.7467	.71175
Efficient agents	1.6628	.71576	1.6258	.72157
Staff quick response on phone	3.9771	.98623	4.0163	.94247
Staff quick response on visit	4.0534	.90814	4.0163	.93198
Staff friendliness	4.0802	.86507	4.0556	.79353
Staff effectiveness	4.0687	.84137	4.0915	.80457
Knowledgeable staff	4.1489	.82859	4.1993	.81952
Staff communication	4.1188	.92262	4.1275	.86466
Last time service received	4.1183	1.95479	3.7451	1.86962
Overall level satisfaction on staff	5.3015	1.19894	5.3705	1.26846
Agent quick response to queries	4.0458	.82919	3.9934	.83782
Agents effectiveness	4.0382	.86573	4.0625	.79148
Knowledgeable agents	4.2252	.84806	4.1716	.76139
Overall satisfaction with agents	5.3130	1.20716	5.3762	1.19755
Easy access to customer service	4.0382	.78691	4.0066	.83782
Easy transaction	3.9962	.84644	4.0530	.81341
Wide range of products	3.8435	1.06239	3.9967	1.02299
Rate the level of easiness on online service	4.2763	1.10994	4.3411	1.24943
Company website ease of use	4.2510	1.11141	4.3100	1.19387
Depth of information on website	4.2625	1.11742	4.3100	1.16838
Level of satisfaction on products	5.0504	1.47923	5.2248	1.36322
Duration to get claim paid	2.1289	1.00201	2.2079	.97038
Overall satisfaction on claim procedures	5.0995	1.30386	5.3857	1.16930

5. CONCLUSION AND RECOMMENDATIONS

The main objective of this study is to measure the customer satisfaction level towards *takaful* and conventional insurance companies. Our study indicates that educated people are major customers of the *takaful* and conventional insurance companies. The results of the study also show that majority of the customers are in the age category of 20 to 29 years old. The most important fact revealed by this study is that *takaful* companies, despite being relatively new in the insurance industry, are able to provide quality services comparable to the services offered by their conventional insurance counterparts. The results in this study suggest that customers are mostly satisfied with the quality of services which include claim procedures; wide range of products;

level of easiness on online service; company website ease of use; depth of information on website; level of satisfaction on products; and duration to get claim paid. The findings however, reveal that takaful operators are lagging behind their insurance counterparts in cheapest product; efficient agents; and the last time service received. The findings imply that there is a need for the management of the takaful companies to make tremendous improvement in product offerings especially in coming up with products with competitive pricing to their customers in order to match with the products offered by the conventional insurance companies.

In addition, it is also important for the management of takaful operators to recruit agents with proper qualifications and provide sufficient trainings for these agents to improve their efficiency. Training of staff is another area of concerned that should be given special attention by the management of takaful operators. The overall quality of services provided by an organization is defined by customers based on their cumulative experiences with that organization. These include among other things, how courteous and responsive the staff is to their questions. Employees who are exposed to courtesy or customer service training courses are well equipped to provide better service when dealing with customers.

Another important insight identified by the study is that, in terms of overall satisfaction on claim procedures, insurance companies are found to provide less efficient services compared to takaful companies. The insurance industry in Malaysia is operating under a dual system, whereby conventional insurance and Islamic insurance (*takaful*) companies are operating side by side. In a dual insurance system, customers are free to choose whether to patronize either conventional or Islamic insurance companies and the quality of services offered by these institutions will greatly affect customers' patronage. The finding implies the need for the management of the insurance companies to relook into their policies on claim settlement and find ways to improve the claim processes. According to a study conducted by J. D. Power and Associates in 2013 on 5,500 home-owners insurance customers in the United Sates, claim settlement is found to be a critical area of service that insurance companies need to pay particular attention to. According to the Senior Director of the insurance practice at J.D. Power and Associates, it is important for insurance companies to ensure that their employees are fully trained to provide efficient and satisfied claim experience to their customers (J.D. Power and Associates, www.prnewswire.com/news-releases/jd-power-and-associates-reports). Improvement

in customer satisfaction on claim settlement will not only maintain the competitive advantage of an insurance company, more importantly, it will also ensure customer loyalty to the company.

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Risk, capital and efficiency in GCC banking: conventional versus Islamic banks

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Abstract

Using the dynamic panel Granger-causality technique, this paper examines the simultaneous inter-temporal relationships between bank risk, efficiency, and capital levels for a sample of 71 commercial banks in Gulf Cooperation Council countries (GCC) over the period 2004-2012. Based on stochastic frontier analysis, we find that conventional banks on average are more cost efficient than Islamic banks. Furthermore, the empirical results suggest that inefficient conventional banks take on a higher level of risk and tend to be less well capitalized. However, we find a positive bidirectional causal relationship between risk and efficiency for Islamic banks. Our results also suggest, only for conventional banks, that improvement in cost efficiency precedes increases in bank capital and vice-versa and there is a positive unidirectional association between risk and capital. Finally, all these relationships are affected by a range of internal and external factors such as size, liquidity, concentration and the economic conditions of the country.

Keywords: Bank capital, Risk, Cost efficiency, Islamic banks, GCC countries

JEL Classification Code: G1

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Introduction

The globalization of the financial system around the world which has been accompanied by deregulation, financial innovations and technological change has contributed to enhancing the integration and competition of the financial services industry. This process has forced banks to operate more efficiently and encouraged them to take on more risk (Hellmann et al., 2000; Moshirian, 2008). In the new financial environment, supervisors and regulators have the dual task of both safeguarding financial stability by giving capital adequacy a more prominent role in the banking regulatory process and promoting financial efficiency. In addition the successive banking crises that have occurred around the world have increased issues regarding the stability of the financial system and have emphasized the need of understanding the determinants of bank-risk taking and its relation with efficiency and bank capital.

Against this background of changes in the banking sector, a number of studies have analyzed the causal relation between risk, efficiency and capital. Most studies cover the US, Europe or other developed countries. However, both theoretical analysis and empirical research provide conflicting predictions and ambiguous results regarding this issue.

Since little empirical work has been undertaken on Arabian banking, the aim of this paper is to take the lead in providing a comprehensive assessment of the inter-temporal relationships between bank risk, efficiency and capital levels in the Gulf Cooperation Council (GCC) banking industry. Over the last two decades, the Gulf region has undergone intense structural changes and decision makers have implemented various measures to enhance the credibility of the banking sector and improve its performance. The measures included liberalizing interest rates, granting new licenses to foreign banks, implementing progressive legal and regulatory reforms and reducing the direct government control (Al-Obaidan, 2008).In addition Islamic finance in the GCC countries has become an important element in their economic development agendas especially after the recent global financial crisis. The volume of assets managed by Islamic financial institutions has dramatically increased in the last few years. For example, Islamic finance assets has increased from USD $1.3 trillion in 2011 to USD $1.8 trillion in 2013 and 34% of the total assets managed by Islamic banks are in the GCC (1). In addition, some researchers (Hasan and Dridi, 2010) state that Islamic banks have illustrated a degree of

resilience and stability in the early stages of the crisis compared to their conventional peers. Based on the new environment of GCC banks, it is crucial to assess the dynamic interlinks among capital, risk and efficiency and compare these interrelations between conventional banks and Islamic banks.

This study which concerns 71 GCC commercial banks covering the 2004-2012 period is organized into two parts. First, we estimate a stochastic cost frontier using the standard translog function by incorporating country level variables to account for variation in banking technologies that may be related to macro-economic conditions and to structural and institutions features of a country. Once the cost efficiency scores are calculated, we compare them according to countries and bank types. As a second step in the analysis, we develop a system of three simultaneous equations linking risk, capital and efficiency within a range of factors (bank-specific, industry specific and macroeconomic indicators) that are believed to have an impact on these variables. We estimate our model for the full sample of banks, separately for Islamic banks and conventional banks to understand the direction of relationship for different types of banks. In order to assess the inter-temporal relationship between risk, efficiency and capital, we both apply the Granger causality estimations and use the dynamic panel GMM technique. This approach allows us to address potential endogeneity, heteroskedasticity and autocorrelation problems in the data.

We aim to contribute to the literature in several ways. First, to our knowledge, this is the first study that investigates the causal relation between bank efficiency, risk and capital for a sample of GCC commercial banks. Second, our paper attempts to examine these relations separately for conventional banks and Islamic banks under the dual banking system. Banks in different business model differ in their attitudes of managing capital, efficiency and risks. Third, in our model we control most of comprehensive bank-characteristics, industry specific and macroeconomic variables which are supposed to influence the dynamic inter links among efficiency, risk and capital. Finally, our sample includes a large banking data set which comprises more than 80% of Islamic and conventional banks in this region. Furthermore this data covers the period before and after the subprime credit crisis which provides important implications for banks and decision makers about the impact of the recent crisis.

The rest of the paper is organized as follows. Section 2 presents a brief review of the literature on the relationship between bank efficiency, capital and risk. Section 3 describes the specification of

our models and presents the variables used in our analysis. Section 4 reports and analyses the empirical results, while the final section concludes the paper and offers some policy recommendations.

5. Review of the literature

Many studies focused on the relationship between risk and capital especially after the introduction of the minimum capital regulation (Basel 1 and 2). Theoretically and empirically this relation in the banking sector is ambiguous (see e.g. Berger and De Young, 1997; Aggarwal and Jacques, 1998; Brewer and Lee, 1986).

According to the regulatory hypothesis, banks have to increase their capital commensurably with the amount of risk taken. A pioneer research by Pettway (1976) concerning US banks over the period 1971-1974 found a positive relationship between equity to total assets and risk. Shrieves and Dahl (1992) also analyze American banks and reach the same positive result. Similar results are reached by Rime (2001) and Iannotta et al. (2007) for European banks.

However, in line with the moral hazard hypothesis, several studies (e.g., Brewer and Lee, 1986; Jacques and Nigro, 1997; Demsetz et al. 1996; Salas and Saurina, 2003) report a negative effect of capital on the levels of asset risks. According to this hypothesis, undercapitalized banks take on excessive risk to exploit existing flat deposit insurance schemes and then more regulatory capital will reduce risk, generating a negative relationship (Demirguc-kunt and Kane, 2002). Overall, we can conclude that there is no consensus on the effect of capital regulations on the risk-taking behavior of banks.

The second strand of literature (e.g., Hughes and Moon, 1995; Hughes and Mester, 1998) suggests that capital and risk are likely influenced by the level of bank efficiency. From a regulatory perspective, an efficient bank with better management is more flexible in terms of its capital levels and risk profile. At the same time, from moral hazard considerations, less efficient banks are tempted to take more risk to compensate for the loss returns. Therefore, capital, risk and efficiency are all interrelated and are simultaneously determined. In consequence, several researchers have conducted studies to analyze the direction of the relation between these variables for different types of banks in different countries. For a sample of US banks over the period 1985-1994, Berger and De Young (1997) investigate the relationships between problem

loans, cost efficiency and capital. By employing the Granger causality technique, they find that declines in cost efficiency precede increases in problem loans especially for the bank with lower levels of capital. Furthermore, this study suggests that higher levels of problem loans result in reductions in cost efficiency. Two similar studies are conducted by Altunbas et al. (2007) and Fiordelisi et al. (2011) for the European banking sector. Using the Seeming Unrelated Regression (SUR), Altunbas et al. (2007) assess the inter-relationships between capital, loan loss provision and cost efficiency for a large sample of banks between 1992 and 2000. In contrast to Berger and De young (1997), they do not find a positive relationship between inefficiency and bank risk-taking. They report that inefficient banks seem to have higher capital levels and lower levels of credit risk. Interestingly, a contradictory result has been seen in a study elaborated by Fiordelisi et al. (2011). Analyzing bank data of 26 European countries from 1995 to 2007, they suggest that lower bank efficiency causes higher bank risk and higher capital levels tend to have a positive effect on efficiency levels.

Recently, two studies have examined the inter-relationships among bank efficiency, capital and risk in a developing country. Tan and Fluros (2013) employ three stages least square method to investigate the inter-temporal relationships between risk, technical efficiency and capital for a sample of 101 Chinese banks over the period 2003-2009. The empirical findings suggest that there is a negative relationship between risk (Z-score) and capitalization while the relationship between risk (loan-loss provision to total loans) and technical efficiency is positive. Granger-Causality method is used by Kasman and Carvallo (2013) to examine the relationship between risk, cost (or revenue) efficiency and capital for a sample of 272 Latin American and Caribbean banks over the 2001-2008 periods. They find evidence that in the face of increased risk and lowered capital, banks have tended to improve cost efficiency.

Finally, we can conclude that both theoretical literature and empirical studies provide different and contradictory results about the relationships between risk, efficiency and capital. This relation is not linear and may depend on some other factors like the agency problem, ownership structure, managerial incentives, asymmetric information, and moral hazard considerations (Deelchand and Padgett, 2009; Altunbas et al. 2007).

To the author's best knowledge, no study has investigated this issue in the GCC banking systems. Following the approach of Kasman and Carvallo (2013) and Fiordelisi et al. (2011), we

attempt in this study to find out if there is any relation among risk, capital and efficiency concerning conventional and Islamic banks in the GCC countries.

6. Methodology and Data

3.1. Efficiency estimation

To empirically implement the measurement of efficiency, we opt for a parametric stochastic frontier approach (SFA) introduced by Aigner et al. (1977). The main advantage of SFA over data envelopment analysis (DEA) is to distinguish between inefficiency and other stochastic shocks in the estimation of efficiency levels (Fries and Taci, 2005). In addition, by using this model, it would be easier to add control variables, such as country-level variables, in the equation of this model than in non-parametric techniques. The importance of using environmental models has been recognized in the banking literature (e.g. Dietsch and Lozano-Vivas, 2000; Kasman and Yildirin, 2006). In this study, we compute cost efficiency rather than technical efficiency, since it refers to both technical and allocative efficiency. In modeling the cost function, we choose the translog specification since it presents the well-known advantage of being a flexible functional form and it does not require too many restrictive assumptions about the nature of technology (Kasman and Carvallo, 2013).

The translog stochastic cost takes the following form:

$$\ln TCijt = \alpha_0 + \sum_{m=1}^{2} \alpha_m \ln Ym,ijt + \sum_{s=1}^{2} \beta_s \ln Ps,ijt + l_1 T + \sum_{l=1}^{8} \rho_l \ln Ejt +$$

$$1/2\left[\sum_{m=1}^{2}\sum_{n=1}^{2} \alpha_{m,n} \ln Ym,ijt * \ln Yn,ijt + \sum_{s=1}^{2}\sum_{r=1}^{2} \beta_{s,r} \ln Ps,ijt * \ln \Pr,ijt + l_2 T^2\right] +$$

$$\sum_{m=1}^{2}\sum_{s=1}^{2} \phi_{m,s} \ln Ym,ijt * \ln Ps,ijt + \sum_{m=1}^{2} \lambda_m T \ln Ym,ijt + \sum_{s=1}^{2} \Psi_s T \ln Ps,ijt + \varepsilon \quad (1)$$

Where subscripts i denote banks, j countries and t time horizon and lnTC the natural log of total costs (interest and non-interest costs), lnYm, the natural log of input prices, lnPs, the natural log of output values, while E is a vector of country-level variables in natural log. T is the time trend variable used to capture technical change; α, β, l, ρ, Φ, λ, and ψ are the parameters to be estimated, and ε the composite error term. To ensure that the estimated cost frontier is well behaved (Fries and Taci, 2005), we impose constraints on symmetry and linear homogeneity. Bank inputs and outputs are defined according to the intermediation approach. We posit that the labour, physical capital and financial capital are inputs whereas the net total loan and other earning assets are outputs (2). The input prices are: the price of capital, measured by the ratio of non-interest expenses (operating cost net of personnel expenses) to total fixed assets, the price of funds, computed by dividing interest expenses (3) to total deposits, and the price of labor. Due to the lack of information about the number of employees, we follow Altunbas et al. (2000), and use a proxy measure of labor price by using the ratio of personnel expenses divided by total assets. Based on previous studies (Srairi, 2010; Fries and Taci, 2005), the vector of country-level variables comprises GDP per capita, deposit density, inflation, degree of monetization (M2/GDP), density of population, concentration market (assets of 3 largest banks/total assets), intermediation ratio (total loans/total deposits) and the ratio of average equity to total assets.

3.2. Model specification

To assess the relationship between bank risk, efficiency and capital, we specify the simultaneous equation system and estimate this empirical model using Granger causality technique. This approach has recently been widely applied in the literature to investigate inter-temporal relationship in banking studies (e.g. Fiordelisi et al. 2011; Kasman and Carvallo, 2013; Casu and Girardone, 2009).

We use the following three linear equations to analyze the dynamic links between risk, efficiency and bank capital:

$$Risk_{it} = f_1(Risk_{i,\,lag}, Eff_{i,lag}, Cap_{i,lag}, X_{it}, Y_{it}) + \varepsilon \qquad (2)$$

$$Eff_{it} = f_2(Eff_{i,lag}, Risk_{i,\,lag}, Cap_{i,lag}, X_{it}, Y_{it}) + \varepsilon \qquad (3)$$

$$Cap_{it} = f_3(Cap_{i,lag}, Risk_{i,\,lag}, Eff_{i,lag}, X_{it}, Y_{it}) + \varepsilon \qquad (4)$$

Where i subscripts the cross-section dimension, t denotes the time dimension, Risk is the variable measuring bank risk, Eff is the cost efficiency scores estimated by SFA, Cap is the level of bank capital proxied by the equity to asset ratio, X and Y represent a range of bank-specific and country-specific variables, and ε is the random error term.

The first equation explains the banking sector risk and test if cost efficiency changes temporally precede variations in bank risk. The second model examines the determinants of bank cost efficiency and assess whether changes in bank risk lead to variations in cost efficiency. Finally, the third equation analyzes bank capital levels and tests whether they temporally precede changes in bank risk and cost efficiency.

Following Fiordelisi et al. (2011) and Kasman and Carvallo, (2013), we use two lags and estimate an AR(2) process for the three models. According to Casu and Girardone (2009), we examine Granger causality as the joint test of the null hypothesis that the coefficients on the two lags are equal to zero (4). In addition, we test the "long-run effect" of each variable by using the restriction that the sum of the lags of each determinant variable is zero. A rejection of the restriction signifies that there is evidence of long-run effect.

To address potential endogeneity, heteroskedasticity and auto correlation problems in the data, we use *the system Generalized Method of Moment* (SYS-GMM) estimators developed by Arellano and Bover (1995) and Blundell and Bound (1998) that was designed to overcome some of the limitation (Bond, 2002) of *the difference GMM*. Arellano and Bond (1991) developed difference GMM where the lagged levels of the regressors are instruments for the equation in first difference, however, the system GMM makes a joint estimation of the equation in levels and in first differences. The validity of the instruments required by the SYS GMM is examined by the Sargan/Hansen test. Our study adopts the two-step estimator which is generally more efficient than the one step GMM estimator (Lee and Hsieh, 2013) and employs the method proposed by Windmeijer (2005) to correct standard errors which tend to be severely downward biased in small samples.

3.3. Data description

Bank risk is measured as the ratio of loan loss reserves to total assets. A higher level of reserves implies greater banking risk. This indicator is widely used in the literature (e.g., Sun and Chang, 2011; Alam, 2012; Altunbas et al. 2007) and is preferred to loan-loss provision since there is a greater level of dispersion of provision in our data than for reserves. Bank efficiency is proxied by cost efficiency calculated under SFA as explained in section 3.1. Bank capital is calculated as the ratio of equity to total assets. Following Fiordelisi et al. (2011), we compute the equity capital as the sum of TIER1 and TIER2. According to Diamond and Rajan (2000), this proxy captures better the concept of bank capital adequacy than the book value of equity.

We also control for internal (bank-specific) and external (country-specific) variables that may influence the relationship between risk, efficiency and capital. The bank specific variables include bank size which is proxied by the logarithm of total assets. According to some studies (Hugles et al. 2001; Beck et al. 2013), larger banks hold less capital, are more diversified and might be more efficient as compared to smaller banks as they benefit from diversification and scale economies. The second bank-specific variable consists of net loans to total assets. A higher level of loans implies higher profit and risk (Casu and Girardone, 2006) and impact adversely on capital and bank efficiency (Deelch and and Padgett, 2009). We also control for bank's business model represented by the net non-interest income to net operating income. Le Petit et al. (2008) and other researchers (e.g. Abedifar et al. 2013; Siroh, 2004) conclude that banks with high non-interest income have higher relative risk. Bank liquidity is represented by the ratio of liquid assets to deposits and short-term funding. This indicator is expected to be negative with risk, since keeping more liquid assets is usually accompanied with lower return (Lee and Hsieh, 2011). In addition, banks that are more liquid may be more efficient and need less capital (Altunbas et al. 2007).

At the country level, we include industry specific variables and macroeconomics indicators commonly used in the banking efficiency literature (Tan and Floros, 2013; Lee and Hsieh, 2013; Srairi, 2013; Brissimis et al. 2008). Three industry specific variables are set as the related external control variables: concentration is measured by the ratio of large three banks in terms of total assets to the total assets of the banking industry, the ratio of banking industry assets over GDP as a measure of banking sector development and stock market development proxied by the

ratio of stock market capitalization to GDP. Two macroeconomics variables are also included in our model: annual real GDP growth to capture business cycle effects and inflation measured by the growth of the consumer price index. The two variables are expected to have an effect on bank risk. Several studies conclude that a higher value of GDP growth reflects higher financial stability (Beck et al. 2013, Vasquez and Frederico, 2012). Other studies conclude that countries with high GDP growth are characterized by efficient banks (Yildirimand Philippatos, 2007; Shure et al. 2004).

(Insert table 1 around here)

Our sample is an unbalanced panel data of 71 commercial banks (48 conventional and 23 Islamic) from six GCC countries: 19 banks in Bahrain, 9 banks in Kuwait, 5 banks in Oman, 7 banks in Qatar, 11 banks in Saudi Arabia, and 20 banks in the United Arab Emirates. Altogether, the final data set contains 627 observations over the period 2004-2012. All data on the bank's balance sheets and income statements are obtained mainly from the Bankscope database of BVD-IBCA which provides a homogenous classification of banks and information. The sample banks are constituted by listed and delisted commercial banks in each country. In the case of missing information, we use annual reports provided by individual banks via their websites. The sources of macroeconomic data and the structure of banking industry for the GCC countries are the annual reports of the central banks of the respective countries and the International Financial Statistics (IFS).

Since different countries have different currencies, all the annual financial values are converted in US dollar using appropriate average exchange rates for each year. Also, to ensure comparability of data across countries, all values are deflated to the year 2004 using each country's consumer price index (CPI).

7. Empirical results

4.1. Efficiency results

Table 2 summarizes the average cost efficiency scores of the banking sector in GCC countries during the period 2004-2012, estimated by the stochastic frontier approach with a translog cost and profit function. It also provides information about the level of bank efficiency by year (panel

A), country (panel B) and by type of bank (panel C), based on the common frontier with country-specific environmental variables.

(Insert table 2 around here)

Looking at the overall mean, the cost efficiency score is equal to 65%, with a standard deviation of 19.48%. This implies that during the period of study, the average bank in GCC countries could reduce its costs by 35% to match its performance with the best-practice bank. The inter-temporal comparison of the scores (panel A) suggests that the average cost efficiency ranges between 64.32% (2004) and 68.14% (2012). Regarding the evolution of these scores over time, we can observe three diverging trends. Between 2004 and 2007, cost efficiency scores witnessed a growth of 6%. But during the period 2007-2009, the average cost efficiency level declined from 68.31% in 2007 to 65.15% in 2009. The decrease of efficiency in this period can be explained by the last crisis of 2008 and by the increase of competition among banks due to liberalization and openness measures adopted recently in GCC countries, especially in Kuwait, Qatar, Saudi Arabia and in the UAE (5). After 2009, cost efficiency has presented an upward trend and reached its highest average value in 2012.The comparison of the cost efficiency measures by country (panel B) reveals a wide range of cost efficiency scores across countries. Table 2 indicates that Omani banks (72.81%) are the most efficient, followed by the UAE (66.12%) and Qatari (61.15%) banks. The Kuwaiti banks are the least cost efficient in the sample with a score of 55.61%.

We now turn to the efficiency of conventional banks as opposed to the efficiency of Islamic banks (panel C). Our analysis shows that conventional banks are more efficient, on average, than Islamic banks (6). The mean cost efficiency score is 68.32% for conventional banks while it is equal to 62.76% for Islamic banks. In terms of cost efficiency, the gap between conventional and Islamic banks has decreased compared to the figure found by Srairi (2010) for the 1999-2007 period. The Analysis of the dispersion of efficiency levels shows insignificant differences between Islamic and conventional banks (12.42% and 13.81%, respectively). Our findings are in line with the studies of Rosly and Bu Baker (2003) and Srairi (2010) which find that Islamic banks are less efficient than conventional banks. The inefficiency of Islamic banks can be explained by the lack of economies of scale due to the smaller size of these banks. In addition,

According to Olson and Zoubi (2008), the inefficiency of Islamic banks may be due to the fact that their customers are pre-disposed to Islamic products regardless of cost.

4-2 Estimation results: Granger causality relationships among bank capital, efficiency and risk

4-2-1 Risk equation

(Insert table 3 around here)

Table 3 summarizes the regression results for the estimation of the risk equation derived from the simultaneous estimation. The granger causality results for risk suggest that cost efficiency declines temporally precede increases in risk for the full sample and conventional banks. This finding supports the bad management hypothesis and the studies conducted by Berger and De Young (1997) for the united States and Williams (2004, 28) and Fiordelisi et al. (2011) for Europe. In the case of Islamic bank, we find a positive relationship between efficiency and risk. It means that efficient Islamic banks tend to take more risk. According to Alam (2012) the negative relationship between inefficiency and risk for Islamic banks can be explained by the cost constraints impediment which restricts the ability of inefficient Islamic banks to take more risks similarly to conventional banks. Table 3 also shows that for the full sample and conventional banks there is a positive relationship between capital levels and bank risks. Thus, our results support the regulatory paradigm following which regulators encourage banks to increase their capital as a result of the amount of risk taken (Altunbas et al. 2007; Peura and Keppo, 2006; Jacques and Nigro, 1997). However, in the case of Islamic banks, capital ratio has no impact on a bank's risk. It seems that this result is related to the business model of Islamic banks. Indeed, Islamic banks do not guarantee depositors money and in consequence the relationship between deposit insurance and managers risk taking incentives may not exist for Islamic banks (Dermirguc-kunt and Kane, 2001).

If we focus on bank specific variables, we observe that bank size is inversely related to risk in all models suggesting that large banks tend to take lower risk and appear to be more stable than their smaller counterparts (Altunbas et al. 2007, Mongid et al, 2012; Tan and Floros, 2013). The same result is found for Islamic banks which seem to have a lower loan loss reserve since their loans are backed by real assets (Alam, 2012). In all estimations, the coefficient of net lending is

negative, implying that loan growth is associated with loan loss reserve loans (Altunbas et al. 2007; Alam, 2012). The relationship between liquidity and risk is positive for conventional banks and negative for Islamic banks. This finding is not surprising in the case of Islamic banks since these banks suffer from limited access to liquidity due to sharia constraints and the absence of hedging instruments which allow mitigating the liquidity risk (Pappas et al. 2012). In terms of financial and macroeconomic environment, we find that bank risk is negatively associated with GDP growth. This result confirms the view that banks from faster- growing countries have a lower portion of bad loans and are risky (Laeven and Levine, 2009; Tan and Floros, 2013; Lee and Hsieh, 2013). Contrary to our expectation, we find a positive relationship between risk and concentration. In a higher concentrated market where competition is relatively lower, GCC banks tend to take a higher risk in order to obtain higher profit which is in line with the competition – stability hypothesis (Tan and Floros, 2013). Finally, concerning the other variables, the coefficients of banking sector development, stock market development and inflation are negative but not significant.

4-2-2 Efficiency equation

(Insert table 4 around here)

Table 4 shows that risk is found to positively Granger-cause cost efficiency in all models, implying that an increase in the sum of the lagged coefficients for risk temporally leads to an increase in cost efficiency. Our results, contrary to the bad luck hypothesis, are consistent with previous studies (Tan and Floros, 2013; Alam, 2012; Kasman and Carvallo, 2013) which conclude that banks with higher loan loss reserves operate more efficiently. As regard to the effects of capital level on bank efficiency, the result indicates that capital positively Granger cause banks' efficiency in the case of conventional banks. It means that better capitalized banks operate more efficiently than under-capitalized ones (Fiordelisi et al. 2011; Mongid et al. 2012). For Islamic banks there exists a negative relationship between capital and efficiency indicating that less efficient banks are required to maintain higher capital-base.

Regarding other control variables, table 4 reports that the coefficient of bank size is statistically significant and positively related to cost efficiency scores. It means that larger banks are more efficient than the smaller ones (Srairi, 2010; Pasiouras, 2008, Mongid et al. 2012). This finding can be explained by economies of scale and scope. However, some studies did not find any

efficiency advantage related to large banks (Girardone et al. 2004; Berger and Mester, 1997) or reported a negative relationship between efficiency and size (Christopoulos et al. 2002; Altunbas et al. 2007, Alam, 2012). It is also clear from table 4 that there is a strong positive relationship between net bank lending and efficiency. This implies that banks which engaged in greater amounts of lending activity have the ability to manage operations more productively. This enables them to have lower cost and consequently tend to be more efficient (Carvallo and Kasman, 2005; Altunbas et al 2007). As expected, the proxy of diversification has a negative and statistical impact on cost efficiency. Similar results were reported by Fiordelisi et al. (2011) which conclude "that more specialized banks benefit from scale and learning economies that enable them to reduce costs more than their diversified counterparts". Turning to the industry-specific variables, we suggest that more concentrated banking market precedes a decrease in cost efficiency. According to Tan and Floros (2013), in a highly concentrated market, bank managers have less incentive to improve efficiency. Finally, stock market development and GDP growth are found to be positively related to bank efficiency as expected.

4-2-3 Capital equation

(Insert table 5 around here)

Regarding capital equation (table 5), the result for the full sample suggests that efficient banks hold more capital. However results vary across types of banks. For conventional banks, we find that the indicator of efficiency is positively related to capital and the relation is bidirectional. A similar result was found by previous studies (Fiordeisi et al. 2011; Berger and De Young 1997; William, 2004). In the case of Islamic banks, there is no such relation between efficiency and capital. Concerning the association between risk and capital, we expect that risk influenced positively capital which means that banks that increased their target capital have also increased their risk exposure. Unlike most of the previous studies (Berger et al. 2008; Shrieves and Dahl, 1992), our findings do not report any relation between risk and capital in all the model estimations.

The bank-specific variables, in table 5, suggest that there is an inverse relationship between bank asset size and capital. Since large banks enjoy bigger guarantee in terms of failure, they tend to take risky positions without providing more capital (McAllister and McManus, 1993; Mongid et al. 2012). We also find that liquidity causes banks to hold more capital in all models. The

estimated coefficients of the remaining other control variables have the correct signs but are all insignificant. In terms of country-specific variables, three indicators are significant in the capital equation. First, the significantly positive coefficient of the proxy of concentration shows that banks in a highly concentrated market are better capitalized. Second a higher level of banking sector development leads to an increase in bank capital. Third, the increase in GDP growth is associated with a decrease in bank capital. This result can be explained by the fact that during the period where economy grows, demand for loans increases and leverage bank asset. In consequence, bank capital measured by equity to total assets decreases (Berger et al, 1995).

4-2-4 Robustness analysis

(Insert table 6 around here)

To check the robustness of the empirical results, we consider the following modification of our empirical model. First, we use the same measures of bank efficiency, capital and risk as defined in table 1 but we apply the three-stage least square estimation (3SLS) rather than the granger-causality technique. The results reported in table 6 are qualitatively similar to our previous findings. Second, we choose other indicators related to bank capital, efficiency and risk. We calculate the equity ratio using the book-value of total equity rather than the Basel committee definition. Bank efficiency is estimated with profit efficiency rather than cost efficiency. We proxy bank's risk by using the z-score developed by Boyd and Graham (1986). It is calculated as the ratio between a bank's return on assets plus equity capital to total assets and the standard deviation of the return on assets. Our results based on the Granger-causality technique, not reported, indicate that there is no difference between conventional and Islamic banks in terms of the inter-temporal relationships between efficiency, risk and bank capital. Indeed, we find decreases in profit efficiency cause higher bank risk for the two types of bank. The empirical results also reveal a positive bi-directional relationship between profit efficiency and capital in the two sub-sample cases. However, concerning the relationship between capital and risk, we find different results between conventional and Islamic banks. The findings clearly demonstrate in the case of conventional bank that capital and risk are positively related and the causality runs from capital to risk. This association is not significant for Islamic banks.

Conclusion

This study examines the inter-temporal relationships between efficiency, risk and capital for a sample of both conventional and Islamic banks in GCC countries over the period from 2004 to 2012. To understand the interplay among these variables, we adopt a simultaneous equation using the dynamic panel Ganger-causality technique. In addition, the paper applies a stochastic frontier approach with country specific environment variables for determining cost efficiency scores of banks.

According to this frontier parametric technique, we conclude that the level of efficiency scores of GCC countries remains still lower compared with other regions. The overall efficiency results also provide strong evidence that Islamic banks are less efficient, on average, than conventional banks. However, the Gap of efficiency between the two types of bank is narrowing especially after the last crisis.

With regards to the relationship between bank risk, capital and efficiency, the granger-causality technique used in this study confirms the belief that these indicators tend to be jointly determined, reinforcing and compensating each other.

In risk equation, the results for the whole sample and conventional banks show that inefficient GCC banks appear to take on more risk to offset this inefficiency. However, in the case of Islamic banks, empirical evidence reveals a positive and significant two-way relationship between efficiency and risk. We also find that banks with higher levels of capital will engage in higher risk taking in the whole sample and in the conventional sub-sample cases. For Islamic banks, we do not find any relation between capital and risk. For the efficiency equation, the estimation results for both conventional and Islamic banks indicate that in the face of increased risk, banks have tended to improve cost efficiency. The empirical findings also indicate that better capitalized banks tend to operate more efficiently, but the result is not true for Islamic banks. In capital equation, we confirm the result found in risk equation that capital and efficiency are simultaneously determined for only conventional banks.

Regarding the impact of internal and external factors on bank risk, efficiency and capital, some conclusions can be drawn. First, large banks are more efficient than smaller ones, hold lower levels of capital and tend to take on more risk. Second, we find that higher liquidity encouraged bank to take risky positions and hold more capital. Third, in a highly concentrated market, banks

which are better capitalized tend to take higher risk and are less inclined to improve their efficiency. Finally, banks from faster-growing countries hold lower levels of capital, are risky and more efficient.

Based on the findings of this research, some policy implications can be drawn. First, there is a lot of room for improving the efficiency of GCC countries. Indeed, it is necessary for these banks to promote and enhance their functioning in several ways (risk management, asset management,…). In addition, supervisory authorities in these countries should continue to reinforce reforms by further liberalizing the banking sector, completing regulatory reforms, expanding the role of private sector and providing conditions for competitive behavior. In particular, the GCC banking sector should be further developed and less concentrated. Second, to improve their efficiency, Islamic banks need to identify cost drivers that are responsible for increasing cost efficiency and have also to undertake several actions and reforms towards their size, portfolio of products, technology, risk management and strategies collaboration with conventional banks. Finally, since efficiency is significantly related to both capital and risk-taking, an increase in efficiency is expected to enhance the overall stability of the banking system in GCC countries. Moreover, it is also important for financial regulation and supervision to include economic efficiency as a component for a bank soundless indicator.

As for future work, it is interesting to investigate the relationships between bank risk, efficiency and capital in terms on changes rather on levels. This analysis could also be expanded to examine the consistency of our findings by using alternative measures of risk, efficiency and capital.

Notes

1. World Islamic banking competitiveness report (WIBC), edition 2012/2013).

2. For Islamic banks, *loans* = Islamic operations = Murabaha receivable + Mudaraba investments + Musharaka investments + loans without interest (Qardhasan) + loans with service charge (Juala) + other short operations (e.g. investment in Ijara assets: leasing) ; *other earning assets* = equity investments + investment in associates + investment securities (Islamic bond: Sukuk). For details of Islamic financing contracts see (e.g., Zahar and Hassan, 2001; Rosly, 2005).

3. In case of Islamic banks, interest expenses represent profits distributed to depositors.

4. Granger causality tests only indicate that changes in one variable precede changes in another variable of interest and they do not show causation in the traditional sense of the word.

5. New licenses to Islamic and foreign banks, new financial free zones in Qatar, Dubai, and Ras Al Khaima (UAE).

6. To examine whether the bank type implies different scores of efficiency, we perform a *t* parametric test. The result confirms significant differences in cost and profit efficiency levels between conventional and Islamic banks.

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Table 1: Variables' description

Variables	Definition and measure
Dependents variables	
- Bank risk	Ratio of loan loss reserves to total assets
- Bank efficiency	Cost efficiency calculated under stochastic frontier analysis.
- Bank capital	Sum of Tier 1 and Tier 2 divided to total assets
Independent variable	
Bank-specific variables	Natural logarithm of total assets.
- Size	Net loans to total assets.
- Net lending	Net non-interest income to net operating income.
- Business model	Ratio of liquid assets to deposit and short-term funding.
- Liquidity	
Industry and Economic indicators	Credit to private sector/GDP
- Banking sector development	Assets of 3 largest banks to total assets of all banks in the country.
- Bank concentration	Ratio of stock market capitalization to GDP
- Stock market development	Annual real GDP growth
- Level of economic development	Growth of the consumer price index
- Inflation	

Table 2: Average cost efficiency scores
by year, country and by type of bank

	Number of observations	Cost efficiency scores (%)	
		Mean[a]	Std
Panel A: Mean by year			
2004	60	64.32	18.32
2005	62	65.82	19.12
2006	64	67.12	19.75
2007	65	68.31	19.25
2008	66	66.20	20.14
2009	68	65.15	21.45
2010	71	66.82	20.85
2011	71	67.38	19.43
2012	67	68.14	20.64
Panel B: Mean by country			
Bahrain	119	58.26	13.82
Kuwait	84	55.61	12.15
Oman	45	72.81	10.26
Qatar	68	61.15	9.43
Saudi Arabia	93	60.81	15.61
U.A.E	185	66.12	14.20
Panel C: Mean by type of bank[b]			
Conventional banks	428	68.32	13.81
Islamic banks	166	62.76	12.42
Overall mean	594	64.76	19.48

Notes: a: The means by year, country and by type of bank are calculated from the total sample.
b: The mean difference is significant at 5% and 10% for cost efficiency scores.

Table 3: Estimation results: Granger causality relationships among bank capital, efficiency and risk (dependent variable: Risk)

Explanatory variables	Full sample		Conventional bank		Islamic bank	
	Coef.	Co. s. e.	Coef.	Co. s. e.	Coef.	Co. s. e.
Intercept	0.105	0.098	0.284	0.154	0.093	0.062
$Risk_{t-1}$	0.025***	0.005	0.015***	0.008	0.035**	0.024
$Risk_{t-2}$	0.018**	0.083	0.094**	0.052	0.015*	0.012
Eff_{t-1}	-0.342**	0.154	-0.284**	0.189	0.652**	0.725
Eff_{t-2}	-0.187	0.125	0.098	0.068	0.091	0.064
Cap_{t-1}	0.539***	0.368	0.324***	0.291	-0.327	0.268
Cap_{t-2}	0.024**	0.015	0.015**	0.013	-0.024	0.014
Size	-0.051***	0.031	-0.067**	0.054	-0.054**	0.049
Netloans/assets	-0.065**	0.086	-0.029	0.035	-0.094	0.194
Diversification	0.063	0.025	0.046	0.054	0.157	0.098
Liquidity	0.195**	0.129	0.022*	0.015	-0.092*	0.054
Concentration	0.094**	0.013	0.057	0.042	0.020	0.034
Bank develop.	-0.068	0.065	-0.036	0.019	-0.009	0.005
Market develop	-0.327	0.256	-0.291	0.200	-0.115	0.085
GDP growth	-0.087**	0.054	-0.059*	0.023	-0.004	0.001
Inflation	-0.038	0.021	-0.024	0.021	-0.081	0.056
M1 (p-value)	0.023**	-	0.019*	-	0.011*	-
M2 (p-value)	0.015	-	0.005	-	0.004	-
Sargan/Hansen(p-value)	0.456	-	0.398	-	0.328	-
Diff Sargan/Hansen (p-value)	0.712	-	0.629	-	0.524	-
Σrisk						
Σeff	-0.192*	0.122	-0.156*	0.146	-0.139	0.116
Σcap	0.054**	0.156	0.064*	0.293	0.026	0.602
Observations	627		435		202	

Notes: We use the two-step system GMM estimator with Windmeijer (2005) corrected standard error (column: co.s. e.). M1 and M2 are tests for the first-order and second-order serial correlation. The Sargan/Hansen is a test of the overidentifying restrictions for the GMM estimators. The variables Σrisk, Σeff, Σcap are the estimated coefficient for the test that the sum of the lagged terms (for the cost efficiency, risk, and capital respectively) is equal to zero. *, ** and *** denotes statistical significance at the 10%, 5% and 1% levels, respectively.

Table 4: Estimation results: Granger causality relationships among bank capital, efficiency and risk (dependent variable: Cost efficiency)

Explanatory variables	Full sample		Conventional bank		Islamic bank	
	Coef.	Co. s. e.	Coef.	Co. s. e.	Coef.	Co. s. e.
Intercept	0.312	0.126	0.195	0.026	0.153	0.053
$Risk_{t-1}$	0.053**	0.014	0.092**	0.027	0.028*	0.013
$Risk_{t-2}$	0.059	0.062	0.079	0.043	0.093	0.024
Eff_{t-1}	0.568**	0.357	0.329**	0.258	0.092*	0.145
Eff_{t-2}	0.056*	0.075	0.035	0.008	0.029	0.004
Cap_{t-1}	0.038**	0.051	0.032*	0.082	-0.085**	0.009
Cap_{t-2}	0.075	0.012	0.032	0.025	-0.007	0.029
Size	0.039**	0.062	0.092	0.054	0.028	0.195
Netloans/assets	0.011**	0.095	0.052**	0.016	0.029	0.018
Diversification	-0.029***	0.253	-0.082**	0.040	-0.005**	0.198
Liquidity	0.012	0.008	0.035	0.005	0.005	0.102
Concentration	-0.159**	0.056	-0.049	0.031	-0.157	0.008
Bank develop.	0.082	0.189	0.075	0.053	0.028	0.003
Market develop	0.025*	0.005	0.062	0.019	0.022	0.005
GDP growth	0.091*	0.001	0.061	0.012	0.002	0.082
Inflation	-0.054	0.071	-0.053	0.026	-0.011	0.082
M1 (p-value)	0.058**	-	0.023*	-	0.046*	-
M2 (p-value)	0.032	-	0.019	-	0.005	-
Sargan/Hansen(p-value)	0.623	-	0.759	-	0.225	-
Diff Sargan/Hansen (p-value)	0.821	-	0.318	-	0.490	-
Σrisk	0.215**	0.059	0.158*	0.296	0.126	0.159
Σeff						
Σcap	0.093**	0.095	0.033*	0.120	0.092*	0.055
Observations	625		435		202	

Notes: We use the two-step system GMM estimator with Windmeijer (2005) corrected standard error (column: co.s. e.). M1 and M2 are tests for the first-order and second-order serial correlation. The Sargan/Hansen is a test of the overidentifying restrictions for the GMM estimators. The variables Σrisk, Σeff, Σcap are the estimated coefficient for the test that the sum of the lagged terms (for the cost efficiency, risk, and capital respectively) is equal to zero. *, ** and *** denotes statistical significance at the 10%, 5% and 1% levels, respectively.

Table 5: Estimation results: Granger causality relationships among bank capital, efficiency and risk (dependent variable: Bank capital)

Explanatory variables	Full sample		Conventional bank		Islamic bank	
	Coef.	Co. s. e.	Coef.	Co. s. e.	Coef.	Co. s. e.
Intercept	0.059	0.035	0.096	0.158	0.168	0.018
$Risk_{t-1}$	0.072	0.182	0.186	0.095	0.061	0.016
$Risk_{t-2}$	0.156	0.056	0.065	0.022	0.246	0.072
Eff_{t-1}	0.286**	0.652	0.652**	0.159	-0.067	0.096
Eff_{t-2}	0.029***	0.022	0.063***	0.052	-0.072	0.062
Cap_{t-1}	0.095**	0.138	0.092**	0.025	0.238*	0.037
Cap_{t-2}	0.092**	0.056	0.052**	0.187	-0.062	0.011
Size	-0.022***	0.057	-0.055***	0.091	-0.091	0.089
Netloans/assets	-0.068	0.061	-0.077	0.082	-0.068	0.025
Diversification	0.056	0.085	0.035	0.063	0.012	0.085
Liquidity	0.068***	0.018	0.072**	0.052	0.061**	0.086
Concentration	0.062**	0.072	0.072*	0.059	0.036	0.015
Bank develop.	0.063**	0.095	0.062	0.084	0.185	0.056
Market develop	0.033	0.015	0.125	0.186	0.072	0.060
GDP growth	-0.066**	0.082	-0.055	0.079	-0.053	0.069
Inflation	-0.015	0.036	-0.066	0.185	-0.061	0.028
M1 (p-value)	0.036**	-	0.069**	-	0.022**	-
M2 (p-value)	0.055	-	0.055	-	0.012	-
Sargan/Hansen(p-value)	0.831	-	0.522	-	0.855	-
Diff Sargan/Hansen (p-value)	0.536	-	0.225	-	0.423	-
Σrisk	0.145	0.022	0.166	0.086	0.321	0.159
Σeff	0.355**	0.095	0.219**	0.054	0.198*	0.092
Σcap	-	-	-	-	-	-
Observations	627		435		202	

Notes: We use the two-step system GMM estimator with Windmeijer (2005) corrected standard error (column: co.s. e.). M1 and M2 are tests for the first-order and second-order serial correlation. The Sargan/Hansen is a test of the overidentifying restrictions for the GMM estimators. The variables Σrisk, Σeff, Σcap are the estimated coefficient for the test that the sum of the lagged terms (for the cost efficiency, risk, and capital respectively) is equal to zero. *, ** and *** denotes statistical significance at the 10%, 5% and 1% levels, respectively.

Table 6.Three stage least square estimation (3SLS) for the relationship between bank capital, cost efficiency and risk in GCC banking: conventional vs. Islamic banks

	Risk			Efficiency			Capital		
	Full sample	Convent. bank	Islamic bank	Full sample	Convent. bank	Islamic bank	Full sample	Convent. bank	Islamic bank
Constant	-3.578	-0.952	-1.265	0.688	1.652	0.671	1.982	0.226	1.992
	(-1.56)	(-1.22)	(-0.95)	(0.99)	(0.662)	(1.15)	(1.33)	(0.05)	(0.56)
Risk				0.258**	0.163**	0.065*	0.053	0.068	1.06
				(2.33)	(2.29)	(1.90)	(0.82)	(0.93)	(0.66)
Effi	-0.198*	-1.654*	0.326**				0.098**	0.063	-0.255
	(-1.82)	(-1.83)	(2.14)				(2.47)	(1.39)	(-0.95)
Cap	0.154*	0.982*	-0.421	1.654*	0.932	-0.552**			
	(1.95)	(2.71)	(-1.02)	(1.86)	(0.62)	(1.99)			
Size	-0.583**	-0.225**	-	0.988*	0.322	0.082	-0.032***	-1.598**	-0.665
	(-2.33)	(-2.18)	0.115**	(1.93)	(1.09)	(0.15)	(-2.69)	(-2.29)	(1.03)
LOAN	-0.633*	-0.058	(-2.21)	0.225**	0.115**	0.066	-0.225	-0.05*	-0.06
	(-1.68)	(-0.65)	-0.154	(2.29)	(2.38)	(0.54)	(-1.06)	(-1.96)	(-0.86)
DIVER.	0.112	0.635	(-0.98)	-0.663	-0.558	-0.095**	0.450	0.098	1.063
	(0.12)	(1.25)	0.223	(-1.11)	(-1.52)	(-2.29)	(0.09)	(0.025)	(0.06)
LIQUI	0.685	0.336*	(1.09)	0.543	0.119	0.062	0.095*	0.328	0.069*
	(0.13)	(1.89)	-	(1.06)	(0.67)	(1.22)	(1.81)	(0.12)	*
CONC	1.365*	0.053	0.661**	-0.554**	-0.521	-0.098	0.082	1.652	(2.19)
	(1.76)	(0.92)	(-2.41)	(-2.44)	(-1.02)	(-0.95)	(0.62)	(0.09)	0.669
BDEV	-0.875	-0.056	0.950	0.778	1.052	0.187	0.653**	0.083	(0.98)
	(-0.98)	(-0.13)	(0.25)	(0.623)	(0.83)	(1.33)	(2.49)	(0.65)	0.082
MDEV	-0.354	-0.652	-0.367	0.445	0.625	0.095	0.089	0.698	(1.32)
	(-1.15)	(-0.10)	(-1.21)	(0.988)	(0.62)	(0.50)	(0.06)	(1.06)	0.524
GDP	-0.589**	-1.365*	-0.458	0.112	0.225	0.153	-1.265*	-0.09	(0.09)
	(-2.01)	(-1.79)	(-0.84)	(1.09)	(1.42)	(0.08)	(-1.77)	(-0.66)	-0.625
INF	-0.665	-0.579	-0.115	-0.662	-0.926	-0.953	-0.562	-0.059	(-1.30)
	(-1.06)	(-0.93)	(-1.32)	(-0.92)	(-0.54)	(-0.06)	(-0.98)	(-0.03)	-0.059
Obs.	627	435	-0.129	627	435	202	627	435	(-0.62)
Chi2	82.59**	55.24**	(-0.12)	115.23***	66.5**	85.32*	45.98**	112.56*	202
			202					*	65.23
			66.99**						

Notes : T-statistics in ( ) ; *, ** and *** denotes statistical significance at the 10%, 5% and 1% levels, respectively.