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The Systemic Benefits of Islamic Banking and Finance Practices: A Comparative Study

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The Systemic Benefits of Islamic Banking and Finance Practices: A Comparative Study

By Mehdi Sadeghi*

Abstract

An emerging literature in the aftermath of the recent GFC has attempted to investigate whether growing Islamic banking and finance practices add any systemic benefit to the global economic system. This paper explores the issue by examining the determinants of systemic risk for a sample of Islamic banks and financial institutions compared with conventional counterparts. Systemic risk is defined as a function of the stock market capitalization, marginal expected shortfall, leverage ratio, correlation of return and volatility of return. Our finding shows the impact of market capitalisation on reducing the systemic risk of Islamic banks and financial institutions is relatively higher than conventional counterparts. This is consistent with the results of some previous studies on the perceived benefits of Islamic finance practices. However, the influence of leverage ratio and marginal expected shortfall on increasing the systemic risk of Islamic banks and financial institutions is significantly higher than conventional counterparts. Overall, our result does not support the notion that Islamic banking and finance practices provide more systemic benefit to the financial system than conventional counterparts.

Keywords: Islamic banking and finance, systemic risk, financial crisis

JEL Classification: G14, G15

I. Introduction

Systemic risk arises from the adverse impacts of the behaviour of financial institutions on the financial system as a whole, leading to a financial crisis. Research on systemic risk has been substantially intensified since the advent of the GFC in 2007. The literature developed since then has provided more detailed explanations for the causes of this risk, with many proposals on how to estimate it, or ways of managing it. On the financial policies and practices side, regulatory and supervisory agencies have been attempting to adjust their rules and guidelines according to the current state of the financial system. For instance, the Basel Committee on Banking Supervision (BCBS) has revised the Basel II Accord into Basel III[1], with recommendations to improve capital adequacy requirements, refine risk management practices, and enhance market discipline and information disclosure. The Financial Stability Board in the US has also been mandated through G-20 leaders' summits to work on methods to solve the moral hazard problem of the Too Big to Fail (TBTF) issue of the financial sector.

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1 Refer to Blundell-Wignall et al. (2010) for more details.

The post-GFC financial environment has further witnessed progress towards building a sustainable financial system, which is more resilient to systemic risk. Sustainable finance is defined as “the practice of creating economic and social value through financial models, products and markets that are sustainable over time.” As an initiative to address this, several banks from Africa, Asia, Europe, Latin America and North America have formed the Global Alliance for Banking on Values (GABV). In Muslim countries, the concepts of values and sustainable finance in banking are met through Islamic inspiration for banking and financial practices. This concept is based on Shariah principles, translated into several rules, such as a ban on interest charges, restraint from taking excessive risks (Gharar), or avoiding speculation in financial transactions. It is perceived that a financial system with such qualities is more sustainable and resilient to financial crisis[2].

The adverse impacts of the recent GFC on the livelihood of millions of people around the world created a heated debate on what elements, or who, should be blamed for this failure[3].

In his presentation before the Financial Crisis Inquiry Commission in the United States (September 2010), the Chairman of the US Federal Reserve, Ben Bernanke, referred to sub-prime mortgages as the factor that triggered the crisis. However, he blamed vulnerabilities, or the structural weaknesses in regulation and supervision of the financial system that propagated and amplified the initial shock. The report published later by the Financial Crisis Inquiry Commission (2011)[4] listed several structural weaknesses, including widespread failures in financial regulation, breakdowns in corporate governance, and systemic and widespread breaches in accountability and ethical behaviour as elements that escalated the initial shock. It may perhaps be a combination of these factors that caused misconceptions and irrational behaviour by financiers who, according to *The Economist* (September 2013) [5], thought they had discovered novel methods to dispel risks, when they actually failed to understand it.

The BCSB reforms have attempted to address these issues in the Basel III Accord to strengthen the prescribed regulation, supervision and risk management framework of banks. For instance, the higher minimum Tier 1 Capital is set at 4.5% for January 2013, increasing to 5.5% in January 2014, and 6% in January 2015. Or, an additional capital conservation buffer of 2.5% of common equity Tier 1 is supposed to be held by banks during good times on top of the minimum capital requirements as a way of reducing the impacts of possible crisis on the erosion of the net worth of banks during bad times[6].

2 For more information on interconnection between Islamic finance and sustainable finance, the interested readers may refer to Myers and Hassanzadeh (2013).

3 Times magazine initiated a pole, by asking the public to nominate 25 top people who should be blamed for causing the GFC.

4 Available at: http://www.cfr.org/united-states/financial-crisis-inquiry-commission-report-january-2011.

5 Available at: http://www.economist.com/news/schoolsbrief/21584534-effects-financial-crisis-are-still-being-felt-five-years-article.

6 Refer to Blundell-Wignall (2010a, 2010b), and Revisions to the Basel II Market Risk Framework, BIS (2009). Available at: www.bis.org/publ/bcbs158.pdf.

Previous studies suggest Islamic banks were less affected by adverse impacts of the GFC because of the quality of assets held on their balance sheets, and prudent behaviour to avoid taking excessive risks. For instance, before the GFC, the average ratio of total assets to equity capital for banks was more than 20:1 in the US, and more than 30:1 in Europe. It was well below 10:1 in the Middle East and North Africa (MENA) region, where many banks and financial institutions are totally or partially involved in Islamic finance activities[7]. An empirical study by Hasan and Dridi (2010) also suggests that Islamic banks were more resilient to the market meltdown during the GFC compared with conventional counterparts. This view was further corroborated byre-assessing Islamic banks' risk using external ratings agencies, which found their risks to be more favourable than—or similar to—conventional banks[8]. A recent comprehensive study by Beck et al. (2013) provides further evidence for resilience of Islamic banks and their high market capitalization during the recent crisis because of superior quality of their assets and better intermediation ratio.

Modern Islamic banking and finance has risen from almost non-existence to become an almost $US2 trillion industry in the past four decades. According to Ernst & Young[9], global Islamic banking assets with commercial banks globally grew by 17.6 percent in 4 years, **crossing $US1.7 trillion in 2013.** Although the market capitalization of this industry is small in global terms, the growth rate is 50 percent faster than the overall banking sector. The finance industry may look at Islamic financial contracts as an alternative means of reducing the chance of a future financial crisis materializing again.

Could Islamic finance and banking can provide systemic benefits to the global economy? This question is of growing interest to academia, the finance industry as well as to supervisory and regulatory authorities. However, the answer to this question is not easy to find for several reasons. For instance, Islamic finance and banking practices my help reduce some of the systemic risk attributed to conventional banks' operations. However, Islamic banks generate their own unique systemic risk, which may not arise from the activities of conventional banks[10]. It is also well known that a significant proportion of Islamic banks and financial institutions' transactions deviate from the Islamic finance theory[11]. Therefore, the net impact of their activities on systemic risk depends on the magnitude of influential factors, which may be revealed through empirical investigations.

The purpose of this paper is to investigate whether Islamic banking and finance practices can add any systemic benefit to the global financial system. We use data for different samples of banks and other

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7 Islamic Banking, OECD Observer. Available at: http://www.oecdobserver.org/news/archivestory.php/aid/2865/_Islamic_banking_.html.

8 M. Parker, Arab News, September 2010. Available at: http://www.arabnews.com/node/355547.

9 Ernst & Young, World Islamic Banking Competitiveness Report, 2013-2014.

10 Refer to Ahmad (2009), and *Kayed* and Mohammad (2009) for details of unique systemic risk of Islamic banks.

11 For instance, Shariah Advisory Board may allow banks to offer limited interest bearing deposit accounts.

financial institutions in the MENA region and Asian countries to analyse the impact of the determinants of systemic risk on Islamic banks and financial institutions compared with their conventional counterparts, with either some Islamic finance activities, or no Islamic finance activities. Systemic risk is defined as the extra capital that a financial institution would need to survive if there were a financial crisis. This variable is assumed to be a function of stock market capitalization, marginal expected shortfall, leverage ratio, correlation of return, and volatility of return. Our finding shows the impact of market capitalization on reducing the systemic risk of Islamic banks and financial institutions is relatively higher than conventional counterparts. This is in line with results of earlier studies on the perceived benefits of Islamic finance practices. However, the influence of leverage ratio and marginal expected shortfall on increasing the systemic risk of Islamic banks and financial institutions is significantly higher than conventional counterparts. Overall, our results don't support the notion that Islamic banking and finance activities add systemic benefit to the financial system.

The rest of the paper is organized as follows. Part II of the paper is allocated to data and methodology. Empirical findings are discussed in section III. The paper is concluded in section IV.

II. Methodology and Data

2.1 Data

Monthly data used in this study is for a two year period, from October 2010 to September 2012. The data was collected from the Stern School of Business V-Lab at the University of New York. These data are for seven purely Islamic banks and financial institutions located in the Middle East, 32 conventional banks and financial instructions located in Muslim countries which offer some Islamic finance products or have windows of Islamic financial services, and 32 entirely conventional banks and financial institutions located in Asia. The more recent samples are essentially used as the control groups to compare their results with the result of the study on the first sample. Attention was paid in selection of the banks and financial institutions in the control groups to make sure they are comparable to Islamic banks and other financial institutions with respect to their size, capital structure, and location. The small number of pure Islamic banks and financial institutions included in our study reflects the availability of data from our data source, and must be considered as a limitation of this study.

2.2 Systemic Risk Model

Numerous methods of systemic risk assessment are suggested by currently developing and evolving literature[12]. Gerlach (2009) classifies these methods into three categories. i) The estimated methods utilizing the conventional indicators of financial stability[13], ii) techniques based on the interconnection between financial institutions[14]; and iii) the assessment based on the behaviour of prices of financial assets[15]. Since the estimation and monitoring of systemic risk has become an ongoing process in the volatile financial environment in which we live, methods which rely on publicly available information to process the data have become more popular to use.

The systemic risk data used in this study is estimated according to a model proposed by Acharya et al. (2010) and Brownlees and Engle (2011). According to Acharya et al. (2010), systemic risk is a negative externality affecting the whole economy caused by capital shortfalls in some financial institutions during crisis. Since systemic risk corresponds to the expected capital shortfall of a given firm, conditional on a crisis affecting the whole financial system, firms with larger capital shortfall are expected to be more systemically risky (Benoit, 2013). The data on systemic risk and other relevant variables are regularly reported by the Stern School of Business V-Lab at the University of New York for most of publicly listed banks and financial institutions around the world. V-Lab estimates systemic risk in $US terms, as well as in an index form called the Systemic Risk Contribution Index. This index ranks firms according to the percentage of total systemic risk each is expected to contribute in a future crisis. Both measures take into account the marginal expected shortfall, the liabilities, and the size of the firms according to the following formula[16].

$$SRIK_{it} = \text{Max}\,[0;\ \gamma\, D_{it} - (1-\gamma)\, MV_{it}\,(1\text{-}LRMES_{it})] \qquad (1)$$

where

SRISK represents systemic risk, γ is the prudential capital ratio, D_{it} is the book value of total liabilities, and MV_{it} is the daily market capitalization or market value of equities.

$LRMES_{it}$ is the long term marginal expected shortfall, defined as the money needed to compensate the capital shortfall of the firms' condition on a 40 percent drop in the market value of their shares within a 6 month period. It is approximated as 1-exp (-18*MES), where MES is estimated as the one day market loss if the return on shares drops by 2%.

12 Bisias, et al. (2012) identified 31 method of estimating systemic risks. Several more have been proposed since they have published their report. Benoit et al. (2013) summarises the theoretical and empirical comparison of these models.

13 Refer to IMF (2011), and Indraratna (2013) as some examples.

14 Billio et al. (2012) study is an example.

15 Papers by Adrain et al. (2008), and Brownlees and Engle (2012) follow this approach.

16 This theoretical argument is largely based on Benoit et al. (2012).

The systemic risk according to this model is an increasing function of the liabilities, and long term marginal expected shortfall, and a decreasing function of the market capitalization. It follows to then view the SRISK as an implicit increasing function of the leverage ratio. Since the market value of debts is constrained, the book value of debt and market value of equity are used to capture the leverage position of financial institutions. Long-run marginal expected shortfall is also interpreted as the expected loss of net worth during crisis, measuring the variability of firms' returns with the global market return[17]. In addition to the three variables discussed above, we examine the importance of the correlation of return and volatility of return in determining the systemic risk.

The regression analysis we have described in the next section relies on a set of conditions and assumptions that makes the resulting estimated model valid. To ensure that error terms produced in our regression analysis are independently and identically distributed, we calculated descriptive statistics on all three samples and did not find any significant abnormality in the central tendency of the data that affects this validity. We also estimated the correlation matrix and Variance Inflation Factor (VIF) to determine which independent variable should be included in the model if a multicolinearity problem exists. As a result, we removed beta from the list of proposed independent variables because of the high degree of multicolinearity it had with marginal expected shortfall. The result of this test is consistent with papers by Benoit et al. (2012), and Guntay and Kupiec (2014), who found marginal expected shortfall measures are contaminated by systematic risk[18].

2.3 Panel Data Model

The two main groups of regression models currently applied to panel data analysis are fixed effect and random effect models. The criteria for selecting more appropriate models within these groups are based on the efficiency and consistency of the estimated coefficients. Econometric theory suggests the results from fixed effect models are always consistent. However, the random effect models are generally more efficient. The priority of application is normally granted to whichever model is statistically consistent as well as more efficient. We first estimated two fixed effect and two random effect models, then applied the Hausman test to compare the efficiency and consistency of their coefficients with each other. The P-value for all three samples suggested the coefficients for random effect models were more efficient, but not consistent. As a result, we report the result for two fixed effect models in this paper. Tables 1-3 in the main body of the paper provide the outcome from the fixed (within) effect model, and A-C in the appendix are based on the fixed effect with dummy variables model. The results from random effect models are not reported in this paper.

17 For a theoretical discussion on the relationship between volatility and leverage, interested readers refer to Engle and Siriwardane (2014).

18 This problem also extends to CoVAR, another popular systemic risk estimate attributed to Adrian et al. (2008).

The general form of defining systemic risk as a function of independent variables is described as:

$$Y_{it} = \alpha_i + \beta_1 X_{1t} + .. + \beta_n X_{it} + u_{it} \qquad (2)$$

where

X_{it} = independent variables

α_i = unobservable time-invariant individual effect

u_{it}= error term

t = 1, 2,…..,T and i= 1, 2,…..N

The fixed effect model must satisfy following state average condition:

$$\frac{1}{T}\sum_{t=1}^{T} Y_{it} = \alpha_i + \beta_1 \frac{1}{T}\sum_{t=1}^{T} X_{it} + \frac{1}{T}\sum_{t=1}^{T} u_{it}$$

Deviation from the state average is estimated as:

$$Y_{it} - \frac{1}{T}\sum_{t=1}^{T} Y_{it} = \alpha_i + \beta_1 (X_{it} - \frac{1}{T}\sum_{t=1}^{T} X_{it}) + (u_{it} - \frac{1}{T}\sum_{t=1}^{T} u_{it})$$

then,

$$\tilde{Y}_{it} = \alpha_i - \bar{\alpha} + \beta_1 \tilde{X}_{it} + \tilde{u}_{it} = \beta_1 \tilde{X}_{it} + \tilde{u}_{it} \qquad (3)$$

where

$$\tilde{Y}_{it} = Y_{it} - \frac{1}{T}\sum_{t=1}^{T} Y_{it} \text{ and } \tilde{X}_{it} = (X_{it} - \frac{1}{T}\sum_{t=1}^{T} X_{it})$$

$\tilde{u}_{it}$ = the random error term with the expected value of: $E(u_{it}) \sim N(0, \sigma^2)$

Since in this model α_i remains constant across state averages, $\alpha_i - \bar{\alpha} = 0$.

Using equation (3) as the foundation formula[19], we estimate systemic risk ($SRISK_{it}$) as a function of the following independent variables:

COR_{it} = correlation coefficient of the individual share price with the market. Change in this variable is expected to have positive impact on the systemic risk.

LVG_{it} = leverage ratio. Change in this variable is expected to have positive impact on the systemic risk.

19 We estimated the coefficients of independent variables in Tables A-C in the Appendix by an alternative fixed effect transformation method of adding a dummy variable for each individual *i* to the model.

$LRMES_{it}$ = Long run marginal expected shortfall defined as the loss of asset value if financial institutions' share price drops by 40% or more within 6 months period. Change in this variable is expected to have positive impact on the systemic risk.

MV_{it} = market capitalization. Change in this variable is expected to have negative impact on the systemic risk.

VOL_{it} = the volatility of stock prices. Change in this variable is expected to have positive impact on the systemic risk.

III. Empirical Findings

Table 1 presents the result of our regression analysis for the sample of Islamic banks and financial institutions. From five independent variables included in the model, the leverage ratio (LVG), long run marginal expected shortfall (LMMES), and market capitalization (MV) are statistically significant at the conventional statistical levels. The estimated coefficients for the volatility of return (VOL) and correlation of return (COR) are not statistically significant. The size of coefficient for LVG suggests that a 1% increase in leverage ratio is expected to cause $102.039 increase in systemic risk. The estimated coefficient for LRMES, indicating that every dollar increase in capital shortfall a bank and financial institutions can cause systemic risk to increase by $860.767. Finally, a single dollar increase in the market value of these banks and financial institutions can virtually reduce systematic risk by the same amount ($0.994). The magnitude and the sign of coefficients in Table A in Appendix are virtually identical to the corresponding coefficients in Table 1, suggesting that our findings are robust with respect to a different model specification.

Table 2 presents the result of our regression analysis for non-Islamic banks and financial institutions that offer some Islamic financial products to customers. Similar to the results in Table 1, only coefficients for LVG, MES and MV are statistically significant at the conventional statistical levels. The coefficients for VOL and COR are not statistically significant. The size of the coefficient for LVG suggests that a 1% increase in leverage ratio is expected to cause $60.291 increase in systemic risk. The estimated coefficient for LRMES indicates that every dollar increase in the capital shortfall of the banks and financial institutions can cause systemic risk to increase by 540.387 dollars. The estimated coefficient for MV is -0.689, indicating that a $1 increase in the market value of these banks and financial institutions can reduce systematic risk by $0.689. There is similarity between estimated coefficients in Table B with corresponding coefficients in Table 2, suggesting our findings are robust with respect to the different type of model we used.

Table 3 presents the result of our regression analysis for purely conventional banks and financial institutions included in this study. Similar to previous tables, only the coefficients for the leverage ratio, marginal expected shortfall, and market capitalization are statistically significant at the conventional statistical levels. The size of coefficient for LVG is equal to 96.523, indicating that any 1% increase in leverage ratio is expected to cause $96.523 increase in systemic risk. The estimated coefficient for MES shows that a one dollar increase in the capital shortfall a bank or financial institution can cause systemic risk to increase by $500.389. Finally, the magnitude of the coefficient for MV suggests that a one dollar increase in the market capitalisation of conventional banks and financial institutions can reduce systemic risk by $0.570. The magnitude and sign of coefficients in Table C in the Appendix closely correspond to coefficients in Table 3 for each independent variable, providing evidence that our findings are robust with regard to a different model specification.

A comparison of findings in Table 1 through to 3 indicates that for all three data samples used in this study the estimated coefficients for LVC, MES and MV are statistically significant at the conventional levels. However, the magnitudes of these coefficients are larger for Islamic banks and financial institutions than the other two samples. For instance, the difference between the LVG coefficient for Islamic banks and financial institutions sample, and non-Islamic banks with some Islamic financial products sample is 41.768. This difference is statistically significant at the 0.01 level according to the z-test estimate (t = 3.139)[20]. This difference in coefficient for the Islamic bank sample v conventional banks is 5.507, but not significant at the conventional levels. The difference between MES coefficient for Islamic banks and financial institutions with non-Islamic banks and financial institutions with some Islamic products and services is 320.580, significant at the 0.05 level (t = 2.355). The difference of MES coefficients for Islamic and conventional banks is 360.378, with t = 2.820, which is statistically significant at the 0.05 level. These findings indicate that Islamic banks and financial institutions are more prone to systemic risk arising from higher leverage ratios and marginal expected shortfalls, compared to their counterparts in the conventional sector. However, for the market capitalization variable, the difference between the coefficients for Islamic and non-Islamic firms which offer some Islamic products and services is -0.306. This coefficient is statistically significant at 0.001 level (-t = 8.164). For Islamic v conventional banks and financial institutions the difference between these coefficients is -0.425 with the t value equal to -10.911, which is highly significant at 0.001 level. This difference indicates that the asset mix of Islamic banks and financial institutions provides more systemic benefits to the financial system than their conventional counterparts. Overall, the results show a mixed outcome, with signs of more positive impacts of independent variables on systemic risk than negative.

IV. Conclusion

20 Drawing on the paper by Clogg et al. (1995), the formula used for this statistical test is: $Z = \sqrt{\dfrac{\beta_1 - \beta_2}{SE_1^2 + SE_2^2}}$

where, $\beta 1$ and $\beta 2$ are estimated coefficients and SE1 and SE2 are their corresponding standard deviations.

This paper investigates the impact of factors that influence the systemic risk of Islamic banks and financial institutions compared with conventional counterparts, with either some Islamic finance activities, or no Islamic finance activities. We use publicly available data for a sample of banks and other financial institutions in the MENA region and some Asian countries to estimate these relationships. Systemic risk is defined as the shortage of capital that a financial institution would have needed to survive if there were a financial crisis. This variable is assumed to be a function of Stock Market Capitalization, Marginal Expected Shortfall, Leverage Ratio, Volatility of Return, and Correlation of Return. Consistent with the theory, our finding shows that the Leverage Ratio, Market Capitalization, and Marginal Expected Shortfall are all statistically significant in determining systemic risk in all three samples. However, Islamic banks and financial institutions are generally more sensitive to the determinants of systemic risk than counterparts in the conventional sector. This is reflected in differences of the absolute value of estimated coefficients for independent variables. According to our findings, increases in the leverage ratio and marginal expected shortfall increase the systemic risk of Islamic banks and financial institutions more than the systemic risk of counterparts in the conventional sector. Conversely, increases in the market capitalization of these firms decreases their systemic risk more than the systemic risk of conventional counterparts.

Although Islamic banks and financial institutions are more prone to the negative impacts of systemic risk determinants, this arises not from the theory of Islamic banking, but perhaps from the way it is practised. According to the theory the profit and loss (PL) sharing contracts, where the financier actually participates in an asset based investment and the risk sharing principle, it supposes to reduce the chance of a bank's failure due to mis-match between short-term contracts on the liability side of the balance sheet, with long-term uncertain loan contracts on the asset side. However, it is well known that the share of PL in the activity of Islamic banks has dropped to as low as 5%[21]. Instead, it is usually preferred to use a debt-like instrument, such as (cost plus) Murabaha contracts, to pass the risk of investment to borrowers, making their activities more similar to conventional banks[22]. This issue, in combination with higher intermediation ratios found in the research by Beck et al. (2013), may be the reason for more sensitivity of Islamic banks and financial institutions to negative shocks.

21 Refer to Khan and Ahamad (2001).

22 For reasons behind banks hesitation to use profit and loss sharing contracts, interested readers may refer to Komling (2014).

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Table 1

This table presents the result of panel data regression analysis (fixed effect) of systemic risk as a function of volatility (VOL), correlation coefficient (COR), market capitalization (MV) and the leverage ratio (LVG) for a sample of 7 Islamic banks and financial institutions. The monthly data extends from 10/2010 to 9/2012. Total panel (balanced) observations are 168. We used Driscoll and Kraay (1998) standard errors approach to make estimated coefficients robust to heteroskedasticity and serial correlation problems.

Variable	**Coefficients**	**Std. Error**	**t value**	**Pr(>|t|)**
COR	426.134	341.667	1.247	0.379
LRMES	860.767	122.797	7.009	0.000***
LVG	102.039	8.511	11.990	<0.000***
MV	-0.994	0.026	-38.402	<0.000***
VOL	0.242	1.380	0.175	0.901

R-Squared : 0.948 Adj. R-Squared : 0.876

F-statistic: 569.320 on 5 and 156 DF, p-value: < 2.22e-16

Significant codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘# ’

Table 2

This table presents the result of panel data regression analysis (fixed effect) of systemic risk as a function of volatility (VOL), correlation coefficient (COR), market capitalization (MV) and the leverage ratio (LVG) for a sample of 32 banks and financial institutions with some Islamic finance activities. The monthly data extends from 10/2010 to 9/2012. Total panel (balanced) observations are 168. We used Driscoll and Kraay (1998) standard errors approach to make estimated coefficients robust to heteroskedasticity and serial correlation problems.

Variables	**Coefficients**	**Std. Error**	**t - value**	**Pr(>|t|)**
COR	411.849	458.956	0.897	0.370
LRMES	540.387	63.770	8.474	< 2.2e-16***
LVG	60.291	11.419	5.280	1.67e-07***
MV	-0.689	0.027	-25.839	< 2.2e-16***
VOL	-1.616	0.998	-1.618	0.106

R-Squared: 0.766 Adj. R-Squared : 0.730
F-statistic: 523.333 on 5 and 763 DF, p-value: < 2.22e-16

Significant codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘#’

Table 3

This table presents the result of panel data regression analysis (fixed effect) of systemic risk as a function of volatility (VOL), correlation coefficient (COR), market capitalization (MV) and the leverage ratio (LVG) for a sample of 32 Asian banks and financial institutions. The monthly data extends from 10/2010 to 9/2012. Total panel (balanced) observations are 768. We used Driscoll and Kraay (1998) standard errors approach to make estimated coefficients robust to heteroskedasticity and serial correlation problems.

Variables	**Coefficients**	**Std. Error (SCC)**	**t- value**	**Pr(>|t|)**
COR	91.808	406.985	0.226	0.822
LRMES	500.389	42.772	11.699	<2e-16***
LVG	96.523	9.736	9.914	<2e-16***
MV	-0.570	0.029	-19.182	<2e-16***
VOL	-1.540	0.955	-1.612	0.107

R-Squared : 0.801 Adj. R-Squared : 0.762

F-statistic: 588.518 on 5 and 763 DF, p-value: < 2.22e-16

Significant codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘#’ 1

Appendix

Table A

This table presents the result of panel data regression analysis (fixed effect) of systemic risk as a function of volatility (VOL), correlation coefficient (COR), market capitalization (MV) and the leverage ratio (LVG) for a sample of 7 Islamic banks and financial institutions. The monthly data extends from 10/2010 to 9/2012. Total panel (balanced) observations are 168. We used Driscoll and Kraay (1998) standard errors approach to make estimated coefficients robust to heteroskedasticity and serial correlation problems.

Variable	**Coefficients**	**Std. Error**	**t value**	**Pr(>|t|)**
COR	426.130	652.200	0.653	0.514
LRMES	860.770	251.660	3.420	0.001***
LVG	102.040	23.421	4.357	0.000***
MV	-0.994	0.037	-26.910	< 2.2e-16***
VOL	0.242	2.931	0.082	0.934
Factor ADIB	421.560	300.500	1.403	0.163
Factor ARB	8486.300	1195.000	7.101	0.000***
Factor DIB	399.190	389.430	1.025	0.307
Factor IAI	-1467.700	352.090	-4.169	0.000***
Factor KFH	3359.600	446.170	7.530	0.000***
Factor MAR	871.950	285.730	3.052	0.003**
Factor QIB	421.560	300.500	1.403	0.163

Multiple R-squared: 0.999, Adjusted R-squared: 0.999
F-statistic: 19220 on 12 and 156 DF, p-value: < 2.2e-16

Significant codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ #’

Table B

This table presents the result of panel data linear regression analysis (with dummy) of systemic risk as a function of volatility (VOL), correlation coefficient (COR), market capitalization (MV) and the leverage ratio (LVG) for a sample of 32 banks and financial institutions with some Islamic finance activities. The monthly data extends from 10/2010 to 9/2012. Total panel (balanced) observations are 736. We used Driscoll and Kraay (1998) standard errors approach to make estimated coefficients robust to heteroskedasticity and serial correlation problems.				
Variables	**Coefficients (HAC)**	**Std. Error**	**t value**	**Pr(>|t|)**
COR	317.974	332.735	0.956	0.340
LRMES	540.626	75.389	7.171	1.694e-12 ***
LVG	60.2136	12.419	4.849	1.494e-06 ***
MV	-0.688	0.036	-19.231	< 2.2e-16 ***
VOL	-1.616	0.957	-1.689	0.092 #
Factor ABP	1502.900	293.257	5.125	3.736e-07 ***
Factor ADC	1877.993	278.789	6.736	3.106e-11 ***
Factor ALK	-331.398	119.855	-2.765	0.0058237 **
Factor ALL	192.303	399.244	0.482	0.6301739
Factor AMM	1265.878	353.127	3.585	0.000358 ***
Factor AUB	749.446	199.320	3.760	0.000182 ***
Factor AUB	-304.959	161.262	-1.891	0.058975.
Factor BSF	426.204	370.666	1.140	0.2505569
Factor CBQ	-131.8789	243.797	-0.541	0.5887014
Factor DAR	-631.1989	158.086	-3.993	7.132e-05 ***
Factor DBQ	-67.6853	176.915	-0.383	0.7021274
Factor DIP	-433.916	81.720	-5.309	1.423e-07 ***
Factor ENB	3665.136	351.064	10.440	< 2.2e-16 ***
Factor FGB	1045.793	312.239	3.349	0.0008480 ***
Factor GBK	44.675	221.267	0.202	0.8400432
Factor GGI	-923.501	212.331	-4.349	1.542e-05 ***
Factor HBL	-20.299	143.861	-0.141	0.8878275
Factor JKB	-315.959	91.327	-3.459	0.0005695 ***
Factor JOR	-265.179	68.539	-3.869	0.0001182 ***
Factor KPC	125.818	205.761	0.611	0.5410562
Factor MBB	7606.874	829.160	9.174	< 2.2e-16 ***
Factor MGIR	-575.628	104.725	-5.496	5.209e-08 ***
Factor PBB	3740.031	658.703	5.677	1.908e-08 ***
Factor PNB	4623.791	472.049	9.795	< 2.2e-16 ***
Factor QIC	-507.467	95.657	-5.305	1.459e-07 ***
Factor QNB	1034.847	896.288	1.155	0.2486023
Factor RB	1031.579	427.913	2.411	0.0161456 *
Factor RHB	2005.633	349.891	5.732	1.405e-08 ***
Factor SBB	682.681	374.241	1.824	0.0684984.
Factor SIB	-76.009	176.421	-0.431	0.6667029
Factor SII	-595.612	184.709	-3.225	0.0013128 **
Factor UBJ	-380.893	132.666	-2.871	0.0041988 **
Multiple R-squared: 0.993, Adjusted R-squared: 0.993 F-statistic: 2832 on 37 and 731 DF, p-value: < 2.2e-16				

Significant codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘#’

Table C
This table presents the result of panel data linear regression analysis (with dummy) of systemic risk as a function of volatility (VOL), correlation coefficient (COR), market capitalization (MV) and the leverage ratio (LVG) for a sample of 32 Asian banks and financial institutions. The monthly data extends from 10/2010 to 9/2012. Total panel (balanced) observations are 768. We used Driscoll and

Kraay (1998) standard errors approach to make estimated coefficients robust to heteroskedasticity and serial correlation problems.				
Variables	**Coefficient**	**Std. Error**	**t value**	**Pr(>|t|)**
COR	144.900	249.900	0.571	0.562
LRMES	500.400	50.390	9.952	< 2.2e-16 ***
LVG	96.560	10.600	9.108	< 2.2e-16 ***
MV	-57.05	0.043	-13.383	< 2.2e-16 ***
VOL	-1.392	0.975	-1.427	0.154
Factor ACOM	-6.99.6 e+02	2.229 e+02	-3.138	0.002 **
Factor ADIRA	-8.89.1 e+02	1.148 e+02	-7.752	0.044e-14 ***
Factor AEON	-8.40.0 e+02	1.887e+02	-4.459	0.818e-06 ***
Factor AEONM	-1.137 e+03	2.500 e+02	-4.548	0.327e-06 ***
Factor ANK	6.291 e+02	6.167e+02	1.020	0.308
Factor BAJA	-9.221e+02	1.908e+02	-4.838	1.597e-06 ***
Factor BAJAJ	-9.918e+02	1.225e+02	-8.087	2.542e-15 ***
Factor CIMB	-5.235e+02	2.596e+02	-2.016	0.044 *
Factor DANAM	-6.746 e+02	3.186e+02	-2.117	0.0346 *
Factor EONT	-7.389e+02	9.199e+01	-8.032	3.832e-15 ***
Factor EASIA	2.822 e+03	4.640 e+02	6.081	1.925e-09 ***
Factor FFIN	-7.559e+02	1.981e+02	-3.815	0.001 ***
Factor GILE	-1.104 e+03	3.286 e+02	-3.360	0.001 ***
Factor HAPO	3.673 e+03	4.235e+02	8.673	< 2.2e-16 ***
Factor INDI	2.581 e+03	4.100 e+02	6.295	5.294e-10 ***
Factor LLIA	-7.456 e+02	1.746 e+02	-4.2704	2.209e-05 ***
Factor LLIZ	-1.223 e+03	1.329 e+02	-9.199	< 2.2e-16 ***
Factor LLID	-8.54 e+02	1.069 e+02	-7.992	5.168e-15 ***
Factor MAL	-9.453 e+02	1.253 e+02	-7.545	1.351e-13 ***
Factor MMB	4.046 e+02	3.449 e+02	1.173	0.241
Factor MPP	6.284 e+03	8.033 e+02	7.822	1.818e-14 ***
Factor NANJ	7.179 e+02	2.959 e+02	2.426	0.015 *
Factor NGK	2.228 e+03	5.350 e+02	4.164	3.499 e-05 ***
Factor NGKO	-5.800 e+02	7.378 e+0	-7.861	1.365 e-14 ***
Factor NGKL	-7.589 e+02	1.310 e+02	-5.794	1.025e-08 ***
Factor PAN	-8.539 e+02	2.161 e+02	-3.952	8.491e-05 ***
Factor PERM	-8.796 e+02	1.706 e+02	-5.156	3.257e-07 ***
Factor PHIL	-4.720 e+02	2.885 e+02	-1.636	0.102
Factor TOK	-7.901 e+02	1.258 e+02	-6.281	5.772e-10 ***
Factor XIS	1.822 e+03	5.181 e+02	3.5165	0.001 ***
Factor YALA	-1.325 e+03	2.908 e+02	-4.557	6.087e-06 ***
Factor YUDA	1.590 e+02	3.156 e+02	0.504	0.615
Multiple R-squared: 0.976, Adjusted R-squared: 0.975 F-statistic: 779.300 on 37 and 731 DF, p-value: < 2.2 e-16				

Significant codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘#’ 1