



# Risk-Taking Behaviour of Islamic Banks: A Panel Study

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## To cite this article:

Ahmad Al-Harbi. Risk-Taking Behaviour of Islamic Banks: A Panel Study. *International Journal of Economics, Finance and Management Sciences*. Vol. 10, No. 1, 2022, pp. 28-36. doi: 10.11648/j.ijefm.20221001.13

**Received:** November 21, 2021; **Accepted:** January 13, 2022; **Published:** January 28, 2022

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**Abstract:** The aim of this paper is to investigate the factors that impact the risk-taking behavior of Islamic banks before the 2008 financial crisis. The study covers a sample of 110 Islamic banks (represent almost all the Islamic banks in the world) across twenty-five countries which are members of the Organization of Islamic Cooperation (OIC; the organization has 57 members), during the period 1989-2008. The author uses a two-step system generalized method of moments dynamic model to analyze the data. Moreover, Fixed Effect (FE) and Random Effect (RE) models are used to check the robustness of the study results. The results show that profitability, liquidity, management efficiency, size and money supply growth reduce Islamic banks risk. On the other hand, capital adequacy, off-balance sheet activities, concentration, deposit insurance, GDP growth and inflation increase Islamic banks risk. The implications of this study can be beneficial to policymakers, regulators, and banks managers in countries with dual financial system or Islamized financial system as it will help them formulate better policies to ensure the stability of the financial system. To be noted that, according to the best of the author knowledge, this is the first paper that study the factors affecting the risk-taking behavior of Islamic banks using a large sample of Islamic banks with a prolonged period (20 years).

**Keywords:** Islamic Banks, Risk-taking, GMM Estimation

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## 1. Introduction

The Islamic finance industry has seen tremendous growth over the last forty years. Until 2019, the global Islamic finance assets increased by 14 per cent year-on-year to US\$2.88 trillion and the Islamic banking sector is the main contributor to this market and is worth at USD 1.99 trillion, 69.1 per cent, according to Islamic Corporation for the Development of the Private Sector [32]. This emphasizes the importance of risk management, as in theory Islamic banks business model may encourage high risk-taking because of the moral hazard incentives that may be caused by the profit sharing and loss bearing scheme.

Existing literature on the risk-taking behavior of Islamic banks is relatively scarce and most of these studies were concentrated on a particular region or a country. Therefore, this paper is an attempt to bridge this gap in literature as the comprehension of the factors contributing to Islamic banks' risk-taking behavior will adds to the current discussion on stability and sustainability of banking and finance sectors. This paper seeks to identify some micro and macro factors

that influence the risk-taking behavior of Islamic banks by using a large sample of banks, almost all the Islamic banks in the world for a 20-year period (1989-2008). The banks of our sample operate in developing/underdeveloped countries were most of its population are Muslims.

This paper will study the link between profitability, capital adequacy, liquidity, management efficiency, off-balance sheet activities, size, concentration, deposit insurance, GDP growth, inflation, money supply growth, and the risk-taking behavior of Islamic banks.

The remaining sections of this paper are as follows; section 2 reviews literature and hypothesis development, while section 3 describes the methodology, section 4 present and discuss results and finally, section 5 concludes the study.

## 2. Literature Review and Hypothesis Development

The number of studies that dedicated to investigating the risk taken behavior of Islamic banks are limited specifically studies using cross-country data, some of these studies will

be highlighted below.

Alam and Tang [5] used data from 99 Islamic banks, data source Bankscope database, operated in 14 countries and examined their behavioral features by applying the prospect theory. They reported that Islamic banks located above target risk level tend to show risk-adverse behavior, while banks below target risk level inclined towards risk-seeking attitude. The study also indicated that banks which have higher loans to total asset ratio tend to take on lower risk. Moreover, the results showed an inverse relationship between loans to total asset ratio and the banks' risk-taking attitude, which suggest that an agency problem could influence the risk-taking behavior. Srairi [56] investigates the impact of ownership structure, measured by two dimensions: nature of owners and ownership concentration, on bank risk. The author compared risk-taking behavior of conventional and Islamic banks (93 conventional and 40 Islamic banks; data source Bankscope database) in 10 MENA countries for the period 2005 to 2009 using ordinary regression model. The results showed an inverse relationship between ownership concentration and risk. In addition, the results showed differences in risk preferences of different classes of owners.

On the governance structure, Alam [6] investigated the linkages between the banking regulatory and supervisory structures associated with the pillars of Basel III and the risk taking of banks using data using country data, banks operating in a dual system, for the period 2006-2010. The study proxied risk by loan-loss reserve to total asset ratio and the estimation method is two-stage data envelopment analysis. The study reported an inverse relationship between capital requirement and bank risk-taking behavior for both Islamic and conventional banks. In addition, the study indicated that higher restrictions had a positive influence on the risk-taking behavior of conventional banks but reduced the level of riskiness in Islamic banks. Also, it been shown that the supervisory power's had insignificant negative effect on the bank risk-taking behavior for the two banking systems. Moving to the effect of the other independent variables on risk-taking behavior of Islamic banks the study reported that banks inefficiency (-), loan growth (-), size (-), and liquidity (-) all had a significant link to bank risk-taking behavior. Similarly, Mollah *et al.* [45] examined whether the difference in governance structures influences the risk taking and performance of Islamic banks compared to conventional banks. They used a sample of 52 Islamic banks and 104 conventional banks operating in 14 countries for the period from 2005 to 2013 (data source Bankscope database), and the estimation method was random-effects GLS. Their results showed that the governance structure in Islamic banks allows them to take higher risks and achieve better performance because of product complexities and transaction mechanisms.

In another direction, González *et al.* [28] studied the relationship between competition and bank stability for 356 banks operating in MENA region during the period 2005–2012. They used Z-score as a proxy for banks risk-taking and GMM was the method of estimation. They found for the overall sample a U-shaped relationship between competition

and banks' risk taking for MENA banks. The negative linear relationship between Z-Score and H-statistics in Gulf countries shows that an increase in competition leads to a reduction in the level of financial stability. On the other hand, the non-Gulf countries show an increase of competition in uncompetitive markets can result in an increase instability. Moreover, the results of Islamic banks showed a significant and negative impact on Z-Score and a significant and positive impact on risk taking indicating that Islamic banks more risky than conventional banks.

Meanwhile, Mokni *et al.* [44] examined determinants of risk-taking in Islamic banks and conventional banks located in the MENA region. The authors adopted generalized least square (GLS) random-effect (RE) technique as their method of analysis and GMM for robustness tests, and the Z-score was the proxy of risk. The data of the study consisted of 15 conventional banks and 15 Islamic banks located in the MENA region over the period 2002-2009, the data obtained from Bankscope database. The main finding is that the determinants' risk-taking significance varies between Islamic and conventional banks. Moreover, the study reported that conventional banks are more stable than Islamic banks. In addition, the results of Islamic banks showed that capital adequacy (-), off-balance sheet activities (-), inflation (-), and GDP growth (+) had significant effect on Islamic banks risk behavior. In contrast, size (-), ownership status (state or private banks; +), stock exchange listing (-), and deposit insurance (-) are extraneous factors for Islamic banks. Similarly, Mairafi *et al.* [42] examined the bank-specific determinants of Islamic bank's risk-taking behavior using cross-country data (64 banks; data taken from Bankscope database) for the period 2006-2015. The authors employed a FE model to study the relation between microeconomic factors and risk-taking behavior of Islamic banks and risk proxied by the standard deviation of the return on equity. The results revealed that asset quality (-) and size (-) had a significant impact on risk-taking behavior in Islamic banks. Disparity, capital (+), management efficiency (+), profitability (+), and liquidity (+) disclose an insignificant relationship with Islamic banks risk-taking behavior.

In a more recent study, Saif-Alyousfi and Saha [54] examined the effect of bank-specific, financial structure and macroeconomic factors on the risk-taking behavior, stability, and profitability of banks in GCC countries during 1998–2017 period, data drawn from Bankscope database. The authors used a two-step system generalized method of moments dynamic model to analyze the data, and risk-taking behavior proxied by the standard deviation of ROA from a three-period rolling window. The study reported that cost (+), non-interest revenue (-), opportunity cost (+), demand deposit (-), non-performing loans (+), capital adequacy (-), off-balance sheet activities (-), GDP (-), concentration (-), stock market (-), size (-), and credit to private sector (+) had significant impact on risk-taking behavior for Islamic banks. Contrarily, liquidity risk (+), market risk (+), loan growth (+), loan to total assets (+), inflation (+), and interest rate (+) had no effect on risk-taking behavior for Islamic banks.

In the light of the foregoing, this study will explore the impact of microeconomics and macroeconomic variables on banks risk-taking behavior. Those variables will be discussed below:

*Profitability:* According to the traditional theory profitable banks are risk averse, Keeley suggested that risk-taking incentives should be lower in more profitable banks because their shareholders stand to lose more value if downside risks realize [34]. This inverse relationship between profitability and risk-taking behavior, profitability reduces a bank risk-taking, is documented by Gekonge and Muriu [27] and Ngono and Pone [48].

Nonetheless, Martynova *et al.* study indicated that risk-taking in profitable banks are more likely when banks leverage constraints are relaxed. On the other hand, low profitable banks try to compensate by taking more risks because in this case banks have no choice except to take higher risks to avoid bankruptcy instead of the alternative which is surrendering to it without a fight (survival instinct). [43]. The study conducted by Hu and Xie found a positive relation between banks risk-taking behavior and profitability (the increase of risk-taking increases profitability) [30]. Based on the above the following hypothesis may be formulated:

*H1.* Profitability is negatively related with risk-taking behavior.

*Capital adequacy:* The impact of capital requirements on banks risk taking is ambiguous. In one hand, it been argued that higher capital is costly thus banks take higher risk by investing in risky assets to compensate for the lost revenue. This positive link between capital requirements and risk-taking behavior is reported by Blum [15], Rime [53], Laeven and Levine [39], Lin *et al.* [41], and Hussain *et al.* [30]. On the other hand, higher capital allows banks to pursue business opportunities more effectively, increased profitability, and absorbs any shocks. This negative relation between capital and risk-taking behavior been documented by many studies such as Zhang *et al.* [59], Ho and Hsu [29], Agoraki *et al.* [4], Lee and Hsieh [40], and Bouheni and Rachdi [18]. Accordingly, the following hypothesis is articulated:

*H2.* Bank capitalization is positively related with risk-taking behavior.

*Liquidity:* According to the hypothesis of agency costs of free cash flow developed by Jensen managers use free cash flow to invest in project with negative net present value [33]. High liquidity will drive managers to enlarge the bank riskiness by increasing loan portfolio, lowering the lending standards, which could lead to insolvency of a bank. The study of Acharya and Naqvi [2], and El Khoury [24] suggested that high liquidity is linked to a bank risk-taking. On the other hand, high liquidity reduces banks risk-taking behavior as high liquidity provide a cushion against shocks, and this proven by Alam [6], Khan *et al.* [38], and Dahir *et al.* [22] results. The next hypothesis is enunciated:

*H3.* Liquidity is negatively related to risk-taking behavior.

*Management efficiency:* This variable shows how efficiently a bank is being run the lower the ratio the more

efficiently a bank operates which results in increased profitability. The “bad management” hypothesis which introduced by Berger and DeYoung suggested that banks operating with low levels of efficiency have higher costs largely due to inadequate credit monitoring and inefficient control of operating expenses and this will increase banks risk-taking behavior in lieu of lost profits [14]. The results of Altunbas *et al.* [9] and Tan and Floros [57] showed a positive link between inefficiency and banks’ risk-taking behavior. Nonetheless, Pappas *et al.* [51] results suggested that the growth of overheads significantly lessens the failure risk for Islamic banks. They argued that Islamic banks invest more in human resource training and development where reputation and customer-relationship management rank high in their priorities. In line with conventional wisdom that the higher the operating cost the higher the risk-taking the next hypothesis is formulated:

*H4.* Management efficiency is positively related to risk-taking behavior.

*Off-balance sheet activities (OBS):* In a commercial bank, the OBS activities consist of traditional intermediate business, commitments, guarantees, and transactions. Thus, OBS activities include items such as letters of credit, unfunded loan commitments, lines of credit, and derivatives. And this can increase banks risk, which supported by Angbazo [10] and Rahman *et al.* [52] findings. However, it been argued that OBS activities increase banks profitability, which allows them to expand their leverage and maximize the return on investment. The study conducted by Saif-Alyousfi and Saha [54], and Mokni *et al.* [44] showed that OBS activities reduce banks risk-taking behavior. Considering that Islamic banks rely on OBS activities to generate revenue as reported by Al-Harbi [8], hence our fifth hypothesis will be as follows:

*H5.* OBS activities are positively related to risk-taking behavior.

*Size:* Large banks benefit from both economies of scale and diversification of its portfolio thus its risk will decrease. The negative relation between size and risk-taking behavior been reported by Alam [6], Mousa and Zaiani [45], Mairafi *et al.* [42], and Saif-Alyousfi and Saha [54] among others. However, larger banks may have higher credit risk because of lower control. In addition, large banks are forced to generate more profit as a result it will take more risks also, large banks are convinced that they will be bailed out by governments because they are “too-big-to-fail” and this encourage large banks to take more risks. The study conducted by Kane [36] and Rahman *et al.* [52] reported a positive link between risk and size. Based on these arguments the following hypothesis may be formulated:

*H6.* Size is negatively related to risk-taking behavior.

*Concentration:* Concentration is a proxy of competition. The Structure-Conduct-Performance paradigm argues that banks operating in concentrated markets have a higher profit due to monopoly rents, which prevent them from taking high risks. Saif-Alyousfi and Saha [54] reported a negative relationship between concentration and risk-taking behavior by banks. On the other hand, the fragility-competition

hypothesis assumes that high concentration erodes banks' profit margin and hence charter value which leads banks to increase its risk because banks have less to lose in insolvency [17, 34]. This confirmed by Claessens and Laeven [21] and González *et al.* [28] findings. In line with the traditional believe that a high concentrated industry is less competitive, and this will increase profitability the following hypothesis is enunciated:

*H7.* Concentration is negatively related to risk-taking behavior.

*Deposit Insurance:* Deposit insurance prevents banks runs, which ensure the stability of banking system from systemic risk problem. Angkinand [11] results suggested that the implementation of explicit deposit insurance, in presence of strict capital requirements, will reduce the negative effect of financial crisis. In addition, Centeno and Petricek [20] study suggested that the increase in deposit insurance did not increase bank risk-taking. However, this scheme may intentionally incentivize banks to take high risks, possibly without limit, due to a payoff structure in which large gains go to banks' shareholders and large losses to the government [17]. The findings of Demirgüç-Kunt and Detragiache [23] and Fu *et al.* [25] support the notion that deposit insurance enhance risk-taking behavior. Therefore, this hypothesis is to be tested:

*H8.* Deposit insurance is positively related to risk-taking behavior.

*GDP growth:* GDP growth is a proxy for the business trend and economic growth in general. In economic upswing banks risk should be lower as banks' loan portfolio become less risky. The findings of Saif-Alyousfi and Saha [54] support this. On the other hand, economic growth may become a source of risk for banks if banks reduced their screening activity and lending standards. This confirmed by Mokni *et al.* [44] findings. Based on these arguments the following hypothesis is articulated:

*H9.* GDP growth is negatively related to risk-taking behavior.

*Inflation:* The effect of inflation on banks risk-taking behavior could be positive or negative. Higher inflation in one hand can make debt servicing easier by reducing the real value of outstanding loans but it can also weaken borrowers' ability to service debt by reducing their real income [19]. Mokni *et al.* [44] reported a negative relation between Islamic banks risk-taking and inflation, while Pappas *et al.* [51] reported a positive link between Islamic banks and inflation rate. Thus, this leads to the following hypothesis:

*H10.* Inflation is positively related to risk-taking behavior.

*Monetary policy:* Low policy rate and the expansion of money supply leads to an increase of the value of real and financial collateral which will reduce banks' risk perception and increase of leverage, in addition income and wealth increase resulting in a higher risk tolerance of borrowers [3, 12]. Ha and Quyen [57] study indicated that loose monetary policy will increase banks risk-taking behavior. In the same vein, tight monetary policy could also increase banks' risk-taking as banks become more aggressive to meet profit target

thus it undertakes more income generating activities such as increasing its loan portfolio and OBS activities. Aboyadana [1], study reported that tight monetary policy in developing countries causes banks to take more risks. Hence, the final hypothesis will be as follows:

*H11.* Monetary policy is negatively related to risk-taking behavior.

### 3. Data and Methodology

Banks data are drawn from Bankscope database for all Islamic banks operating in OIC states (represent more than 90 per cent of all Islamic banks in the world), only 25 countries have Islamic banks, for the period 1989-2008. In addition, the data from Bankscope for the classification of Islamic banks has been checked against other sources as Bankscope database misclassify Islamic banks. Moreover, this study did not include banks with Islamic windows as well as the period before and during the conversion for banks that converted from conventional to Islamic banking. All of this reduced our sample to 110 banks, unbalanced data. To be noted that all the variables winsorized at 1 per cent and 99 per cent level to remove the effect of outliers.

This study employs two-step system GMM, proposed by Arellano and Bover [12] and Blundell and Bond [16], to unbalance panel data to estimate the factors influence risk-taking behavior in Islamic banks. The two-step GMM estimation is applied because system GMM method remove the bias generated by standard panel models and gives efficient and consistent estimates even if explanatory variables are not strictly exogenous and if heteroskedasticity and autocorrelation within individuals exist. Moreover, system GMM technique as suggested by Nickell [50] tackles endogeneity problems and fixed effects as well as removing dynamic panel bias. Furthermore, GMM estimator is more efficient than difference GMM estimation as it uses a system which combines regressions of levels and first differences.

The equation of the model represented below:

$$\text{Risk}_{i,t} = \beta_0 \text{Risk}_{i,t-1} + \beta_1 B_{i,t} + \beta_2 M_{i,t} + \varepsilon_{i,t}$$

Where subscripts  $i$  and  $t$  refer to bank and year, respectively,  $\text{Risk}_{i,t}$  is bank risk-taking,  $\text{risk}_{i,t-1}$  is the lagged bank risk-taking,  $B_{i,t}$  denotes bank-specific variables,  $M_{i,t}$  denotes macroeconomic variable, and  $\varepsilon_{i,t}$  is the error term.

The robustness of our results is checked by regressing the data using FE and RE models, Table 4.

This study uses loan loss provision to liabilities ratio as proxy for risk. The variables used by this study, its notion, and its hypothesized impact are shown in Table 1.

### 4. Results and Discussion

Table 2 shows the correlation matrix of the variables. The correlation coefficients are less than 0.8 signifying a weak correlation between variables, multicollinearity is not an issue. Similarly, Table 3 presents economic and institutional indicators. It shows that most of the countries have low

GDPPC, low GDP growth rate, high inflation rate, high money supply growth, and high concentrated industry.

Moreover, majority of the countries do not have explicit deposit insurance scheme, implicit scheme.

*Table 1. Definition and hypothesized signs of variables.*

Variable	Measure	Notion	Hypothesized sign
Dependent Variable			
Risk	Loan loss provision/total liabilities	LBA	
Independent Variables			
Bank Specifics			
Profitability	Net income/total assets	ROA	-
Capital adequacy	Capital/total assets	EQA	+
Liquidity	Deposit/total assets	DSA	-
Management efficiency	Overhead/net income	OTI	-
Off-Balance sheet activities	Other operating income/total assets	OBS	+
Size	Log of bank assets (constant 2005 US\$ prices)	LNA	-
Macroeconomic Factors			
GDP	Real GDP growth	GDPG	-
Inflation	Consumer price index (CPI)	INF	+
Money policy	Money supply growth	MSGR	-
Deposit insurance	Dummy, equal 1 if a country has explicit deposit insurance and zero otherwise	INSR	+
Concentration	Herfindahl-Hirschman Index (calculated by adding up the squares of the market shares of all banks)	HHI	-

*Table 2. Correlation matrix.*

	LBT	ROA	EQA	DSA	OBS	CTI	LNA	HHI	GDPG	INF	MSGR
LBT	1										
ROA	0.061	1									
EQA	0.111**	0.298***	1								
DSA	-0.116**	-0.148***	-0.493***	1							
OBS	0.275***	0.289***	0.144***	-0.262***	1						
CTI	-0.209***	-0.640***	-0.056	-0.080*	0.042	1					
LNA	-0.073*	-0.091**	-0.271***	0.309***	-0.116**	0.030	1				
HHI	0.011	0.087**	0.021	-0.152***	0.244***	0.116**	-0.352***	1			
GDPG	0.110**	0.056	0.008	-0.094**	0.227***	0.003	0.014	-0.011	1		
INF	0.019	-0.022	-0.112**	-0.044	0.022	0.105**	0.226***	0.147***	0.032	1	
MSGR	-0.058	0.129	0.018	-0.097**	0.202***	-0.013	-0.101**	0.132***	0.248***	-0.297***	1

Source: Author using Eviews; \*\*\* p< 0.01, \*\* p< 0.05, \* p< 0.1.

Table 4 shows the results of the three methods used in this study, FE and RE to check the robustness of system GMM method. The first hypothesis testing shows that profitability has a negative effect on Islamic banks risk-taking behavior and the results are significant at 1 per cent level. Therefore, the hypothesis is accepted. The results are confirmed by Gekonge and Muriu [27] and Ngono and Pone [48] findings but contradicted the findings of Mairafi *et al.* [42].

The second hypothesis testing shows that capital adequacy influences risk-taking behavior positively and the results are significant at 1 per cent level. Thus, the hypothesis is accepted. The results are as predicted because Islamic banks capital buffer is high due to regulation requirement, high capital is costly, and this induces risk-taking behavior by banks to compensate for lost profitability. The findings are supported by Blum [15], Rime [53], Laeven and Levine [39], Lin *et al.* [41], and Hussain *et al.* [31] results.

The third hypothesis testing shows that liquidity reduces Islamic banks risk-taking, results significant at 1 per cent level.

Therefore, the hypothesis is accepted. The findings aligned with our assumption because Islamic banks hold large amount of liquid assets due to the unavailability of shariah compliant instruments. The findings are supported by Alam [6], Khan *et al.* [38], and Dahir *et al.* [22] study.

The fourth hypothesis testing shows that costs had a negative and significant, 1 per cent level, impact on Islamic banks risk-taking behavior which led us to reject the fourth hypothesis. These results confirm Pappas *et al.* [51] findings. This implies that Islamic banks direct more resources to reduce its risks. Hence, Shariah supervisory board (SSB) which is a unique feature of Islamic banks, represent extra costs to Islamic banks, helps in reducing Islamic banks risk as suggested by Fakhrunnas and Ramly [26] and Najwa *et al.* [47]. They reported that the higher the number of SSB the lower the risk-taking behavior of Islamic banks. Similarly, Nguyen [49] study revealed that Sharia committee's high effectiveness can constrain risk-taking behaviors in Islamic banks.

Table 3. Economical and Institutional Indicators.

No.	Country	GDPPC (US \$ 2005)	GDP Growth	Inflation	Money supply growth	Deposit Insurance	Concentration (HHI)	MACP	Oil Production
1	Algeria	2771.07	3.0	10.577	5.95	1 <sup>a</sup>	4452.089	N.A.	Producer
2	Bahrain	15001.49	5.5	0.612	10.725	1 <sup>b</sup>	6705.575	108.70	Producer
3	Bangladesh	322.91	5.3	6.158	7.49	1 <sup>c</sup>	1462.147	4.41	None
4	Brunei	8736.47	1.9	1.360	4.733	0	9176.381	N.A.	Producer
5	Egypt	1183.19	4.8	9.170	2.245	0	1753.626	38.56	Producer <sup>1</sup>
6	Gambia	432.04	3.5	6.231	11.585	0	5518.746	N.A.	None
7	Indonesia	1187.83	4.5	11.501	7.685	1 <sup>d</sup>	4017.103	26.13	Producer <sup>2</sup>
8	Iran	2302.11	4.0	19.684	3.005	0	4511.222	15.01	Producer
9	Iraq	1294.28	7.2	30.924	3.15	0	5569.799	N.A.	Producer
10	Jordan	2026.67	6.0	5.788	2.785	1 <sup>e</sup>	5696.076	115.70	None
11	Kuwait	31148.52	9.2	3.461	4.978	0	2243.546	86.94	Producer
12	Lebanon	5117.77	4.4	18.969	2.98	1 <sup>f</sup>	941.382	17.58	None
13	Malaysia	4678.78	6.1	3.035	9.445	1 <sup>g</sup>	1877.419	173.37	Producer
14	Mauritania	564.05	3.7	6.357	-0.107	0	2711.200	N.A.	None
15	Pakistan	596.01	4.3	7.990	7.000	0	2099.610	21.25	None
16	Palestine	1520.44	-4.42	4.314	10.255	0	8401.863	30.264	None
17	Qatar	43530.22	11.0	4.701	10.945	0	3423.653	85.04	Producer
18	Saudi Arabia	12914.50	2.8	1.431	6.535	0	1837.287	62.59	Producer
19	Senegal	732.64	3.7	3.336	6.52	0	2610.887	N.A.	None
20	Sudan	658.54	5.8	47.24	2.835	1 <sup>h</sup>	6116.529	N.A.	Producer <sup>3</sup>
21	Syria	1492.74	4.4	6.781	5.64	0	7839.721	N.A.	Producer
22	Tunisia	2470.78	4.8	4.207	4.345	0	1269.725	12.92	Producer <sup>4</sup>
23	Turkey	6148.58	4.3	52.604	6.445	1 <sup>i</sup>	4023.610	21.90	None
24	U.A.E.	31315.46	6.2	4.950	11.32	0	1569.050	55.45	Producer
25	Yemen	787.09	4.8	25.733	-2.689	1 <sup>j</sup>	3073.378	N.A.	Producer

All variables, except deposit insurance, are averaged over the period 1992-2008 (or the most available years). The deposit insurance variable takes value 1 if the country has explicit insurance deposit coverage (as of 2008) and zero otherwise. The concentration ratio calculated using HHI method. MACP is the market capitalization to GDP.

a: since 1997, b: since 1993, c: all period, d: since 1998, e: since 2000, f: all period, g: since 1998, h: since 1996, i: all period, j: since 2008.

1: Net exporter until 2009, 2: Net exporter until 2004, 3: Net exporter since 1999, 4: Net exporter until 2000.

Table 4. Empirical results.

	System-GMM	FE	RE
LBT (-1)	0.114 (11.785) ***		
ROA	-0.362 (-13.247) ***	-0.286 (-4.567) ***	-0.234 (-3.832) ***
EQA	0.046 (9.481) ***	0.015 (2.777) ***	0.009 (2.200) ***
DSA	-0.010 (-7.496) ***	-0.006 (-2.332) **	-0.004 (-1.722) *
CTI	-0.026 (-25.906) ***	-0.015 (3.537) ***	-0.015 (-4.271) ***
OBS	0.244 (25.961) ***	0.184 (2.615) ***	0.155 (3.252) ***
LNA	-0.144 (-5.726) ***	-0.005 (-0.082)	-0.006 (-0.157)
HHI	0.000 (15.106) ***	-0.000 (-0.148)	0.000 (0.003)
INSR	0.399 (8.246) ***	-0.006 (-0.032)	0.030 (0.279)
GDPG	0.009 (3.430) ***	0.010 (1.874) *	0.017 (2.241) **
INF	0.009 (9.751) ***	0.003 (0.810)	0.003 (0.872)
MSGR	-0.002 (-3.021) ***	-0.007 (-1.861) *	-0.007 (-1.981) **
	J-statistic 44.721	F-statistic 4.808	F-statistic 13.572
	Prob. 0.441	Prob. 0.000	Prob. 0.000

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

t-statistic in parentheses.

The fifth hypothesis testing shows that OBS activities increase Islamic banks risk-taking behavior and the results significant at 1 per cent level. Consequently, the hypothesis is accepted. The findings contradict Saif-Alyousfi and Saha [54], and Mokni *et al.* [44] study. This implies that Islamic banks take high risks to increase its profitability and this due

to high competition.

The sixth hypothesis testing shows that size reduces Islamic banks risk-taking behavior, results significant at 1 per cent level. Thus, the hypothesis is accepted. The study findings substantiated by Alam [6], Mousa and Zaiani [45], Mairafi *et al.* [42], and Saif-Alyousfi and Saha [54] study.

The seventh hypothesis testing shows that concentration increases Islamic banks risk-taking behavior, results significant at 1 per cent level. Hence the hypothesis rejected. The results support fragility-competition hypothesis and come in line with Claessens and Laeven [21] and González *et al.* [28] findings.

The eighth hypothesis testing shows that deposit insurance scheme increases Islamic banks risk-taking behavior, and the results are significant at 1 per cent level. Thus, the hypothesis is accepted. These findings supported by Demirgüç-Kunt and Detragiache [23] and Fu *et al.* [25] study.

The ninth hypothesis testing shows that GDP growth has positive link, increase, to Islamic banks risk-taking behavior and the results are significant at 1 per cent level. Thus, the hypothesis is rejected. The findings of the study in line with Mokni *et al.* [44] study. This imply that the economic improvement was not enough to lead to a decrease of Islamic banks risk and this mainly due to the weak economies of OIC countries. Also, it can be argued that Islamic banks reduced their screening activity and lending standards [43].

The tenth hypothesis testing shows that inflation increase Islamic banks risk and the results are significant at 1 per cent level. Thus, the hypothesis is accepted. The results confirm Pappas *et al.* [51] findings.

The eleventh hypothesis testing shows that money supply growth increases Islamic banks risk-taking behavior and the results significant at 1 per cent level. This verify Aboyadana [1] findings.

Finally, the outcomes of FE and RE are almost identical to system GMM model results implying that our results are robust.

## 5. Conclusion

This paper sought to investigate the risk-taking behavior of Islamic banks for the period before the 2008 crisis, 1989-2008, using data from almost all the Islamic banks in the world. The estimation method adopted by this study is system GMM and the robustness of our results checked by regression the data using FE and RE (the results are robust).

The results reveal that profitability, liquidity, cost, size, and money supply growth supply reduce Islamic banks risk-taking behavior. In contrast, capital, off-balance sheet activities, deposit insurance, concentration, GDP growth, and inflation increase Islamic banks risk-taking behavior. Thus, regulators, policy makers, and banks managers could formulate policies around these factors to ensure the stability of the financial system. For example, increase Islamic banks size, more regulation for off-balance sheet activities, design a better deposit insurance scheme, and intensifying vigilance during contraction period.

Although, this study used a large sample of Islamic banks and for prolonged period (20 years) and gave a good idea about the factors affecting Islamic banks risk-taking behavior it concentrated on the period before the 2008 financial crisis thus researchers may study the same factors for the period after the crisis.

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