

Risk management in Islamic banks: A Panel Data Analysis 2011-2021

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Abstract :

Banking and financial operations in recent years have witnessed many important changes, which were the main reason for the occurrence of financial and banking crises. This phenomenon change lead to the necessity to develop mechanisms related to risk management in all banking appeared, even in Islamic institutions. The main objective of this paper is to test the efficiency of risk management in Islamic banks through the capital adequacy ratio, for a sample of six Islamic banks across a time series extending from 2011 to 2021, using standard techniques for panel data. The results of this study indicate that credit risk, return on equity affect negatively the capital adequacy of Islamic banks, while return on asset, operational risk and liquidity risk, they have insignificant impact on the capital adequacy.

Keywords: Risks, Capital adequacy, Islamic banks, Panel data.

Jel Classification Codes: O4,P4

Introduction :

Islamic banking is the fastest-growing segment in the global financial industry. According to the Islamic Finance Country Index Report (Country 2019), Islamic banking and finance grew at the average growth rate of 12.46% annually (2012–2019) with total assets held by the Islamic banks (IBs) valued at US\$2.591tn by the end of 2018. Despite the advancement made by Islamic banks, the Islamic financial industry should not be viewed in segregation. The precise codes of conducts in the Muslim religion and the distinctive characters of Islamic banking differentiate it from the

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conventional banks.¹ Islamic banks dispose the interest-based traditional system and abide by the principles of Islamic law to advance the property rights, profit and loss sharing and sanctity of the contracts.² Therefore, the restriction of interest or usury (riba) in Islam does not imply that credit is precluded, capital is not remunerated and risk is not valued. Thus, Islamic banks offer distinct banking model comparative to the conventional banks under the guidance of the Shariah law³; Despite this development and advantages in Islamic banking, Islamic banks face many risks that limit their growth. They still have many challenges and efforts to develop their work systems and innovate financial tools to manage the risks that Islamic banking is exposed to.

Statement of the problem:

the study gives an answer to this research question: “How efficient is the risk management in Islamic banks? “

study Hypotheses:

H1: Return on asset significantly effect on capital adequacy ratios.

H2: Return on equity has a significant effect on capital adequacy ratios.

H3: Liquidity risk has a significant effect on capital adequacy ratios.

H4: Credit risk has a significant effect on capital adequacy ratios.

H5: operational risk has a significant effect on capital adequacy ratios.

Study objectives :

This study aims specifically at achieving the following objectives:

1. Shedding light on the efficiency of risk management in Islamic banks
2. To explain the different risks that Islamic banks face.

I. Literature Review:

1- Risk management of Islamic banks :

- Risk management, according to Cumming and Hirtle (2001), is attributed to “the overall process that a financial institution follows to define a business strategy, to identify the risks to which it is exposed, to quantify those risks, and to understand and control the nature of risks it faces”.⁴
- Risk management is a forward looking process, which involves decision making on an Ongoing basis. The Basel Committee on Banking Supervision (2001) defines financial risk management as a sequence of four processes: the Identification of events into one or more broad categories of market, credit, operational And other risks (and then into specific sub-categories); the assessment of risks using Data and a risk model; the monitoring and reporting

¹ **Abedifar, P., Molyneux, P. and Tarazi, A.** (2013), “Risk in Islamic banking”, Review of Finance, Vol. 17 No. 6, pp. 2035-2096.

² **Mirakhor, A. and Zaidi, I.** (2007), “Profit-and-loss sharing contracts in Islamic finance”, Handbook of Islamic Banking, Vol. 49 No. 1, pp. 2-37

³ **Noordin, N.H. and Kassim, S.** (2019), “Does Shariah committee composition influence Shariah governance disclosure? Evidence from Malaysian Islamic banks”, Journal of Islamic Accounting and Business Research, Vol. 10 No. 2, pp. 158-184

⁴ **Christine M. Cumming and Beverly J. Hirtle,** (2001), The Challenges of Risk Management in Diversified Financial Companies ,*Economic Policy Review*, Vol. 7, No. 1.p1-17.

of the risk assessments on a timely Basis; and the control of these risks by senior management. (Banking s.d.)

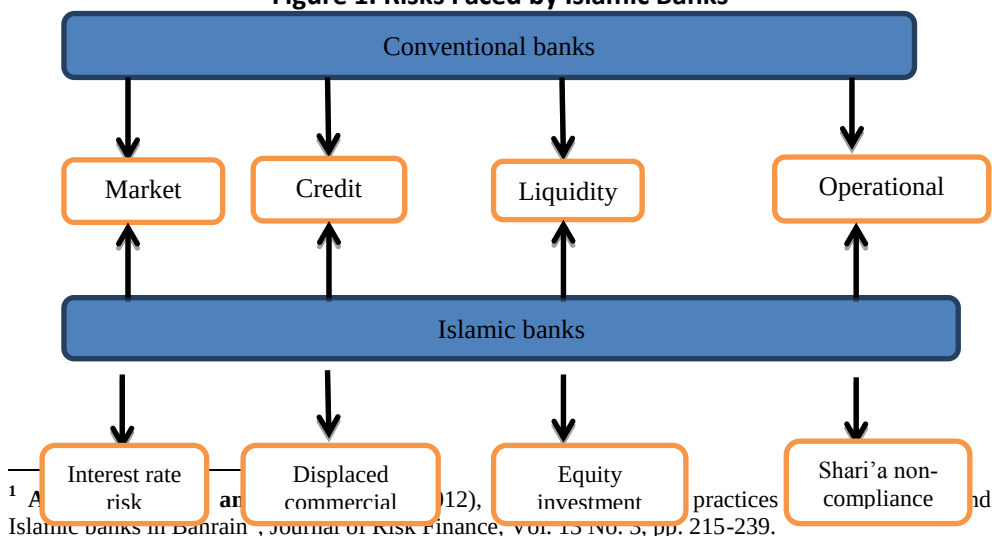
- Risk management is an ongoing process that depends directly on changes in the internal and external environments of banks.¹

For Islamic banks, risk management is very complicated because Islamic banks cannot simply replicate the established practices of conventional banks. However, in terms of the risk management process, Islamic banks are similar to conventional banks. In addition,² have argued that the respective risk management processes of Islamic banks (IBs) and conventional banks (CBs) are, in fact, similar, inasmuch as both kinds of banks begin with risk identification, mitigation, and efforts to control exposure to risk in order to maintain profitability. Unlike CBs, however, IBs must ensure that as the framework develops, all the tools used are in line with the requirements of Shariah. In the context of IBs, risk identification is a two-step process: The first is negative Shariah screening, which excludes Riba-, Gharar-, and Maysir-based transactions—this step reduces exposure to risk to a level considered to be appropriate. The second is positive screening, which emphasizes justice, ethics, and accountability issues. Every product offered by an Islamic bank must be subjected to the first screening, which is conducted by the bank's Shariah board.

2- Risks Faced by Islamic Banks :

Islamic banks are exposed to very different kinds of risks. Many factors play significant role in the occurrence of risks, such as increased volatility in the market; rapid development of financial innovations; and increases or changes in competitive and regulatory environments .In theory, Islamic banks are exposed to two types of risk: those faced by conventional banks and risks that are specific to Islamic banks

Figure 1. Risks Faced by Islamic Banks



¹ A. Al-Farooq, "Risk Management in Islamic Banks in Bahrain", *Journal of Risk Finance*, Vol. 13 No. 3, pp. 215-239.

² Kayed, Rasem; Hassan, M. Kabir. (2011), "The Global Financial Crisis and Islamic Finance", *Thunderbird International Business Review*, Vol.4, no1.551-564.

Source: Author

There are risks common to both conventional and Islamic banks, namely:

Credit risk : is the potential exposure to risk which occurs when one of the parties to a deal makes a payment, as in Salam (sale by advance payment for the future delivery) or Istisnā (contract for manufacture) contract, or with the delivery of assets, as in Murāba'ah (sale on goods with markup) contract, before receipt of funds. In the case of finance based on profit sharing, as in Murāba'ah and Mushārah (profit and loss sharing), credit risk arises when the business owner/entrepreneur fails to pay the bank its share of profits when due. This generally occurs when banks have insufficient information (an asymmetric information problem) about the actual profit of the enterprise owing them money. Murāba'ah, basically trading contracts subject to counterparty credit risk, potentially arise because of nonperforming trading partners. The sources of such nonperformance can be of an external systematic nature.¹

Liquidity risk: it is a risk when a business entity is not able to meet short-term financial demands. This happens when a security or hard asset is unable to convert into cash without a loss of capital.²

Market risk: Market risk is another important financial risk for Islamic banks, which exposes banks as a result to different types of risks, such as mark-up risk, price risk, leased asset value risk, foreign exchange (FX) risk and securities price risk. For example, in the case of bay'al- salam, during the period between the delivery of the commodity and the sale of the commodity at the prevailing market price, Islamic banks are exposed to commodity price volatility.

Operational risk: This risk is defined as the risk of loss resulting from inadequate or failed internal processes, people, systems or external events. This risk includes losses resulting from non-compliance with the Shari'a and failure to fulfill fiduciary responsibilities.³

Besides the risks that conventional banks face, Islamic banks have to deal with additional types of risks are as follows:

- **Shari'a non-compliance risk:** The risk that arises from failing to comply with Shari'a rules and principles as determined by the Shari'a board of the bank.⁴
- **Rate of return risk:** This risk is closely linked to the rate of return provided to investment account holders, who are also known as depositors in Islamic banks. These depositors will be disappointed if they receive,

¹ **Hamid A. H. Al-Wesabi, Nor Hayati Ahmad,** (2013), Credit Risk of Islamic Banks in GCC Countries, International Journal of Banking and Finance (IJBF) Vol. 10, No.2, .p97-105.

² **Luboš Pástor, Robert F. Stambaugh,** (2003), Liquidity Risk and Expected Stock Returns, Journal of Political Economy. Vol 11, NO 3, p 642-685.

³ **Rhanoui, S., & Belkhoutout, K.** (2018). Operational Risk in Both Conventional and Islamic Banking Perceptions: Differences and Similarities. European Scientific Journal, 2018.v14n13p110 <https://doi.org/10.19044/esj>.

⁴ **Lahsasna, A.** (2014). Shari'ah Non-Compliance Risk Management and Legal Documentation in Islamic Finance. John Wiley & Sons. <https://doi.org/10.1002/9781118809181>.

returns on their deposits that are lower than the market rate.¹ The rate of return risk therefore corresponds with an adverse change in the investor's expectations regarding an investment's rate of return;

- Displaced commercial risk: This risk is a consequence of the rate of return risk in Islamic banks and manifests itself whenever the bank finds itself unable to pay competitive rates of return.² This result is likely to encourage depositors to withdraw their funds. Thus, in order to retain its funding providers and dissuade investors from withdrawing, the Islamic bank would relinquish all or part of its profits for the benefit of the depositors;
- Equity investment risk: This risk arises from entering into a partnership for the purpose of undertaking or participating in a financing or general business activity as described in the contract³.

3- Capital Standard According to Basel III:

After the 2008 financial tsunami impaired global financial assets and impacted international financial developments, The Basel Committee of Banking Supervision announced its endorsement of Basel III standards. The standards build on the existing regulatory structures of Basel I and Basel II accords. The regulators' intent with Basel III is a future of more capital, more liquidity, and lower risk. It improves the ability of the banking sector to absorb financial and economic shocks, improves risk management, and governance and strengthen banks' transparency and disclosures. Basel III establishes higher and better-quality capital standards through additional capital buffers, more restrictive capital definitions, higher risk weighted assets (RWSs), and higher standards for minimum capital ratios. Higher capital standards will primary help allow banks to use the build-up capital during boom times in periods of financial stress and hence, reduce cyclicalities in financial markets.

The implications of increased capital standards would include significant effects across the banking industry and capital markets. The reforms will fundamentally reduce industry profitability (as measured by ROE) and require alteration of balance sheet management techniques for banks to limit illiquid assets, restrict unstable sources of funding, and manage higher funding costs. These forms will also require banks to transform their business models (i.e., due to higher capital costs), and to undertake significant process and system changes to achieve upgrades in areas of stress testing, counterparty risk, and capital management infrastructure.⁴

Table 1 represents the Basel III Capital Standards. The Minimum Common Equity Ratio, basically consists of common shares plus retained income, will increase to

¹ Salem, R. A. (2013). Risk management for Islamic banks. Edinburgh University Press.

² Hasanah, Heni, et al. "Displaced commercial risk: empirical analysis on the competition between Conventional and Islamic Banking systems in Indonesia." *Advances in Natural and Applied Sciences*, vol. 7, no. 3, pp. 292.

³ Helmy, Mohamed (2012): *Risk management in Islamic banks*, journal of ESLSCA Business, vol.8, NO 2, P155.

⁴ Al-Hares, O. M., Abu Ghazaleh, N. M., & El-Galfy, A. M. (2013). Financial Performance And Compliance With Basel III Capital Standards: Conventional vs. Islamic Banks. *Journal of Applied Business Research (JABR)*, 29(4), 1031–1048.

4.5%, in addition to a Capital Conservation Buffer of 2.5% to withstand future periods of stress bringing the total common equity standards to 7%. The Tier 1 capital standard will increase to 6%, which means that other types of Tier 1 instruments, can account for up to 1.5% of Tier 1 capital. The Tier 1 Capital is one of the most prominent risk measures to determine bank capital adequacy. The ratio itself is important as it lends insight into losses a bank can take before solvency becomes a serious concern. It is the core capital, which includes common equity as can be found on the balance sheet including other qualifying financial instruments based on stricter criteria (i.e, retained profit, general reserves and legal reserves).

Total Capital to Risk Weighted Assets Ratio is known as Capital Adequacy Ratio (CAR). CAR is a measure of a bank's total capital. The ratio determines the capacity of a bank in terms of meeting the time liabilities and other risks such as market risk, operational risk, credit risk, and others. It also measures how much capital is used to support the banks' risk assets. The ratio quantifies in addition to Tier 1 capital, a secondary bank capital, known as Tier 2 capital. Tier 2 capital includes items such as undisclosed reserves, general loss reserves, subordinated debt, and hybrid debt and equity instruments. Tier 2 capital ratio itself lends insight into losses a bank can absorb in the event of a winding-up and so provides a lesser protection to depositors.

A Countercyclical Buffer within a range of 0% - 2.5% of common equity (or other fully loss absorbing capital) will be implemented according to national circumstances. The purpose of the countercyclical buffer is to achieve the broader macro-prudential goal of protecting the banking sector from periods of excess aggregate credit growth. And the new minimum standards in relation to risk-weighted assets (RWAs) will be 4.5% common equity/RWAs; 6.0% Tier 1 capital/RWAs, and 8.0% total capital/RWAs. The difference between the total capital requirement of 8.0% and the Tier 1 requirement can be met with Tier 2 and higher forms of capital.¹

Table 1. Base III capital standards

	Common Equity (After Deductions)	Tier 1 Capital	Total Capital
Minimum	4.5%	6.0%	8.0%
Capital Conservation Buffer 2.5%			
Minimum Plus Capital Conservation Buffer	7.0%	8.5%	10.5%
Counter-Cyclical Buffer	0- 2.5%		
Maximum			13.0%

Source: Author

Thus, the formula for CAR is as follows:

¹ **Kevin Nooree Kim and Ani L. Katchova**, (2020), Impact of the Basel III bank regulation on US agricultural lending, *Agricultural Finance Review*, Vol. 80 No. 3, pp. 321-337.

$$CAR = \frac{\text{Total capital}}{\text{Total risk} - \text{weighted assets (credit risk + Market risk + Operational risk)}} \geq 10.5$$

4- Capital adequacy as Indicator of Risk Management Efficiency :

The capital adequacy ratio is an indicator of the level of capital in the banking sector. According to the risk absorption theory proposed by the research of Diamond et Dybvig,¹ Allen D² and Repullo³ and it is the ratio which protects banks against excess leverage, insolvency and keeps them out of difficulty. In legal terms, capital adequacy is a term used to describe the adequacy of a bank's aggregate capital in relation to the risks, which arise from its asset portfolio, off balance sheet transactions, its common operations, and all other risks associated with its business⁴. It is defined also as the ratio of banks capital in relation to its current liabilities and risk weighted assets. Risk weighted assets is a measure of amount of banks assets, adjusted for risks. An appropriate level of capital adequacy ensures that the bank has sufficient capital to expand its business, while at the same time its net worth is enough to absorb any financial downturns without becoming insolvent. It is the ratio which determines banks capacity to meet the time liabilities and other risks such as credit risk, market risk, operational risk etc.⁵ a higher capital ratio will improve the ability of banks to absorb the risks associated with the creation of liquidity and thus increasing the ability of the bank to create more liquidity. On the other hand, a high level of capital improves the ability of banks to create liquidity. When a bank needs more liquidity, it usually results in a higher loss due to the disposal of illiquid assets. However, this can be avoided if the bank has a high level of capital to provide the necessary liquidity. It has been noted that Basel framework for risk management is centered on capital adequacy, where internal risk models are in a way that capital augmentation is suggested to cover for possible consequences of risk-taking.⁶ In this case, the capital adequacy requirement forms the core of prudential regulation and supervision.

II. Previous empirical studies:

Despite the vital importance of risk management in banking, studies on risk management in Islamic banks. Although there are many studies based on conventional banks, there is a lack of studies examining risk management specific to Islamic banks. We organized empirical studies that relevant to the objective of the study with respect to risk management in Islamic banks into two categories.

¹ **Douglas W. Diamond, Philip H. Dybvig.** (1983), Bank Runs, Deposit Insurance, and Liquidity, The Journal of Political Economy, Volume 91, Number 3,p 401-419.

² **Allen, F; D, Galen,** (2004), Financial Intermediaries and Markets, the journal of Econometrica, Volume72, NO 4.P 1023-1061.

³ **Rafael Repullo,** (2004), Capital requirements, market power, and risk-taking in banking, Journal of Financial Intermediation, Volume 13, NO 2, Pages 156-182.

⁴ **Hitchins, J; Hogg, D; D, Mallet.** (2001), Banking: A Regulatory Accounting and Auditing Guide, Croner.CCH Group Limited, London.

⁵ **Nikhat Fatima.** (2014), Capital Adequacy: A Financial Soundness Indicator for Banks, Global Journal of Finance and Management, Vol 6, Number 8, pp. 771-776.

⁶ **Ojo, A,** (2008), Efficiency of Capital Regulation for Nigerian Banks, Nigerian Journal of Economics and Social Science, vol4,no 3,p 667-679.

The first category contains the pure studies of risk management in Islamic banks. Secondly, we presented the studies of the determinants of capital adequacy.

1- Pure studies of risk management in Islamic banks:

- a. The study of PARLAKKAYA Raif; ÇETİN Hüseyin; DEMİRCİ Nihat ,2022, entitled " risk management in Islamic banks: a research on the participation banks in Turkey "¹: the aim of this study is to identify the main risks faced in participation banks in Turkey. In addition, it is aimed to specify and explain main methods and practices are used for measuring, reducing and managing these risks. For this purpose, the researchers used a qualitative research was conducted on 5 Islamic banks operating in Turkey. Within the scope of the research, the data obtained by the deep interview method was interpreted by descriptive analysis method. the findings of the study can be summarized as follows: risk management in Islamic banks is largely similar to conventional banks. On the other hand, different types of risks encountered in these banks and the obligation to comply with Islamic principles differentiate Islamic banks in the risk management process. Islamic Banks are better than conventional in managing risk.
- b. Hassen M.Kabir; Khan Ashref ; Paltrinieri, Andrea study ,entitled " Liquidity risk, credit risk and stability in Islamic and conventional banks "² this study aimed to provide a thorough assessment of Islamic banks' liquidity risk compared to conventional banks , Employing a simultaneous structural equation approach, on a comprehensive dataset of 52 Islamic and conventional banks for the period of 2007–2015 . Moreover, the study reveals the following results: There is a negative relationship between liquidity risk and stability for only IBs. Islamic Banks are better than conventional in managing risk.
- c. The study of Boussaid Mohamed Abdelkrim, entitled "risk management in islamic banks: An applied study on the effectiveness of risk management at the level of Al Baraka Bank of Algeria ".³ The researcher tried through his thesis, to highlight the effective role that Islamic banks play in risk management . The study found that there is a significant negative relation between capital adequacy and capital risk , return on equity. and credit risk, return on asset have a positive effect on capital adequacy. And there is no significant relation between liquidity risk and capital adequacy .

¹ PARLAKKAYA Raif; ÇETİN Hüseyin; DEMİRCİ Nihat. (2022), « RISK MANAGEMENT IN ISLAMIC BANKS: A RESEARCH ON THE PARTICIPATION BANKS IN TURKEY », Journal of Economics and Administrative Sciences Faculty, Vol 9, n° 2, p. 608-636.

² Hassen M. Kabir; Khan Ashref; Paltrinieri, Andrea.(2019),« Liquidity risk, credit risk and stability in Islamic and conventional banks » , Research in International Business and Finance, Vol 48 , n°15, p.17-31.

³ Boussaid Mohamed Abdelkrim. (2019),« risk management in islamic banks: An applied study on the effectiveness of risk management at the level of Al Baraka Bank of Algeria », Doctoral thesis ,Abou Bekr Belkaid University .

2- The determinants of capital adequacy studies:

- a. **Guendouz Abdolkarim study, entitled " the Determinants of bank capital adequacy: (Applied case for the Kingdom of Saudi Arabia) "**¹.
:The study aimed to determinate the Determinants of bank capital adequacy They used a sample of eleven bank of Saudi Arabia for a period ranging from 2010–2019. They utilized Bank size (Vol), Return on Assets (ROA), Liquidity risk (LIQ), Credit risk (RSK) as independent variables and Capital Adequacy (CAP) as dependent variable. They found that the impact of credit risk and return on asset on bank is positive. and liquidity risk had a negative impact. while there is no correlation between bank size and capital adequacy.
- b. **The study of Smaoui Houcem; Ines Ben Salah, entitled " The Determinants of Capital Ratios in Islamic Banking"**². The researchers investigate the determinants of capital ratios in contemporary Islamic banking using a sample comprising 122 Islamic banks (IBs) spanning the period 2000–2014. We measure IBs' capital holdings using the capital-to-total assets ratio, the capital adequacy ratio, and the tier 1 capital ratio. We use the system Generalized Method of Moments estimator to tackle any possible issues of endogeneity and omitted variable bias. The results show that Islamic banks capital ratios are persistent over time, revealing the existence of short-term adjustment costs. In addition, protection of shareholder rights seems to have a positive and robust effect on IBs capital holdings, whereas bank size, deposit structure, and bank competition are significantly negatively related to IB's capital ratios, thus confirming the "too-big-to-fail" effect. We also show that generous deposit insurance systems lead to lower IB's capital ratios.
- c. **The study of Abusharba Mohammed ; Triyuwono Iwan , entiteled " Determinants of Capital Adequacy Ratio (CAR) in Indonesian Islamic Banks"**³. This study analyzes the determinants of the capital adequacy ratio in the Indonesian Islamic banking industry multiple linear regression analysis and pair-wise correlation matrix are used to explain the effect of explanatory variables; profitability (ROA), assets earning quality (NPF), deposits structure (DEP), liquidity (FDR) and operational efficiency (OEOI) on a proxy variable, which is the capital adequacy ratio (CAR). The study found that profitability and liquidity are positively related to the capital adequacy requirements. Meanwhile, uncollectable funds measured by nonperforming financing (NPF) is significant but negatively related to

¹ **Guendouz Abdolkarim** .(2022),« the Determinants of bank capital adequacy: (Applied case for the Kingdom of Saudi Arabia)»,Arab Monetary Funds ,vol.95, p. 05-23.

² **Smaoui Houcem ;Ines Ben Salah**.(2020).« The Determinants of Capital Ratios in Islamic Banking», The quarterly review of economics and finance,vol 77, p. 186-194.

³ **Abusharba Mohammed; Triyuwono Iwan**. (2013). « Determinants of Capital Adequacy Ratio (CAR) in Indonesian Islamic Banks», Global Review of Accounting and Finance,vol 4, n°1, p. 159-170.

the capital adequacy ratio. On the other hand, depositor's funds and operational efficiency have no significant effect on capital adequacy of Indonesian Islamic banks. Moreover, this study revealed that all selected Islamic commercial banks in Indonesia are committed over than 8 percent the minimum of capital requirements during the period of financial global crises. Finally, it was found that Indonesian Islamic banks have an excessive fund to meet their obligations and protect the owners of capital.

III. METHODOLOGICAL APPROACH:

1- Sample and data collection:

Our study is based on a sample composed of six Islamic banks : al Rajhi bank, Bahrain islamic bank , Muamalat bank, Jordan Islamic banks, Rayan bank, Hillal bank . In order to carry out this study, we used the financial statements (balance sheets and income statements) of these banks. These documents are collected from the banks' websites. In order to test the hypotheses of our research .We opted for the panel data regression method. using the following variables: (ROA) Return on Assets, (ROE) Return on Equity, (LR) Liquidity Risk, (CR Credit risk, (OR) Operational risk, as independent variables, and (CAR) Capital adequacy ratio as dependent variable , during the period (2011-2021) and therefore the number of observations used is (N×T) i.e. (6×11) which is 66.

Then the study model will be chosen as follows:

$$CAR = f(ROA, ROE, LR, CR, OR)$$

CAR :Capital adequacy

ROA: Return on asset

ROE: Return on equity

LR: Liquidity risk

CR: Credit risk

OR: Operational risk

$$CAR = \beta_0 + \beta_1 ROA + \beta_2 ROE + \beta_3 LR + \beta_4 CR + \beta_5 OR + \mu_i$$

2- Unit root test :

It is considered among these tests developed for the first generation, which is the most widely used in order to detect the properties of the time series of panel variables and to test the existence of a unit root or not. which is based on the hypothesis of the independence of individuals, to detect the unit root of the panel data and determine the degree of its integration. there are several tests prepared for this Purpose.and we will use the most important and most common of these tests. which are the LLC test proposed by Levin, Lin & Chu (2002), and the IPS test proposed by Im, Pesaran and Shin (2003):

Table 2. Unit root tests for variables

	Level		1st difference	
	LLC	IPS	LLC	IPS
CAR	0.41 (0.66)	-0.18 (0.42)	-3.56 (0.00)***	-2.23 (0.01)**
CR	-7.68 (0.00)***	-4.36 (0.00)***	/	/

LR	-7.13 (0.00)***	-2.62 (0.00)***	/	/
OR	-1.11 (0.13)	-0.70 (0.24)	-5.54 (0.00)***	-1.96 (0.02)**
ROA	-0.87 (0.19)	-0.59 (0.27)	-5.59 (0.00)***	-2..16 (0.01)**
ROE	-0.47 (0.47)	0.36 (0.64)	-5.21 (0.00)***	-2.66 (0.00)***

Source: Based on EViews 12. output

Through Table No. (1) the (LLC) test and (IPS) test, we note that (CR) credit risk, (LR) stable liquidity risk at level I(0), (CAR) capital adequacy ratio, and (ROA) (Return on assets, (ROE) return on equity, and (OR) stable operational risk at the first difference I(1).

3- Statistique descriptive:

Table No.(2) refers to the descriptive statistics of the variables Panel data:

Table 3. Descriptive statistics for variables

Variable	Observations	Mean	Std.Dev	Minimum	Maximum
CAR	66	0.1768	0.033	0.1161	0.2448
ROA	66	0.0243	0.0085	0.0097	0.048
ROE	66	0.1795	0.0821	0.0202	0.3729
LR	66	0.3029	0.2964	0.0226	0.940
CR	66	0.4786	0.2466	0.0062	0.78
OR	66	0.6116	0.1879	0.1805	0.99

Source: Based on EViews 12. output

From Table No. (2) we note :

- Capital Adequacy Ratio (CAR): The average capital adequacy ratio was 0.1768% and the standard deviation was 0.033%, recording the highest ratio in Jordan Islamic Bank of 0.2448%, and the lowest ratio of Bahrain Islamic Bank was 0.1161%.

-Return on assets (ROA): The average return on assets was 0.0243%, with an estimated standard deviation of 0.0085%, recording the highest percentage in Bahrain Islamic Bank 0.048%, and the lowest rate in Jordan Islamic Bank 0.0097%.

-Return on Equity (ROE): The average return on equity was 0.1795% and the standard deviation was 0.0821%, recording the highest percentage of 0.3729% in Muamalat Bank, and the lowest percentage of (Hillal) Bank with 0.0202%.

-Liquidity risk (LR): The average liquidity risk was 0.3029%, with a standard deviation of 0.2964%. The highest ratio was 0.94% in Jordan Islamic Bank, and the lowest ratio was recorded in Muamalat Bank with 0.0226%.

-Credit risk (CR): The average credit risk was 0.4786%, with a standard deviation of 0.2466%. The highest rate was 0.78% in Bahrain Islamic Bank, and the lowest was recorded in Jordan Islamic Bank with 0.0062%.

- Operational risk (OR): The average operational risk was 0.6116 percent, with a standard deviation of 0.1879%. The highest percentage was 0.99% in Al-Rajihi Bank, and the lowest percentage was recorded in Al Rayan Bank with 0.1805%.

4- Static Panel Estimate:

The three types of static Panel models were estimated: the cumulative regression model, the fixed effects model, and the random effects model, as shown in Table No. (4):

Table 4. Parameters of the study model estimated using the three models

Dependent variable CAR	Random effect (REM)model		Fixed effect model (FEM)		Pooled regression model (PRM)	
Independent variables	Prob	Coef	Prob	Coef	Prob	Coef
ROA	0.0001	-1.435	0.8517	-0.1212	0.0008	-1.4358
ROE	0.0000	-0.1353	0.0056	-0.1726	0.0004	-0.1353
LR	0.0320	0.0293	0.8568	0.0032	0.0787	0.0293
CR	0.3023	-0.0140	0.0087	-0.0681	0.4000	-0.014
OR	0.2334	0.0162	0.0702	0.0355	0.3307	0.016
C	0.0000	0.224	0.0000	0.2206	0.0000	0.224
R²	0.5593		0.7318		0.5593	
F-statistic Prob	15.23 (0.000000)		15.01 (0.000000)		15.23 (0.000000)	
DW	0.98		1.35		0.98	

Source: Based on EViews 12. output

5- Model comparison tests:

5.1- The trade-off between the pooled regression model (PRM) and the fixed effects model (FEM):

Fisher's constrained test: We use Fisher's constrained test to compare between the cumulative regression model (PRM) and the fixed effects model (FEM). And through the following relationship:¹

$$F(N - 1, NT - N - K) = \frac{(R_{FEM}^2 - R_{PRM}^2)/(N - 1)}{(1 - R_{FEM}^2)/(NT - N - K)} = 7.07$$

H0: A pooled regression model (PRM) is the appropriate model.

H1: The Fixed Effects Model (FEM) is the appropriate model.

Where:

K: the number of estimated parameters (5).

N: the number of sample members (6).

T: time (11).

¹ **W. Greene**, (2011), Econometric, Traduction de la 7th édition par héophile Azomahou et Phu Nguyen Van et Wladimir Raymond ,édition française dirigée par Didier Schlachter,Pearson Education.

R^2_{FEM} : Coefficient of determination when using a fixed effects model (FEM).

R^2_{PRM} : Coefficient of determination when using aggregate regression model (PRM)

Table 5. LM Breusch-Pagan's Lagrangian multiplier test

Test type	Probability	Test value
Breusch and Pagan TEST	0.000	7.07

Source: Based on EViews 12. Output

Fischer's calculated statistical value (Fcal) $F(5.55) = 7.07$ and probability (0.000) was smaller than the moral level 5%, i.e. accepting the alternative hypothesis that the fixed effects model (FEM) is appropriate.

5.2- Trade-off between the pooled regression model (PRM) and the random effects model (REM):

* Breusch-Pagan Lagrangian multiplier test: Breusch-Pagan test was conducted, which is based on the trade-off between the pooled regression model (PRM) and the random effects model (REM), the null hypothesis (H_0) the assembly regression model is appropriate, and the alternative hypothesis (H_1) model. Random effects is appropriate.¹

H_0 : A pooled regression model (PRM) is the appropriate model.

H_1 : The random effects model (REM) is the appropriate model.

Table 6. LM Breusch-Pagan's Lagrangian multiplier test

Test type	Probability	Test value
Breusch and Pagan test	0.023	5.11

Source: Based on EViews 12. Output

From Table No. (6) The alternative hypothesis is accepted because the probabilistic value of the Breusch-Pagan test was (0.023), which is less than the 5% significant level, and therefore the random effects model (REM) is appropriate.

5.3- Trade-off between Fixed Regression Model (FEM) and Random Effects Model (REM):

* Test: Hausman. The test (Hausman, 1978) is based on the trade-off between Fixed Regression Model (FEM) and Random Effects Model (REM), Alternative Hypothesis (H_1) Fixed Effects Model is appropriate, **null** hypothesis (H_0) Random Effects Model is appropriate.²

¹ Damondar. N Gujarat, D. C Porter,(2008), Basic Econometrics,5th edition,The McGraw-Hill Series.

² Damodar. N Gujarats ,(2004), basic economics, Traduction par Bernard Bernier, 4 éme édition, université de Bruxelles

0H: Random Effects Model (REM) is the appropriate model.

H1: Fixed Effects Model (FEM) is the appropriate model.

Table 7. Hausman Test

Test type	probability	Test value
Hausman test	0.0000	35.38

Source: Based on EViews 12. Output

Through Table No. (7), the probability value of the Hausman test (0.0000) is shown, which is less than the significant level of 5%, and therefore we reject the null hypothesis and accept the alternative hypothesis, which is the fixed effects model (FEM) that is appropriate for the study to estimate the static panel. And the results of the assessment:

6-Results and discussion:

Table 8. Estimation of fixed effects model

Dependent variable:CAR		
Independent variables	Prob	Coef
ROA	0.8517	-0.1212
ROE	0.0056	-0.1726
LR	0.8568	0.0032
CR	0.0087	-0.0681
OR	0.0702	0.0355
C	0.0000	0.2206

Source: Based on EViews 12. Output

Table (8) shows that :

- Return on asset has a negative insignificant impact on capital adequacy at the level of intangible 5%, So that when return on asset increase by 1% capital adequacy will decrease by 0.1212. Therefore, the first hypothesis is refused. And that could be due to the high profit in Islamic bank which may increase the appetite of banks for risks, rather than it is attention to strengthen capital bases, in addition the Islamic banks under the study are already experiencing high levels of capital adequacy compared to capital adequacy standard issued by the Basel III.
- Return on equity has a significant and negative effect on capital adequacy at the level of morality 5%. The coefficient of Return on equity shows that an increasing in the banks' capital must follow a one unit in Roe decrease the banks' capital adequacy by 0.1726. Based on that the second hypothesis is accepted .This results indicate that Islamic banks under the study are growing steadily and this growth.
- There is a positive insignificant effect of Liquidity risk on capital adequacy. Accordingly, The third hypothesis is rejected. This is due to the nature and

specificity of the activity of the activity of Islamic banks in an economic environment that does take into account the work of this type of banks especially the relationship between central banks and Islamic banks.

- A negative and statistically significant impact between credit risk and capital adequacy at moral level 5%. So that a 1% higher credit risk will decrease capital adequacy by 0.0681. Therefore, the fourth hypothesis is accepted, as higher risks lead to higher profitability, due to the well-known theoretical relationship between return and risks, and this result is inconsistent with the capital adequacy standard issued by the Basel III. Where it is assumed that increased risk will raise capital adequacy requirements.
- Positive and immoral relationship between operational risk and capital adequacy ratio at the moral level 5% (moral at10%), examining the increased operational risk by 1% will lead to a capital adequacy ratio of 0.035%.so, the fifth hypothesis is refused.

Conclusion:

Islamic banking is characterized by its inherent characteristics stemming from the nature of its work that make it able to face risks, and accordingly. achieving a greater understanding of the nature of the risks facing Islamic banks is one of the basic requirements to be able to design the methods by which these risks are managed because the future of banks has become dependent on the extent of the bank's ability contain the risks to which it is exposed. Moreover, this article aimed to shedding light on the efficiency of risk management in Islamic banks and to explain the different risks that Islamic banks face. The results of this study indicate that credit risk, return on equity affect negatively the capital adequacy of Islamic banks, while return on asset, operational risk and liquidity risk, they have insignificant impact on the capital adequacy. On this basis, we conclude that Islamic banks are highly efficient in their risk management.

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