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THE INTERNAL AND EXTERNAL DETERMINANTS OF THE PERFORMANCE OF JORDANIAN ISLAMIC BANKS: A PANEL DATA ANALYSIS

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ABSTRACT

The primary aim of this study is to evaluate the performance of Islamic banks in Jordan and identify the significant factors that influence their performance. The study focused on the three Islamic banks in Jordan that are listed on the Amman Stock Exchange (ASE) for which data was obtained from 2009 to 2020. A panel data analysis, random effects model and the generalized least squares (GLS) method were used to analyze the data and to test the study hypotheses. Based on the results, credit risk and capital adequacy positively and statistically affect the performance of Islamic banks in Jordan, measured using return on assets (ROA) and return on equity (ROE). With regard to external determinants, the GDP growth rate was shown to positively and statistically affect the performance of Islamic banks. The results also indicate that money supply (M2) statistically affects the performance of Jordanian Islamic banks (ROE).

Contribution/Originality: This study is significant as it contributes to the existing literature by establishing the profitability determinants of the Islamic banking industry and measures the banks' ability to control financial decisions, particularly those related to investment, and to achieve the predicted advantages through investment. The study also highlights the financing formulas depended on by the Jordanian Islamic banks, which are based on Shariah law.

1. INTRODUCTION

In a country's economic setting, banks function as the engine as they store money, pursue development and investment, and circulate money. In other words, the banking system has a major role in the provision of financing, investments, and banking services all over the globe, and in the current times, banks even facilitate and organize financial transactions among individuals and institutions in the community to meet their financial requirements regarding activities ranging from investing surplus funds to meeting deficits through granting credit facilities. In particular, Islamic banks are institutions providing services that are aligned with the principles of Islamic law to the public, institutions, and organizations. Thus, the primary objective of this type of bank is to realize the highest level of profit through financial grants that is consistent with the Islamic law provisions in different forms, including Murabaha, Mudarabah, and Musharakah based on risk-bearing and profits & losses. The aim is to contribute to the development of the economy and society in a way that is effective and positive.

In line with the purpose of this study, managerial and regulatory objectives require an extensive evaluation of the Islamic banks' performance. Viewed from a management perspective, the different performance measures have to be taken into consideration to heighten a bank's value. While managers strive to determine the outcome of administrative decisions, banking regulators are more focused on maintaining banking system safety and efficiency, public confidence, and overseeing the banks' performance to highlight issues within them, as without such oversight, problems that crop up remain unaddressed. Ultimately, this leads to the breakdown of the financial system. In this regard, depositors may also be keen to know how the banks perform as they are not generally entitled to fixed returns with unguaranteed nominal values of deposits. Thus, this signifies the need to assess the Islamic banks' strengths and weaknesses, taking into consideration the balance sheets and income statements, external economic and financial features of the bank, and an analysis of indicators to reveal the current status of Islamic banks.

Currently, Islamic financial institutions can be found in over fifty nations, while in Jordan, the focus of the present study, Islamic banking activity can be traced back to 1978 following the establishment of the Jordan Islamic Bank for Finance and Investment. Years later, in 1998, the Islamic International Arabic Bank began its operations in order to analyze the Islamic banking experience in the country and the determinants of their profitability between 2009 and 2020. The analysis made use of internal and external determinants that have been extensively used in prior literature, with the former determinants including credit risk, capital adequacy, bank size, and non-interest income to total assets. With regard to the latter determinants, they include inflation, money supply and GDP growth. The variables that were found to have a positive effect were differentiated from those that had a negative effect, enabling management to improve the positive variables' effects and minimize the effects of the negative ones. This study is one of the few that has examined the internal and external profitability determinants of Jordanian Islamic banks.

In the banking sector of Jordan, the operations differ based on bank size and market share, and this influences their competitiveness level. Aside from this, there are many external factors that may influence their overall performance, for instance, global financial crises. The Jordanian Islamic banking industry is characterized by distinctive banking and economic activities in light of the volume of such activities. Hence, the performance of such banks needs to be classified and their determinants identified.

Studies in literature directed their focus on financial ratios while overlooking economic factors as determinants of the industry's performance and. as such, in the present study, the following questions are answered:

1. What are the most important determinants of Islamic banking in Jordan?
2. Is there a relationship between the determinants of Islamic banking and its performance in Jordan?

There are various challenges faced by Islamic banks considering they are not merely financial institutions but institutions functioning to realize different development investments. Hence, the primary crucial business and nature of Islamic banking activities become clear and this influences their performance.

2. THEORETICAL FRAMEWORK

The performance of banks is affected by many factors that can be divided into internal factors (organization variables) and external factors (environmental variables). Both factor types are detailed below.

2.1. Organizational Factors

The organizational factors of a bank relate to the business volume or activities, the technology used, and the efficiency of the management (Fani, Khan, Kumar, & Kumar, 2018).

- The volume of business is one of the factors that determines the productivity efficiency of the banks. The lower the costs, the fewer the withdrawals, and the higher the resources volume, which increases the bank's operational capacity and enhances its productivity and profitability.

- The technology used refers to the hardware, software, and e-methods adopted in banking interactions and business completion. The higher the technology level adopted for banking business, the higher the banking services quality, the lower the costs, and the higher the profitability.

- Administrative competencies are reflected in the quality of services and the achievement of good standing via compatibility and harmony of relationships within the bank, cooperation, and teamwork, as well as its competency in making major decisions.

The environmental factors are external variables that affect the performance of banks. They are legal and political aspects, economic environment, and social environment.

- The legal and political environments pertain to the political conditions, laws and regulations, and processes that govern a country's banks' activities.

- The economic environment pertains to the condition of the economy and macroeconomic factors and the investment climate.

- The social environment pertains to the customs, social structure, and awareness level that reflect the individuals' abilities to make decisions when it comes to banks.

Return on assets (ROA) after taxes is one of the profitability indicators extensively used in literature and it refers to the ability to generate profits and the bank's management efficiency. On the other hand, the interest rate on property rights refers to the interest rate that the investors receive, particularly those who are capital holders. It is the returns for shareholders from the ROA combined with investment account holders in addition to their speculative profits, and net income from banking services and assets transferred from the banks other than those of investment account holders (Islamic Financial Services Board).

Every process in an Islamic bank is based on the Shariah provisions and they constantly try to achieve the safety standards established by Shariah, as they form the basis of exchanges between banks and customers (Sufian & Habibullah, 2010).

In addition to the above, performance indicators that are profitability-related within Islamic banks are the targets of administrations, as they gauge the level of resource effectiveness and efficiency usage, and represent the outcomes of policies and decisions, and are thus indicators of the bank management's performance (Masud Rana, Hossain, & Rekha, 2016). Islamic banks' profits can be divided into shareholders' shares and depositors' shares. Indicators of profitability are therefore categorized into three, which are:

1. General income and expenditure indicators, expenditure ratio, revenue, and profit margin ratio, among others.
2. Indicators based on the perspective of the bearer (ROA and ROE).
3. Indicators based on the perspective of investment account holders (return on investment deposits).

The top utilized indicators in banks' performance are return on assets (ROA) and return on equity (ROE). ROA is indicative of the efficiency level of the bank in comparison to its counterparts, whereas ROE is indicative of the ability of the bank to attract and secure investors (Muhammad, Rehman, & Waqas, 2016; Qayyum & Noreen, 2019).

2.2. Theories

2.2.1. Market Power (MP)

The relationship between profitability and market share/market concentration is underpinned by two main traditional competing hypotheses of market power – the Performance Behavior Structure (PBS) hypothesis and the Efficiency Structure hypothesis (ES).

2.2.2. Efficiency Structure Hypothesis (ES)

This theory was proposed by Demsetez (1973), and later Peltzman (1977), with the assumption of the differences that exist in the efficiency of establishments and their market dispersion, which results in market share

inequality in the form of higher efficiency level on average, and the development of larger market shares for a small number of banks.

Under the efficiency hypothesis, a banks' performance is based on the positive relationship between market share (efficiency) and its profits. Moreover, the market concentration stems from the leading enterprises' work efficiency, and in this regard, for the efficient firms' major shares, work efficiency is high, while it is low for the inefficient firms. In a related study, Kamaruddin, Safab, & Mohdc (2008) examined cost efficiency, revenue efficiency and profit efficiency among commercial and Islamic banks using a study sample of 43 Islamic banks and 37 commercial ones in 21 African, Asian and Middle Eastern countries from 1995 to 2005. The results indicated that bigger volume banks had higher efficiency levels.

Several studies have been dedicated to the performance of traditional banks, but the issue in the context of the Islamic banking industry has been largely overlooked. The main focus of the studies was placed on theoretical issues concerning the performance of Islamic banks, relying on descriptive analyses rather than statistical estimations (ElGamal & Inanoglu, 2005), and this holds true for studies on traditional banks. Authors also investigated the determinants of banking performance related to competitiveness and efficiency.

The majority of studies of this caliber focused on the internal and external determinants of the performance of Islamic banks (e.g., (Ahmad & Ahmad, 2004; Asma'Rashidah et al., 2011)). In the context of Malaysia and Indonesia, the determinants of profitability were focused on by Izhar & Asutay (2007), while Al-Jarrah & Molyneux (2003) covered Saudi Arabia, Yemen, Egypt, and Sudan.

The studies dedicated to the effects of external factors on the performance of Islamic banks include Berger (1995), who found that GDP growth affected supply and demand factors for credit facilities and deposits. For money supply, a positive and statistical significant effect was found between cash supply and Islamic banks' performance (Srairi, 2009).

More specifically, macroeconomic environment is a significant external factor that influences the performance of Islamic banks, and based on the findings of most studies, a positive relationship exists between inflation and performance (Athanasoglou, Brissimis, & Delis, 2008). Other studies, such as Kosmidou, Tanna, & Pasiouras (2005), on the other hand, found a negative inflation–performance relationship among Islamic banks, while Staikouras & Wood (2003) supported the direct effect of inflation, as reflected in the increased cost of labor and the indirect effect reflected in the increased price levels. Meanwhile, Al-Khouri (2011) found that the rate of inflation had no significant relationship with the performance of Islamic banks.

In the same line of study, Javaid & Alalawi (2018) investigated the internal and external determinants of profitability among nine Saudi Islamic banks from 2000 to 2013. According to the results, bank characteristics, industry characteristics, and macroeconomic variables were significant determinants of the profitability of the banks. They also noted a positive and significant coefficient of capital adequacy. Similarly, in the study by Bakkeri & Ali (2020), the focus was placed on the internal and external determinants of 30 Islamic banks in the Middle East and North Africa and the effects on their profitability from 2005 to 2018, and they revealed that size and inflation had no significant effects on profitability. Also, in the GCC, Braima (2021) examined the impact of GDP and inflation rates on five Islamic banks and found them to have no significant effects on the soundness of the banks.

In the context of Saudi Arabia, the internal and external profitability determinants of nine Islamic banks from 2000 to 2013 were the focus of a study by Javaid & Alalawi (2018). They found that banks' characteristics, industry characteristics, and macroeconomic variables were all significant determinants of the profitability of the banks. The results also supported a positive and highly significant coefficient of capital adequacy.

3. STUDY METHODOLOGY

The study used annual data that was gathered through banks' statistics in the annual reports from three registered banks (the Jordanian Islamic Bank, International Islamic Arab Bank, and the Safwa Islamic Bank) on the

Amman Stock Exchange between 2009 and 2020. The study sample data was provided by the Jordan Securities Commission and the Central Bank of Jordan. The panel data was exposed to a multiple linear regression analysis.

3.1. Study Variables

There are three major variables in the study model which function as the determinants of the Islamic banking performance. The measurement methods are presented and discussed in the following sub-sections.

3.1.1. Measuring the Banks' Performance (dependent variables)

The dependent variables used in this study (ROA and ROE) are financial ratios, which are useful indicators of the financial performance of institutions and they can be obtained from the calculations in financial statements. The study employed a multivariate analysis to clarify the determinants of financial performance of Jordanian Islamic banks listed on the Amman Stock Exchange.

1. Return on Equity (ROE)

This dependent variable measures the return on investments by shareholders in the bank. It is used in this study as the profitability indicator in the regression analysis along with return on assets (ROA), which follows several studies in literature (e.g., Altunbas (2005)). It reflects the management effectiveness in using funds that stems from the shareholders' contributions to the bank. It is measured by the following formula:

ROE = Net Income/Equity Capital

ROE is a measurement of the net income amount after taxes collected that a bank's shareholders' contribute to the capital. Shareholders generally prefer a higher return on their equity, but increased ROE demonstrates increased risk. This may be exemplified by the ROE equation, which shows that a decrease in total equity capital relating to net income increases the return on equity under net income and this may result in a considerable decrease in capital, exceedance of the least regulatory capital standards, and increasing insolvency risks (Saunders & Cornett, 2014).

2. Return on Assets (ROA)

The other dependent variable is ROA and it refers to the ratio of net income to total assets, measuring profitability and efficiency of the bank based on total assets (Guru, Staunton, & Balashanmugam, 1999). ROA measurement is obtained by dividing the net profit after interest and tax over total assets, and this represents the company's profitability relating to its total assets. ROA also gauges the company's efficiency in optimal usage of assets to realize the objective of the shareholders, which is to maximize profits, depending on the industry, type and size of assets. Utilized in production, ROA is useful for comparing financial performance between companies in a single sector to determine profitability stemming from assets investments. As the assets of an organization comprise the total liabilities and capital, they are utilized to finance the activities of the company, which is why the ROA ratio provides insight into the effectiveness of organization in profit-making using invested funds.

ROA = Net Income/Total Assets

3.1.2. Independent Variables

The present study's independent variables consist of internal variables that relate to the characteristics of the bank and are influenced by the internal administrative decisions that the bank makes and the external variables of the banking sector as well as the macroeconomic environment that the bank's management cannot control.

First: *Independent internal variables that function as determinants of Islamic banks performance.*

In the Islamic banking sector, the performance of banks is determined by internal characteristics that are detailed as follows:

1. Credit Risk

This is among the top determinants of bank performance. More specifically, risk refers to the possibility of the objector/customer to wholly/partially pay the interest, principal or both. Theoretically, the increased exposure of the bank to credit risk could have an adverse effect on its performance. Hence, the bank must strive to avoid credit risks by ensuring that the credit supervision and risk management are both effective.

In a related study, Miller & Noulas (1997) reported a negative relationship between credit risk and bank performance. Credit risk measurement can be obtained by the ratio of the allocation of the remaining credit to total loans, or the ratio of even loss reserves to loans or non-pay due, or the ratio of net credit facilities to total assets. In this study, credit risk is expressed using the ratio of the provision for credit losses to total credit facilities based on the definition given by Athanasoglou et al. (2008).

2. Non-interest Income Ratio

Most of the profits made by Islamic banks stem from non-traditional activities, so much so, that the percentage of non-interest income is predicted to be positive in its effect on the performance of Islamic banks (Chowdhury, Haque, & Masih, 2017).

3. Capital Adequacy

This ratio represents the level of the ability of the bank to bear losses. Capital adequacy can be expressed in several ways – capital-to-risk ratio, capital-to-total ratio, deposits, and capital-to-total assets ratio. In the majority of studies, capital adequacy was found to have a positive effect on banks' performance (e.g., Pasiouras & Kosmidou (2007)). The present study followed Flamini, McDonald, & Schumacher (2009) in their measurement of capital adequacy as the ratio between the book value of property rights to total assets.

4. Bank Size

The measurement of bank size lies in the natural logarithm of the size of assets. In particular, the effect of a company's size on its performance is still ambiguous but researchers agree that size does affect performance level. Large companies often perform outstandingly as they are able to leverage economies of scale and efficiently organize their investment activities (Majumdar, 1997), and similarly, the size of the company could positively affect its performance, with large companies being able to broker better deals in the money market or in other production markets factors (Mathur & Keynon, 1998). In a related study by Banz (1981), size was reported to have a negative effect on the performance of the company, with size growth leading to the inability to maintain outstanding performance.

Second: *Independent external variables that determine the performance of the Islamic banking sector.*

The external determinants of the performance of the Islamic banking sector include the macroeconomic environment that is not connected to the management of the bank and are not under the management's control. They are as follows:

1. Growth Rate in Gross Domestic Product (GDP)

Several studies examined the effect of GDP on bank performance, with some revealing a positive effect (e.g., Kosmidou et al., 2005; Sufian & Habibullah, 2010), while others revealed that macroeconomic indicators, such as GDP, had no significant impact on bank performance (Ben & Goaied, 2006).

2. Inflation (INF)

Perry (1992) revealed that inflation effects hinge on the level of predictability and the perception, which indicates that a bank can predict inflation and prepare interest rates on the basis of the prediction of the right to higher returns rather than increased costs. This makes inflation a significant external determinant of bank performance. If a bank is unable to predict inflation, the costs will outweigh the benefits, and thus the performance of the bank will be affected. The majority of studies reported a positive inflation–performance relationship among Islamic banks (e.g., Athanasoglou et al., 2008), and based on the Jordanian banking sector studies, a positive relationship was evident (Al-Jarrah., 2010).

3. Money Supply (M2)

Money supply represents the cash available in the economy with an increase in money supply indicating an increase in liquidity in the market and in banks, which could lead to motivating investments and increased returns. Studies of this caliber revealed a positive relationship between money supply and bank performance (e.g., Haron & Azmi, 2004). The measures adopted in this study to gauge the determinants of the performance of Islamic banks are presented in Table 1.

Table 1. Measurement of study variables.

The performance of Islamic banks		
Variable	**Abbreviation**	**Description**
Return on Assets	ROA	Net income/Total assets
Return on Equity	ROE	Net income/Equity capital
Internal Determinants		
Variable	**Abbreviation**	**Description**
Credit Risk	CR	Provision for loan losses/Total loans
Ratio of Capital	CRA	Total equity/Total assets
Size of Bank	BS	Log of total assets
Non-interest revenue ratio	NIEA	Non-interest revenue to total assets
External Determinants		
Variable	**Abbreviation**	**Description**
Inflation	INF	Rate of inflation
Money Supply	M2	Growth rate of money supply
Gross Domestic Product	GDP	Growth of Gross Domestic Product

3.2. Econometric Methods

Following the calculation of the ROE and ROA of Islamic banks, the internal and external determinations associated with banks' performance was obtained, represented by rate of return on assets and rate of return on equity through the use of the multiple linear regression method for panel data. To test the hypothesis, the strategy was selected using the econometric methods detailed below.

The panel data concept is made up of a combination of time series data and its dimensions (cross-sectional), with the attribute of maintaining the same data and measuring quantities with the passing of time. Panel data use has benefits over using time series data/cross-sectional data as it can tackle an extensive range of issues and solve more complex problems with increasing degrees of freedom and numbers of observations. This is accompanied by the increasing strength of tests making panel data more efficient than time series, which often faces self-correlation issues, as the model is structured in a suitable way and the effects of some variables can be minimized or eradicated (Brooks, 2008; Verbeek, 2012). The simplest measurement of panel data regression involving the estimation of one equation for the entire dataset (Brooks, 2008).

$$y_{it} = \alpha + \beta x_{it} + u_{it}$$

(1)

In the above equation, y denotes the dependent variable, i denotes unit, t denotes time, x denotes the independent variable, and u denotes the random error term.

In the field of financial research, two major models are applicable, namely the fixed effects model and the random effects model. The former decomposes the error term into distinct effect and the residual error varying over time and across entities, and is estimated by the following equation (Brooks, 2008; Verbeek, 2012):

$$y_{it} = \alpha + \beta x_{it} + u_i + v_{it}$$
(2)

The latter model (random effects) is deemed to be more efficient compared to its counterpart (fixed effects model), as it gauges fewer parameters. Accordingly, the Hausman test was employed to identify the most suitable test to be adopted depending on the significant level of Chi-square. If the value is less than 5%, then the fixed effects model is suitable, but if it exceeds 5%, then the random effects model is more suitable.

$$y^*_{it} = \alpha^* + \beta x^*_{it} + \gamma \hat{x}_{it} + u^*_{it}$$
(3)

In this study, the relationship between the internal and external determinants and the performance of Islamic banks using ROE and ROA is estimated for the period from 2009 to 2020 using the econometric models presented below:

$$ROA_{it} = \beta_0 + \beta_1 CR + \beta_2 CRA + \beta_3 BS + \beta_4 NIEA + \beta_5 INF + \beta_6 M2 + \beta_7 GDP$$
(4)

$$ROE_{it} = \beta_0 + \beta_1 CR + \beta_2 CRA + \beta_3 BS + \beta_4 NIEA + \beta_5 INF + \beta_6 M2 + \beta_7 GDP$$
(5)

4. RESULTS AND DISCUSSION

Table 2 contains an initial description of the study variables in determining the Islamic banking environment characteristics and indicating the business outcomes from 2009 to 2020.

Table 2. Descriptive statistics.

Variable	Mean	SD	Maximum	Minimum
ROA	0.970107	0.686184	2.758	–1.29
ROE	9.841464	6.456886	21.828	-3.147
CR	0.025739	0.02491	0.142652	0.00278
CRA	0.162487	0.162339	0.826311	0.071378
BS	1.71E+09	1.26E+09	4.21E+09	1.14E+08
NIEA	2.431338	2.575315	10.29221	-2.55016
INF	109.6321	8.435509	119.3	95.4
M2	2.59E+10	4.95E+09	3.30E+10	1.83E+10
GDP	2.21E+10	4.21E+09	2.84E+10	1.56E+10

On the basis of the above table, the average ROA is 0.97%, while the average ROE is 9.48%, with upper and lower values displayed, and with some banks achieving high profitability coupled with lower losses.

4.1. Results of Statistical Tests and Standard Analysis

There are three stages to the statistical testing of the study variables:

Stage 1 – The stability of data was established using the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) unit root tests.

Stage 2 – Linear correlation tests were conducted between the explanatory variables using a multicollinearity test to ensure that multiple linear correlation is absent.

Stage 3 – The Hausman test was carried out to identify a suitable model to test the study data (random effect model or fixed effect model).

4.2. Unit Root Test Results

Economic data is often riddled with structural changes that may influence the level of stability of time series data. Therefore, the determination of the stability level is important prior to testing the relationships between the variables, as this call for the same level of instability and integration of data. If the first differences of the variable series is stable, then the parent chain is integrated from first order I(1), but if it is stable following the second differences, then the first series is integrated from the second order I(2), as recommended by Seddighi & Lawler (2000). The avoidance of the effects of instability and stagnation in time series should be addressed using one of the most extensively utilized treatments (e.g., the difference method or the logarithmic conversion method).

Table 3. Results of the ADF and PP tests for data stability.

Variable		ADF	PP	Result
ROA	Level	***-4.647925	***-4.647514	Stationary
	First difference	***-6.799028	23.27121***-	Non-stationary
ROE	Level	-2.115983	-2.056276	Stationary
	First difference	***-4.894918	***-8.817458	Non-stationary
CR	Level	***4.544830-	***-4.478129	Stationary
	First difference	***7.132626-	***-19.88398	Non-stationary
CRA	Level	-2.356280	-2.396787	Stationary
	First difference	***-5.265358	-6.309439	Non-stationary
BS	Level	-1.575795	-1.575795	Stationary
	First difference	***5.200839-	***5.232690-	Non-stationary
NIEA	Level	*2.798326-	*2.760234-	Stationary
	First difference	***6.525692-	***14.70109-	Non-stationary
INF	Level	-2.381100	-2.381100	Stationary
	First difference	***5.004854-	***5.004854-	Non-stationary
M2	Level	***5.921017-	*2.628759-	Stationary
	First difference	***4.988573-	***5.149174-	Non-stationary
GDP	Level	***5.451828-	*2.685591-	Stationary
	First difference	***5.260122-	***5.294249-	Non-stationary

Note: *** denotes significance at 0.01, * denotes significance at 0.10.

The study variables were tested using the ADF and PP tests, and based on the results, (see Table 3) the variables are not at a stable level with the significance value for the two tests exceeding 5%, and thus the null hypothesis is deemed to be accepted. Because the unit root's existence was confirmed, it was necessary to take the first difference for the entire variables before the retest, and after the retest. The results revealed significance values of less than 5% for the two tests, so the alternative hypothesis, which states the absence of unit root and the stability of the time series data was accepted.

4.3. Multicollinearity Test

Table 4. Matrix of correlations between independent variables.

Correlation	CR	CRA	BS	NIEA	INF	M2	GDP
CR	1						
CRA	0.235638	1					
BS	0.021762	-0.57044	1				
NIEA	-0.093843	0.244293	-0.391889	1			
INF	-0.214298	-0.261749	0.275597	0.284544	1		
M2	-0.136973	-0.3274	0.435248	0.150887	0.26449	1	
GDP	-0.136773	-0.334188	0.436419	0.179778	0.498919	0.509799	1

A strong correlation, or a strong linear relationship, between the independent variables shows the possible presence of linear correlation, which in some cases, could lead to a standard error (SE) in the estimated parameters.

When this happens, an insignificant result is obtained. However, in the present study, no linear correlation was found between the independent variables, which were tested through correlation analysis and the VIF. The correlation analysis results are tabulated in Table 4 and they indicate no multiple correlation issue between the independent variables as the correlation among them appeared weak.

All the independent variables were exposed to determination factor (Rj2) but the dependent variable was exposed to the VIF test using the formula: VIFj = 1 / (1-Rj2).

In cases where VIFj > 5 there is a multiple correlation issue between the independent variables, following the study by Asteriou & Hall (2007). The VIF test results for the study variables are displayed in Table 5, and from these we can see that there is no issue of multiple linear correlation among the study variables in the standard models.

Table 5. VIF results for linear correlation.

Variance Inflation Factor (VIF)	
Independent Variable	**The first model using return on assets**
CR	2.089958
CRA	2.626154
BS	2.686128
NIEA	2.054995
INF	4.782279
M2	2.548585
GDP	1.584834
Variance Inflation Factor (VIF)	
Independent Variable	**The second model using return on equity**
CR	2.121917
CRA	2.635110
BS	2.059221
NIEA	3.734658
INF	3.380429
M2	2.645649
GDP	2.322573

The fixed effects model and random effects model were evaluated using the Hausman test, and the generalized least squares (GLS) was used to take into consideration the heterogeneity and autocorrelation of the error limit, as suggested by Greene (2012). The Hausman test supported the suitability of the random effects model for testing the effects of the internal and external determinants of the performance of Jordanian Islamic banks (ROA and ROE), with a probability ratio or level of significance (Chi-square) greater than 5%.

First: The ROA Model

The results from the evaluation of the ROA model show that the relationship between the internal determinants of the performance of Islamic banks regarding credit risk and capital adequacy and ROA were statistically significant, with t-statistics for the ratio of loan loss allocations to total loans supporting a direct statistically significant relationship at the level of 1%. This result may be attributed to the fact that Islamic banks grant credit facilities through different forms of financing with high exchange risks for higher profit margins.

The capital adequacy parameter through t-statistics shows that there is a statistically significant direct relationship at the 5% level from the return of capital ratio (book value of property rights to total assets) on the performance of Islamic banks, indicating that the independent variable is statistical in extension. The banks performance measured by ROA indicates that those with high capital have the ability to finance from sources with risks and low costs, which are positively reflected in their profitability performance. This result was also reported by Pasiouras & Kosmidou (2007).

Table 6. Panel data for the ROA model regression results.

Independent Variable	Dependent Variable	
	ROA Random effects model	ROA Fixed effects model
CR	27.70140 (2.980115)***	29.43608 (2.933794)***
CRA	3.181986 (2.070453)**	3.340210 (2.121008)**
BS	1.85E-09 (1.433636)	2.06E-09 (1.267973)
NIEA	0.046084 (0.029200)	0.361132 (0.570012)
INFL	0.056496 (0.873935)	0.060151 (0.940142)
M2	2.69E-10 (1.061004)	2.98E-10 (0.986806)
GDP	5.017204 (2.381081)*	0.981389 (0.874593)
R-squared	0.523635	0.538968
Adjusted R-squared	0.491626	0.474953
F	8.327541	7.662662
Prob. (F-Stat)	0.000	0.000
Hausman test Chi-Sq.	1.485244	
Prob. (Chi-Sq)	0.8293	
No.	36	36
Banks	3	3

Note: *** denotes significance at 0.01, ** denotes significance at 0.05.and * denotes significance at 0.1.

Moving on to the external determinants of Islamic banks' performance, based on the t-statistic results, a positive relationship exists with GDP, which is statistically significant at the 5% level.

This result indicates that the variable does contribute to the performance of Islamic banks based on ROA. This result can be attributed to the high growth rate in GDP and the enhancement of economic conditions, which goes hand in hand with the increase in demand for banking services provided by Islamic banks – this in turn increases the banks' profitability, as revealed by Srairi (2009). Considering the fatalistic value of the parameters, the estimation results of the external determinants showed insignificant relationships between the rate of inflation, the rate of money supply, and banks' performance.

Second: The ROE Model

According to the results of the evaluation of the ROE model, the percentage of non-interest income as an internal determinant, and inflation rate as an external determinant, had no statistically significant contributions to the performance of Islamic banks. On the other hand, the t-statistics for the parameter of credit procedures showed a direct statistical significance at the 5% level, indicating the variable's role in explaining banks' performance measured through ROE. Regarding the capital adequacy ratio, the t-statistic results support a direct relationship with Islamic banks' performance at the 5% level of significance. This may be related to the fact that Islamic banks possess capital adequacy, and financial resources can be used to open financing and achieve high profits, as argued by Pasiouras & Kosmidou (2007). With regard to the bank size, the t-statistic results support a direct relationship at the statistically significant level of 5% on banks' performance (ROE). Banks hold enough capital to obtain low-cost financing resources, which could have a positive influence on their profitability.

Moreover, the t-statistics for the cash supply parameter show a direct and statistically significant relationship at the 5% level, which means that Islamic banks have high liquidity and adequate fund availability. This result is aligned with that of Haron & Azmi (2004). On the other hand, inflation was not found to be statistically significant.

Table 7. Panel data for the ROE model regression results.

Independent Variable	Dependent Variable	
	ROE Random effects model	ROE Fixed effects model
CR	67.01643 (2.092436)**	-1.42E-08 (-2.282022)**
CRA	7.963293 (1.886811)**	0.495259 (2.014956)**
BS	-1.23E-08 (-2.614203)**	3.27E-09 (1.599875)
NIEA	6.097309 (1.137194)	2.650279 (0.438069)
INFL	0.372511 (1.508778)	61.04151 (1.583642)
M2	2.10E-09 (2.178482)**	2.29E-9 (1.969362)*
GDP	8.308003 (1.771170)*	9.297588 (2.156835)**
R-squared	0.637409	0.513251
Adjusted R-squared	0.572907	0.484192
F	18.563914	12.240697
Prob. (F-Stat)	0.000	0.000
Hausman test Chi-Sq.	3.938472	
Prob. (Chi-Sq)	0.4144	
No.	36	36
Banks	3	3

Note: ** denotes significance at 0.05, *denotes significance at 0.1.

Based on the t-statistic results, GDP growth showed a positive relationship at the 10% level with Islamic banks' performance (ROE). This may be related to the fact that increased GDP and enhanced economic conditions have a positive influence on performance. Economic prosperity generally heightens the demand for Islamic banking services and finances, as revealed by Srairi (2009). The coefficient value of determination (R2) supported the model's ability to explain the variation in Islamic banks' performance by 52%. The f-test showed high statistical significance of the model and the WD test indicated no issue of self-correlation in the model.

5. CONCLUSION

The performance models developed in this study were based on the review of prior literature and theories and the calculation of internal and external determinant ratios of Islamic banks from 2009 to 2020. The first model tested the effects of internal and external determinants of Islamic banks' ROA performance, while the second model tested the effects of the same determinants on the Islamic banks' ROE performance. The two models had similar results regarding statistical signals and significance – they show that capital adequacy and stock financing significantly impact banks' performance, so Islamic banks need to increase their portfolios of equity financing and promote Mudarabah contracts based on the risk-sharing principle. Other significant positive effects were found for credit risk on the performance of Islamic banks and for macroeconomic environment determinants for GDP growth and money supply. Considering the funds representing the banks' main assets, it is recommended that banks implement stringent measures when granting loans to enable the recovery of a higher proportion of funds. Moreover, the performance indicators of the macroeconomic environment generate optimum results in providing insight into Jordanian Islamic banks' performance, and hence, such information disclosure by the relevant authorities is required as well as the cooperation of the banks and the Central Bank of Jordan to establish a united database that could function as the primary information source for stakeholders on banks' performance.

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