Journal of Money and Economy
Vol. 20, No. 3, Summer 2025
pp. 323-345

Original Research Article

Investigating the Effect of Islamic Financing Instruments (Sukuk) On the Profitability of Islamic and Conventional Banks (Member Countries of the Organization of Islamic Cooperation (OIC))

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Received: 13 Jul 2025 Approved:15 Sep 2025

Bank profitability largely depends on financing methods, and Islamic financial instruments such as sukuk have emerged as alternative tools to enhance bank performance. This study examines the impact of sukuk on low, medium, and high profitability levels of 24 Islamic and 12 conventional banks over the period 2003–2023, considering both the 2008 financial crisis and non-crisis periods, using dynamic quantile panel regression. The results show that during the crisis, sukuk development improved profitability for conventional banks at all levels but reduced profitability for Islamic banks, particularly those with low profitability, whereas in non-crisis periods, sukuk negatively affected both bank types at low and high profitability levels. These findings indicate that sukuk have heterogeneous effects on bank profitability depending on bank type, profitability level, and economic conditions, providing valuable insights for policymakers and bank managers in optimizing financing strategies.

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Keywords: Sukuk, Dynamic Quantile Panel Regression, Bank Profitability, 2008 Financial Crisis
JEL Classification: G29, G10, C23

1 Introduction

In recent years, as financial markets have experienced significant growth, banks, as one of the main institutions in financial markets, have also come under intense competition influenced by this growth trend.In order to maintain their position in the banking market and retain their customers, banks must strengthen the main indicator of success and the key reason customers turn to banks, which is profitability. To enhance this aspect, the influencing factors must be well understood, and appropriate policies should be adopted in response to how these factors impact it. (Havaledar Nejad, 2017)

In the literature on banking and financial development, there is no solid theory regarding the factors affecting bank profitability. Most of the research conducted in this field has used a combination of micro and macroeconomic variables along with accounting ratios to explain profitability (Ezzati et al., 2015). However, banks should be thinking about creating solutions to develop various financial instruments to support investment, production, and employment. One of the logical solutions for developing the money market is utilizing modern Islamic financing instruments through the issuance of sukuk in the capital market (Rajaei Baghsiaei et al., 2018)

The financial instrument Sukuk refers to a financial instrument involving a specific physical asset and contracts such as Mudarabah and Ijarah, in accordance with Islamic banking law. (Fotros and Mahmoudi, 2008). Currently, it is recognized as the most effective experience at the level of the Islamic world, and during the 2008 financial crisis, it was not exposed to global shocks nor did it transfer its risk to international investors for portfolio diversification. (Naifar et al., 2017). Although Belanes et al. (2015) in their research show that Islamic banks were resilient against the 2008 global financial crisis, on the other hand, Hasan and Dridi (2010) state in their study that the 2008 financial crisis had a significant impact on conventional banking, to the extent that this system experienced serious disruption and a meaningful decline.

Given the high importance of the banking system in countries' economies and the significant impact of bank profitability and returns in encouraging depositors to increase their deposits due to their share in the profits, examining the factors affecting bank profitability seems necessary.Accordingly, the present study seeks to answer the question of whether the development of the sukuk market has an equal impact on

different levels of profitability in the banking system (both Islamic and conventional) during the 2008 financial crisis and in non-crisis periods.

This research is the first comprehensive study on the impact of sukuk market development on different levels of profitability of Islamic and conventional banks.The literature review shows that most studies have used panel data frameworks and have not reached a consensus regarding the impact of sukuk on bank profitability.Therefore, the present study examines the effect of the common Islamic financing instrument (sukuk) on the profitability of the banking system (Islamic, conventional, and the overall sample) during the period from 2003 to 2023 for 10 member countries of the Organization of Islamic Cooperation, which have either Islamic banking, conventional banking, or both. Using dynamic quantile panel regression and new econometric techniques, this study provides consistent and reliable results. In light of this research, the impact of sukuk on the banking system is determined through three characteristics—competition, substitution, and complementarity—during the 2008 financial crisis and in non-crisis periods.

The structure of the article is as follows: in the next section, the theoretical foundations and literature review are presented. In the third section, the research methodology and the model used in this study will be explained. In the fourth section, the results obtained from the model estimation are analyzed. Finally, the last section provides the conclusion and recommendations.

2 Theoretical Foundations and Review of Empirical Studies

Since different frameworks for the banking system are used in various countries, differences in the performance of banks will be observed. By categorizing these differences into conventional and Islamic banks, a comparable classification can be achieved, and the resulting average findings may ultimately provide useful insights for optimizing the interest rate in our country. (Tari, 2008).

The financial crisis had a significant impact on conventional banking, to the extent that this system experienced disruption and a meaningful decline; meanwhile, Islamic banking maintained its stability throughout the crisis. After the crisis occurred, some observations indicated that in countries with both Islamic and conventional banks, Islamic banks were more stable compared to conventional banks when facing the financial crisis.The difference in performance between Islamic banks and conventional banks, especially in countries that have both types of banking, attracted the attention of experts and economic scholars.The financial crisis provided a

suitable testing ground to conduct a practical comparison between the performance of Islamic and conventional banks (Afshari et al., 2017).

Today, the Islamic financial system is rapidly growing and developing worldwide, and not only Islamic countries emphasize the necessity of using financial instruments, but this trend is also clearly evident in other countries around the world (Mousavian, 2007). Sukuk, as one of the Islamic financing instruments, has experienced unprecedented success over the past two decades; its profitability has been greater than investment in other well-known and lesser-known financial instruments. However, evidence on how sukuk affects the banking sector is scarce (Ibrahim, 2015). Smaoui and Khawaja (2017) examined the relationship between the sukuk market and the banking sector and concluded that banks and sukuk are substitutes for each other.This is justifiable in countries where the banking system and sector dominate, as the banking system limits the role and activity of the sukuk market.Although their analysis did not examine the context and source of this substitution and did not successfully address whether conventional and Islamic banks compete equally with sukuk, this issue has nevertheless become a starting point for comprehensive research on the interaction between sukuk markets and banks (Hassan et al., 2018).

In contrast, a number of existing studies in the field of financial intermediation support the existence of a competitive effect between the banking sector and financial markets, in which the growth of one side necessarily occurs at the expense of a decline in the other. Within the interest group theory framework, Rajan and Zingales (2003) posit that incumbent financial intermediaries, particularly traditional banks, may hinder capital market development, as expanded market-based finance weakens their control over credit allocation and diminishes their informational rents. In fact, sukuk is one of the Sharia-compliant securities that has entered the financial market and, in a way, competes with the banking system; as a result, economic actors are compelled to choose between sukuk and bank financing. Therefore, it would not be surprising if the expansion of sukuk usage leads to a decrease in profitability within the banking system (Rajaei Baghsiaei et al., 2018). Of course, this should not be analyzed as a negative issue, because if it leads to strengthening the capital market in comparison to the banking system, it will benefit the national economy of countries and reduce their overreliance on the banking system.

Another set of studies shows that financial markets complement the banking system (Mimouni et al.,2019). A well-developed banking system can serve as a complement to the expansion of liquidity and a deep sukuk

market, as banks can act as intermediaries and market makers in that space(Smaoui and Khawaja, 2017), and since each of the banking systems—the money market and the capital market—meets part of society's needs, their interaction can, through various instruments, respond to the diverse demands of the market.

While the theoretical framework for the relationship between financial markets and the banking system is well-developed in the literature, empirical evidence remains, at best, inconclusive.Extensive research has been conducted on the factors affecting bank profitability; however, no study has specifically examined the impact of sukuk on the profitability of Islamic and conventional banks across different profitability levels (low, medium, and high), both during the 2008 financial crisis and in its absence, while simultaneously investigating the nature of their relationship. For example, Salhani and Mouselli (2022), by examining the effect of sukuk on the profitability of Islamic banks in the United Arab Emirates, concluded that the impact of sukuk on the studied profitability ratios (return on assets and return on equity) is insignificant. In another study, Le and Nguyen (2020a), while examining the effect of capital structure on the profitability of Vietnamese banks using a quantile regression approach, concluded that a continuous increase in the required capital of banks does not necessarily lead to higher profitability.

Bibiand Mazhar (2019),by examining the relationship between Islamic bonds (sukuk) and the performance of Islamic banks in Pakistan, concluded that there is a significant but negative relationship between sukuk and the profitability of Islamic banks. Therefore emergence of the sukuk market may pose a threat to the profitability of Islamic banks in the country. Mimouni et al., (2019), examined the effect of sukuk on the performance of 71 Islamic banks and 146 conventional banks across 13 countries and concluded that sukuk reduces the profitability of Islamic banks and has no impact on the performance of conventional banks.The other variables used, including bank size (with a negative and significant effect), capital adequacy (a negative relationship), and other country-specific and bank-specific variables—such as macroeconomic factors and management efficiency—had little to no impact. Hossain and Khalid (2018), in examining the determinants of bank profitability before and during the crisis in Bangladesh, it was shown that over the entire study period, only the variables of equity to total assets and the cost-to-income ratio had an impact on profitability. However, before the crisis period, only the cost-to-income ratio was influential, and during the crisis period, net interest income was the variable that had an effect.

Regarding the macroeconomic and industry-specific variables used in this study, only the treasury bill variable had an impact, and it remained consistent across all three periods. Smaoui and Khawaja (2017), conducted a study examining the effects of financial development on sukuk markets. The findings of this study showed that sukuk and bank loans are substitutes for each other, while sukuk, bonds and the stock market are complements. Ultimately, this article shows that the 2008 global financial crisis had a positive impact on the expansion of sukuk markets.Samadi et al., (2023), in a comparative analysis of the impact of sukuk market development on the profitability of Islamic and conventional banks, concluded that the development of the sukuk market increases the profitability of Islamic banks but has no effect on the profitability of conventional banks.Additionally, the results showed that the COVID-19 crisis does not moderate the impact of sukuk market development on the profitability of Islamic and conventional banks. Rajai Baghsiaei and Safaei Ilkhchi (2022) examined the effect of macroeconomic variables and sukuk on the profitability of Iranian banks and concluded that bank size, GDP growth, and inflation have a positive and significant impact on both profitability indicators, while operating leverage, exchange rate growth, and total traded sukuk have a negative and significant effect on both profitability indicators. Jalalzadeh Azar et al., (2020) examined the impact of macroeconomic variables and banking system-related variables, and the estimation results showed that inflation, sukuk, and the ratio of equity to total assets have a positive and significant effect, while government ownership, the ratio of total expenses to total assets, and bank size have a negative impact on the return of the banks under study. Rajaei Baghsiaei et al. (2018), in their study on Islamic financing instruments and the profitability of private banks in Iran, concluded that participatory contracts (Mudarabah and Musharakah) have a direct and significant relationship with bank profitability, whereas exchange contracts do not have a significant relationship with bank profitability. In another study, Porohan (2016) examined the factors affecting the profitability of Iranian banks and concluded that bank size, management efficiency, and capital adequacy have a negative effect, while commercial mix, bank concentration, inflation, and economic growth have a positive effect on profitability. Reviewing the conducted studies shows that most researches have examined the effect of sukuk on bank profitability. However, to date, no study has simultaneously investigated the effect of sukuk on the profitability of Islamic and conventional banks, explained the nature of sukuk's relationship (substitutive, competitive, and complementary) with the banking system

during the 2008 financial crisis and non-crisis periods, and most importantly, analyzed this effect across different profitability levels (low, medium, and high) of banks.Therefore, the present study, in the context of the interaction between capital and money markets, in addition to examining the effect of sukuk on the profitability of Islamic and conventional banks in ten member countries of the Organization of Islamic Cooperation—each having either Islamic banking, conventional banking, or both—uses a dynamic panel quantile approach across three profitability levels (low, medium, and high) and compares the results during the 2008 financial crisis and the non-crisis period over the 2003-2023 timeframe to also investigate the nature of their relationship.

3 Research Method

Multiple external and internal factors have influenced the structure and performance of the banking system, leading to the emergence of diverse financing methods and banking practices; however, despite all these changes, the banking system remains the primary field for financing economic activities in many countries and plays a key role in transferring resources from savers to investment units (Hoffmann, 2011). Accordingly, following the studies of Le and Nguyen (2020b), Chowdhury et al., (2017), and Mimouni et al., (2019), this study examines the effect of sukuk on the profitability of banks (Islamic, conventional, and the overall sample) during crisis and non-crisis periods across three profitability levels: low, medium, and high.

3.1 Model Specification for Sukuk and Profitability in Non-Crisis Periods

First, sukuk along with some factors affecting bank profitability are theoretically and empirically specified. In other words, the baseline model (the model without crisis) simultaneously encompasses periods before and after the crisis and aims to examine the effect of sukuk on profitability.

$$\mathrm{Quant}_{\mathrm{ROA,it}}(\tau_k|\alpha_i X_{it}) = \beta_0 + \beta_1 \mathrm{ROA}_{it-1} + \beta_2 \mathrm{LR}_{it} + \beta_3 \mathrm{AQ}_{it} + \beta_4\, ln\mathrm{SUKUK}_{it} + \beta_5 \mathrm{GDP}_{it} + \beta_6 \mathrm{ME}_{it} + \beta_7 \mathrm{CAR}_{it} + \beta_8 \mathrm{lnsize}_{it} + \beta_9 \mathrm{INF}_{it} + \beta_{10} LERNER + \varepsilon_{it} \quad (1)$$

3.2 Model Specification with Crisis Effect (Dummy Variable)

In order to consider the effect of the 2008 financial crisis on the profitability of the banks studied at different levels (low, medium, and high), a dummy variable has been included in the model, which is described as follows.

$$\text{Quant}_{\text{ROA,it}}(\tau_k|\alpha_i X_{it}) = \beta_0 + \beta_1 \text{ROA}_{it-1} + \beta_2 \text{LR}_{it} + \beta_3 \text{AQ}_{it} + \beta_4 ln\text{SUKUK}_{it} + \beta_5 \text{GDP}_{it} + \beta_6 \text{ME}_{it} + \beta_7 \text{CAR}_{it} + \beta_8 \text{lnsize}_{it} + \beta_9 \text{INF}_{it} + \beta_{10} LERNER + \beta_{11} ln\text{SUKUK} * \text{crisis}_{it} + \varepsilon_{it} \quad (2)$$

In Equation 2, the variables used, their measurement metrics, and their expected signs are presented in Table 1.

Table1
Used Varaible

Description of Variable	Definition/Labe	Expected Sign
Dependent Variable		
Return on Assets	Net profit to total assets ratio/(ROA)	±
Bank-specific variables(Bankvar)		
Liquidity Risk	Liquidity ratio to total deposits/(LR)	±
Asset quality	Ratio of non-performing loans to total loans/(AQ)	+
Managerial efficiency	Cost-to-income ratio/(ME)	-
Bank size	Total assets/(B)	±
Capital Adequacy Ratio	The ratio of core capital to risk-weighted assets/(CAR)	±
Macrovar (Country-specific variables)		
Sukuk market development	The ratio of sukuk market investment to Gross Domestic Product/(Ln_sukuk)	±
Inflation	Consumer Goods and Services Price Index /(INF)	±
Economic growth	Real per capita GDP growth/(GDP)	+
Market power	Lerner index /(LERNER)	±

Source: Research Findings

Profitability indicators are divided into four categories, each of which reflects different aspects of banks' performance (Sharifi, 2016). Among these indicators, return on assets is recognized as a key ratio for evaluating the profitability of banks and is the most common measure of bank profitability in the profitability literature (Asadi, 2016). In this study, this ratio has been used to measure the profitability of the banks under investigation.

3.3Dynamic Quantile Panel Regression

To examine the relationship between two variables, ordinary least squares regression(OLS) is typically employed. Using least squares regression, the relationship between the quantile variable and the conditional mean response

can be estimated. However, like many statistical methods, this approach also has certain limitations. One of the criticisms of this method is that it only provides an approximation of the conditional mean of the distribution and consequently offers an incomplete description of the conditional distribution. Accordingly, quantile regression, introduced by Koenker and Bassett (1978), generalizes the classical least squares approach to models for conditional quantile functions. It enables the estimation of conditional quantile functions, each of which characterizes the behavior at a specific point in the conditional distribution, and thus provides a more comprehensive representation of the conditional distribution.In other words, examining quantile regression functions across the full range of τvalues provides a more comprehensive description of the relationship between X and Y. Given the varying distribution of the dependent variable, the results differ across different quantiles (McCord et al., 2020). For the random variable Y, the τ_{th} quantile is defined by the value of Y such that the probability of Y being less than or equal to that value is at most τ, and the probability of Y being greater than that value is also at most $\tau - 1$.Similarly, the τ_{th} quantile regression function, denoted by B(τ), is fitted to the data as a linear or quadratic function such that approximately a proportion τ of the observations fall below B(τ) and a proportion $\tau - 1$ fall above it.The estimate b(τ) of B(τ)is obtained by minimizing the weighted absolute values of the residuals, where positive residuals are assigned weights equal to τ, and negative residuals are also assigned weights equal to 1- τ. The basic quantile regression model can be expressed as follows.

$$y_i = x_i'\beta_\theta + u_{\theta i} \qquad \text{with} \qquad Quant_\theta\,(y_i|x_i) = x_i \tag{3}$$

In the above equation, x_i represents the vector of regressors. β_θ denotes the vector of parameters to be estimated, and $u_{\theta i}$ represents the vector of residuals. $Quant_\theta\,(y_i|x_i)$, which denotes the θ_{th} conditional quantile of y_i given x_i, is obtained by solving the following quantile regression problem.

$$\text{Min}\beta = \sum_i \theta|y_i - x_i\beta| + \sum_i (1-\theta)|y_i - x_i\beta| = \text{min}\beta \sum_i \rho\theta\, u_{\theta it}\ ,\ \theta\epsilon\ (0,1) \tag{4}$$

Where $\rho\theta$ is considered as a control function and is defined as follows, Equation (5) is solved using linear programming techniques.

$$\rho(\varepsilon) = \theta\varepsilon \text{ if } \varepsilon \geq 0 \quad (5)$$
$$(\theta - 1)\varepsilon \text{ if } \varepsilon < 0$$

By substituting u(τ)=0.5, the median regression—which is a special case of quantile regression—is obtained. Other parts of the conditional distribution can also be derived by varying u(τ) (McCord et al., 2020).

4 Findings and Results

The aim of this study examined the effect of sukuk on different levels of profitability in Islamic and conventional banks using the dynamic quantile panel regression method over the period 2003–2023, both during the 2008 financial crisis and in its absence. The study also seeks to explain the nature of their relationship in terms of whether the effect is complementary, substitutive, or competitive. The information and data related to the banks' variables were obtained from the banks' balance sheets, and the data on environmental variables (inflation rate, gross domestic product, sukuk, and the Lerner index) were sourced from the World Bank website. All data analyses were conducted using Stata 17 software.

The various dimensions of phenomena in statistics manifest themselves as random variables, and studying them becomes possible by determining their distributions. For this purpose, descriptive statistics of the model variables are first examined, with the results presented in Tables 2, 3, and 4.

Table 2
Descriptive Statistics of All Research Variables (All Banks)

Stats	Obs	roa	car	aq	logb	me	lr	gdp	infation	lerner	ln_sukuk
Mean	756	0.8363	10.4587	16.3114	4.9613	30.2319	73.8400	3.8103	11.8894	0.1912	-1.0614
SD	756	1.6120	14.8572	50.0212	1.4499	39.0207	82.2251	4.1289	12.0418	0.3231	2.6588
Max	756	14.0000	170.0000	611.2000	15.2800	357.4000	440.8100	26.17007	2.3100	0.6600	4.8000
Min	756	-11.2700	-90.2700	-0.1400	2.3100	-3.7200	0.0000	-8.8600	-4.8600	-0.5200	-5.5100
Skewness	756	0.7386	1.6833	5.1894	1.9415	2.5228	0.9898	0.5656	1.4324	-0.6105	-0.0327
Kurtosis	756	19.2684	27.1403	40.1128	12.0713	14.6534	3.5330	6.3202	4.9713	2.2639	2.1286

Source: Research Findings

Table3

Descriptive Statistics of Variables for Islamic Banks

Stats	obs	roa	car	aq	logb	me	lr	gdp	infation	lerner	ln_sukuk
Mean	252	1.6688	19.5995	13.6192	4.4251	56.8339	123.8326	4.5303	5.0361	0.3377	0.6401
SD	252	2.3745	19.9812	24.6004	0.8443	45.9613	72.9641	4.1264	6.3236	0.2399	1.6144
Max	252	14.0000	170.0000	99.9200	6.0000	357.4000	420.9500	26.1700	72.3100	0.6600	4.8000
Min	252	-11.2700	-90.2700	0.0200	2.3100	1.0000	0.7300	-8.8600	-4.8600	-0.4300	-3.5100
Skewness	252	-0.3948	0.7014	2.3011	-0.1964	2.6117	0.7708	0.7235	5.3097	-1.2427	0.3169
Kurtosis	252	12.0302	22.2391	7.0887	2.3227	12.8690	3.7486	7.9022	52.8092	4.2544	3.5083

Stats	obs	roa	car	aq	logb	me	lr	gdp	infation	lerner	ln_sukuk
Mean	504	0.4203	5.8881	17.6576	5.2293	16.9310	48.8437	3.4497	15.3162	0.1182	-1.9123
SD	504	0.7523	8.3253	58.7217	1.6072	26.4481	74.9227	4.0866	12.7436	0.3347	2.6714
Max	504	4.0600	41.2000	611.2000	15.2829	232.2581	440.8100	26.1702	72.3088	0.6552	4.8013
Min	504	-2.8000	-0.6662	-0.1418	2.4133	-3.7162	0.0008	-8.8553	-4.8633	-0.5200	-5.5073
Skewness	504	1.7302	1.2042	4.6751	1.8066	1.9077	1.5513	0.4980	0.9405	-0.3110	0.4276
Kurtosis	504	7.5355	3.9035	31.1963	10.4354	10.8919	5.0952	5.5721	3.3461	1.9291	2.2147

Source: Research Findings

Table4

Descriptive Statistics of Variables for Conventional Banks

Stats	obs	roa	car	aq	logb	me	lr	gdp	infation	lerner	ln_sukuk
Mean	252	1.6688	19.5995	13.6192	4.4251	56.8339	123.8326	4.5303	5.0361	0.3377	0.6401
SD	252	2.3745	19.9812	24.6004	0.8443	45.9613	72.9641	4.1264	6.3236	0.2399	1.6144
Max	252	14.0000	170.0000	99.9200	6.0000	357.4000	420.9500	26.1700	72.3100	0.6600	4.8000
Min	252	-11.2700	-90.2700	0.0200	2.3100	1.0000	0.7300	-8.8600	-4.8600	-0.4300	-3.5100
Skewness	252	-0.3948	0.7014	2.3011	-0.1964	2.6117	0.7708	0.7235	5.3097	-1.2427	0.3169
Kurtosis	252	12.0302	22.2391	7.0887	2.3227	12.8690	3.7486	7.9022	52.8092	4.2544	3.5083

Source: Research Findings

Based on the values in the above tables, none of the research variables are normal or symmetrical; therefore, the quantile regression method is useful when dealing with asymmetric distributions and various types of skewness. Although in our sample, conventional banks are fewer in number, the results of the above tables indicate that, considering the return on assets index of 1.66% for conventional banks and 0.42% for Islamic banks, on average, they are more profitable. On the other hand, Islamic banks in the examined sample are larger in size than conventional banks, but the capital adequacy ratio of conventional banks is approximately three times that of Islamic banks. Additionally, Islamic banks are riskier than their conventional counterparts because their risk-weighted assets account for 17.65% of their total assets, compared to 13.61% risk-weighted assets for conventional banks. Conventional banks, compared to Islamic banks, transfer their liquid assets significantly, and therefore bear higher liquidity risk. Their cost-to-income ratio is about 56.83%, which is significantly higher compared to 16.93% for Islamic banks.

At the same time, the results of the Shapiro-Wilk test for all three studied samples also support the rejection of the null hypothesis of normality, indicating asymmetric data distribution in all three samples (overall, Islamic banks, and conventional banks).Therefore, ordinary least squares regression is not suitable for examining the effect of explanatory variables on profitability, and given the high explanatory power of quantile regression in asymmetric distributions, using the quantile method is appropriate for this study.

Table 5
Results of Normality Test

Variable	**Statistic**		
	All Banks	Islamic Banks	Conventional Banks
roa	11.901***	11.085***	8.016***
car	11.940***	10.943***	9.383***
aq	14.061***	13.025***	10.213***
logb	10.026***	8.895***	3.204***
me	11.707***	11.034***	8.751***
lr	10.487***	11.072***	5.739***
gdp	8.050***	6.441***	6.715***
infation	10.514***	8.156***	9.652***
lerner	8.710***	6.926***	7.013***
ln_sukuk	7.795***	7.959***	3.475***

Note: *, **, *** indicate significance at the 1%, 5%, and 10% probability levels.
Source: Research Findings

To examine the stationarity of the variables, the Levin-Lin-Chu unit root test was used, and its results are presented in Table 6. According to the results of the table below, the null hypothesis of the stationarity test for the research variables is rejected, and the model variables are stationary.

Table 6
Resultsof Levin-Lin-Chu Unit Root Test

Variable	Statistic			degree of stationarity
	All Banks	Islamic Banks	Conventional Banks	
Car	-6.1550 (0.0000)	-3.5291 (0.0002)	-4.3227 (0.0000)	I (0)
infation	-4.7670 (0.0000)	-3.7785 (0.0001)	-2.9453 (0.0016)	I (0)
ln_sukuk	-13.3589 (0.0000)	-4.8087 (0.0000)	-2.9013 (0.0019)	I (0)
logb	-7.8338 (0.0000)	-7.3962 (0.0000)	-2.9493 (0.0016)	I (0)
lr	-3.6428 (0.0001)	-2.2721 (0.0115)	-1.7544 (0.0397)	I (0)
me	-3.0707 (0.0011)	-1.3851 (0.0830)	-2.8651 (0.0021)	I (0)
gdp	-10.9994 (0.0000)	-9.5380 (0.0000)	-4.2224 (0.0000)	I (0)
aq	-6.5268 (0.0000)	-7.2057 (0.0000)	-2.4686 (0.0068)	I (0)
lerner	-13.3589 (0.0000)	-13.1999 (0.0000)	-6.2843 (0.0000)	I (0)
roa	-9.2966 (0.0000)	-4.8006 (0.0000)	-7.7480 (0.0000)	I (0)

Source: Research Findings

As previously mentioned, this study examined the effect of sukuk on three levels of profitability—high, medium, and low—of the banks under study (Islamic, conventional, and the entire sample) using dynamic panel quantile regression, considering both the crisis effect and the non-crisis effect. Following that, the results from these estimations are presented separately in Tables 7 and 8.

Table7

Results of Quantile Regression Estimates Without Crisis Effect

Variable	High level of profitability			Moderate level of profitability			Low level of profitability		
	Conventional Banks	Islamic Banks	All Banks	Conventional Banks	Islamic Banks	All Banks	Conventional Banks	Islamic Banks	All Banks
Profitability of the previous period	***0.736 (0.000)	***0.820 (0.000)	***0.823 (0.000)	***0.862 (0.000)	***0.865 (0.000)	***0.868 (0.000)	***0.586 (0.000)	***0.583 (0.000)	***0.556 (0.000)
aq	***0.009- (0.000)	***0.000 (0.000)	***0.002- (0.000)	***0.006- (0.000)	***0.000- (0.000)	***0.000- (0.000)	***0.005 (0.000)	***0.001- (0.000)	***0.001- (0.000)
me	***0.001 (0.000)	***0.004 (0.000)	***0.008 (0.000)	***0.002- (0.000)	*0.000 (0.037)	***0.011- (0.000)	***0.021- (0.000)	***0.005- (0.000)	***0.012- (0.000)
lr	***0.003 (0.000)	***0.001 (0.000)	***0.004 (0.000)	***0.001 (0.000)	0.000- (0.970)	***0.001 (0.000)	***0.005 (0.000)	***0.000 (0.000)	***0.002 (0.000)
car	***0.036 (0.000)	***0.015 (0.000)	***0.0025 (0.000)	***0.002 (0.000)	***0.008 (0.000)	***0.006 (0.000)	***0.013 (0.000)	***0.021 (0.000)	***0.011 (0.000)
logb	***0.207- (0.000)	***0.001- (0.000)	**0.005- (0.004)	***0.054- (0.000)	***0.000- (0.001)	*0.001- (0.011)	***0.046- (0.000)	***0.000- (0.000)	*0.004- (0.072)
inflation	***0.018 (0.000)	***0.000 (0.000)	*0.008 (0.019)	0.003- (0.186)	0.000- (0.528)	-0.001 (0.106)	***0.023 (0.000)	***0.000 (0.000)	*0.001 (0.045)
gdp	***0.018 (0.000)	***0.001 (0.000)	*0.003 (0.696)	*0.014 (0.022)	**0.002 (0.005)	*0.001 (0.156)	***0.123 (0.000)	***0.001 (0.000)	*0.002 (0.049)
lerner	***2.952- (0.000)	***0.030- (0.000)	0.193 (0.506)	***0.620- (0.000)	***0.016- (0.003)	0.021- (0.236)	***0.778- (0.000)	***0.005- (0.000)	0.021 (0.603)
ln_sukuk	***-0.025 (0.000)	***0.002- (0.000)	*0.017- (0.019)	0.018 (0.077)	0.003 (0.373)	0.003 (0.152)	***0.126- (0.000)	***0.004- (0.000)	*0.011- (0.011)

Note: *, **,*** indicate significance at the 0.1%, 1%, and 5% probability levels.
Source: Research Findings.

- The profitability coefficient of the previous period is positive and significant for all banks across all profitability levels. In other words, the profitability of each period is also influenced by the profitability of the previous period. This result is consistent with the findings of Berger and Di Patti (2006), which show that bank profitability remains stable over time. This consistency may stem from the implementation of laws and regulations regarding bank capital ratios, market competition barriers, and sensitivity to external shocks (Mimouni et al., 2019).
- There is a consensus that bank profitability directly depends on the quality of assets on the balance sheet. This means that poor credit quality has a negative impact on bank profitability, and vice versa.The model estimation results also indicate that at all levels of profitability, the response of the profitability variable to asset quality is negative—except for conventional banks with low profitability levels and Islamic banks with high profitability. Undoubtedly, the reason is the increase in non-performing assets, which leads to unrealized income and requires allocating a significant portion of the profit margin to cover expected credit losses.

- Management efficiency (cost-to-income ratio) is one of the most important factors distinguishing banks in terms of performance. Obviously, the lower this ratio is, the more efficiently the bank has operated in terms of costs. According to the estimation results, at low and medium levels of profitability, a negative effect of efficiency has been confirmed, which is consistent with the study by Badulescu and Petria (2013) and Capraru and Ihnatov (2014).
- Liquidity risk, which results from a bank's inability to repay or reduce its liabilities or to obtain resources for increasing its assets, is one of the key factors affecting the profitability of banks. According to the results, at all levels of profitability and in all banks—except Islamic banks with moderate profitability levels, where the impact is negligible—a positive and significant effect of liquidity risk on profitability is observed. This finding is consistent with the study by Badulescu and Petria (2013).
- The capital adequacy ratio of banks is recognized as a protective factor for banks against all financial and non-financial risks, unexpected losses, and also as a safeguard for depositors and creditors. According to the obtained results, this ratio has had a positive and significant impact on profitability at all levels of profitability and for all banks—Islamic, conventional, and the overall sample—which confirms the findings of Badulescu and Petria (2013) and Capraru and Ihnatov (2014).
- Another structural variable affecting bank profitability is bank size. The relationship between bank size and profitability lies in the fact that larger banks, compared to smaller ones, are in a better position due to having more opportunities, and therefore, they tend to be more profitable. However, various studies have reported this effect differently. The results indicate that at all levels of profitability, the impact is negative, which is consistent with the studies by Mimouni et al. (2019), Jalalzadeh Azar et al., (2020), and Porohan (2016).
- Various studies show differing results regarding the relationship between profitability and inflation. If the expected inflation rate is higher than the increase in loan interest rates, the bank’s profit increases. On the other hand, if inflation is unanticipated, it may lead to increased financial costs and negatively impact the bank’s profitability. In the conducted estimation, the inflation rate has had a positive and significant effect on banks with low and high levels of profitability, which is consistent with the findings of Porohan (2016) and Najafi Shariatzadeh et al. (2016). However, for the overall sample of banks with a moderate level of profitability, the effect is not significant.

- According to studies examining the relationship between economic growth and the profitability of financial sectors, gross domestic product (GDP) growth—as a standard measure of economic expansion—has a positive effect on bank profitability. The estimation results of the present study also reveal a positive and statistically significant impact of this variable across all levels of profitability. These findings are consistent with the results reported by Ali et al. (2011) and Porohan (2016).
- The Lerner Index is negative for both conventional and Islamic banks, while it is statistically insignificant for the overall sample. This finding supports the "quiet life hypothesis," which suggests that larger banks facing less competition tend to focus on efficiency and risk reduction rather than profit maximization.
- Consistent with the study by Mimouni et al. (2019), the coefficient of Sukuk issuance is negative at both low and high profitability levels, regardless of whether banks are Islamic or conventional, and also in the overall sample. This suggests that Sukuk issuance may deprive the banking system of market share, consequently reducing the income banks earn from financial intermediation. This finding aligns with the results of Smaoui and Khawaja (2017), who indicate that Sukuk markets and the banking system act as substitutes for each other. According to this perspective, countries with dominant banking sectors tend to limit the role and activity of the Sukuk market. The findings of this study confirm the substitution effect and demonstrate that Sukuk issuance has an adverse impact on bank profitability. However, at moderate levels of profitability, Sukuk has no significant effect on the profitability of any type of bank—Islamic, conventional, or in the overall sample. Specifically, Islamic banks compete with Sukuk to attract investors and borrowers who seek Sharia-compliant financial instruments. As a result, when firms seek financing under Islamic principles, they may turn either to Islamic banks or to Sukuk-issuing companies. Similarly, investors who wish to invest in compliance with Islamic law may choose among various Islamic banks, financial products, or Sukuk instruments. In this sense, Sukuk directly competes with Islamic banks. This increased competition can push Islamic banks to the margins. Furthermore, it may potentially affect the quality of loan-based securities in Islamic banks, as they risk losing their creditworthy clients to the Sukuk market. Consequently, this loss negatively impacts the profitability of Islamic banks.

The Impacts of the 2008 Financial Crisis

This section examines the effect of the 2008 financial crisis on the profitability of the banks under study. The global financial crisis had several adverse effects on the conventional banking industry. Despite the immense pressure on banking institutions, Islamic banks were able to withstand the negative consequences of the crisis and remained relatively stable during periods of economic turbulence (Hasan & Dridi, 2010). To assess the impact of the crisis on the performance of Islamic banks, conventional banks, and the overall sample, a dummy variable was constructed. This variable was created by interacting it with the Sukuk variable, taking the value of 1 for the year 2008 and 0 for all other years. The estimation results are presented in Table 8.

Table 8

Quantile Regression Estimation Results with Crisis Effect

	High level of profitability			**Moderate level of profitability**			**Low level of profitability**		
Variable	Conventional Banks	Islamic Banks	All Banks	Conventional Banks	Islamic Banks	All Banks	Conventional Banks	Islamic Banks	All Banks
Profitability of the previous period	***0.555 (0.000)	***0.813 (0.000)	***0.798 (0.000)	***0.842 (0.000)	***0.862 (0.000)	***0.876 (0.000)	***0.627 (0.000)	***0.587 (0.000)	***0.562 (0.000)
aq	***0.011 (0.000)	***0.000 (0.000)	***0.003 (0.000)	***-0.004 (0.000)	***0.000 (0.018)	***0.000 (0.050)	***-0.004 (0.000)	***-0.001 (0.000)	***-0.001 (0.000)
me	***-0.002 (0.000)	***0.004 (0.000)	***0.009 (0.000)	***-0.001 (0.000)	***0.000 (0.000)	***-0.001 (0.000)	***-0.016 (0.000)	***-0.005 (0.000)	*** -0.012 (0.000)
lr	***0.004 (0.000)	***0.001 (0.000)	***0.003 (0.000)	***0.001 (0.000)	0.000 (0.070)	**0.000 (0.003)	***0.003 (0.000)	***0.000 (0.000)	***0.002 (0.000)
car	***0.024 (0.000)	***0.017 (0.000)	***0.0024 (0.000)	***0.004 (0.000)	***0.012 (0.000)	***0.005 (0.000)	***-0.008 (0.000)	***0.020 (0.000)	***0.011 (0.000)
logb	***-0.107 (0.000)	***-0.001 (0.000)	*-0.003 (0.048)	**-0.026 (0.004)	*-0.001 (0.043)	*-0.003 (0.021)	***0.021 (0.000)	***-0.001 (0.000)	***0.000 (0.000)
inflation	***-0.005 (0.000)	***-0.001 (0.000)	*-0.002 (0.007)	*0.000 (0.092)	*-0.001 (0.031)	***-0.002 (0.000)	***-0.014 (0.000)	***0.000 (0.000)	***0.000 (0.000)
gdp	***0.048 (0.000)	***0.000 (0.008)	**0.003 (0.013)	***0.014 (0.000)	**0.000 (0.005)	**0.001 (0.009)	***0.023 (0.000)	***0.001 (0.000)	***0.005 (0.000)
lerner	***-3.402 (0.000)	***-0.030 (0.000)	*-0.049 (0.081)	***-0.409 (0.000)	*-0.042 (0.069)	**-0.081 (0.006)	***-0.122 (0.000)	***-0.005 (0.000)	***-0.86 (0.000)
ln_sukuk	***0.018 (0.000)	***-0.004 (0.000)	***0.002 (0.049)	***0.057 (0.000)	***-0.005 (0.0099)	***0.012 (0.000)	***0.138 (0.000)	***-0.003 (0.000)	***0.004 (0.000)
Sukuk*crisis	***0.125 (0.000)	***-0.008 (0.001)	***-0.0018 (0.083)	***0.292 (0.000)	***-0.004 (0.078)	***-0.023 (0.000)	***0.575 (0.000)	***-0.001 (0.000)	***-0.002 (0.000)

Note: *, **, *** indicate significance at the 0.1%, 1%, and 5% probability levels.
Source: Research Findings.

The last row of Table 8 includes controls for the impact of the 2008 global financial crisis. The coefficient of the crisis variable for conventional banks is positive across all levels of profitability. This result confirms that following the 2008 crisis, Sukuk gained greater popularity due to improved borrower screening and risk management, thereby supporting its complementary effect on conventional banks. In contrast, during the crisis, the impact on Islamic banks and the overall sample remains negative across all profitability levels, similar to the pre-crisis scenario. This continues to support the substitution effect, indicating that Sukuk issuance competes with Islamic banks even under crisis conditions.

Islamic financing (Sukuk) has a positive and statistically significant impact on the profitability of conventional banks and the overall sample across all three profitability levels. It is expected that Sukuk issuance enables conventional banks to channel their excess liquidity into government-backed securities, thereby enhancing profitability through higher returns. These findings suggest that Sukuk acts as a complement to the banking system and are consistent with the results of Song and Thakor (2010). However, similar to the non-crisis scenario, Sukuk continues to have a negative impact on the profitability of Islamic banks across all three levels of profitability, supporting the substitution effect in times of crisis. On the other hand, the negative impact of Sukuk on Islamic banks is less pronounced at higher levels of profitability under crisis conditions. This can be attributed to significant post-crisis reforms and innovations within the banking system, which aimed to improve competitiveness and increase market share. In other words, Islamic banks appear increasingly capable of adapting to the rapid growth of the Sukuk market and overcoming the competitive pressures posed by it.

The table results indicate that the capital adequacy ratio for conventional banks with low profitability levels is negative, which reflects their inability to cover potential risks and poor capital management for banks at this profitability level. However, at medium and high profitability levels, and for all the banks studied (including Islamic, conventional, and the overall sample), the ratio is positive and significant. Capital is one of the main factors in assessing the health and financial strength of banks. In fact, the amount of capital held by each bank is considered as a buffer against losses arising from various operational risks. Therefore, increasing the capital amount can lead to higher profitability.

The effect of the asset quality variable on the return on assets for all three categories of banks studied is negative at low and medium profitability

levels, indicating poor credit quality in these banks. In other words, due to an increase in non-performing assets, which leads to unrealized income and requires allocating a significant portion of profit margins to cover expected credit losses, profitability decreases. However, the coefficient of this variable is positive and significant at high profitability levels. To explain this, it can be noted that the higher the bank's capital-to-asset ratio, resulting in lower capital risk and greater public trust in the bank, the higher the bank's profitability will be. Therefore, asset quality in banks is directly related to their financial performance.

Liquidity risk is positive and significant at all profitability levels for all three bank samples studied, except for Islamic banks with medium profitability levels where it is not significant. The reason for this positive relationship can be explained by the fact that the more the investment, the greater the resulting profit.

The inflation rate variable, except for Islamic banks and the overall sample at low profitability levels, is significant at other levels and has the expected negative coefficient, indicating an increase in unexpected inflation rates.

The coefficient of the cost-to-income ratio (management efficiency) is negative and significant at low and medium profitability levels across all three samples studied, but it is positive at high profitability levels. Since a lower value of this ratio indicates that a financial institution has better operational efficiency compared to those with a higher cost-to-income ratio, Islamic banks are more efficient compared to conventional banks. In other words, good management can generate higher income with lower overall costs.

During times of crisis, the coefficient of profitability from the previous period is positive and significant for all banks across all profitability levels, indicating that the profitability of each period is influenced by the profitability of the preceding period.

Interestingly, the estimated coefficient for the Lerner variable is negative at all levels and its effect on the profitability of banks is significant. According to this coefficient, there is a negative relationship between market power and the profitability of Islamic banks, conventional banks, and the overall bank sample. In other words, the greater a bank's market power, the less attention it pays to sukuk.

The coefficient of bank size is negative at all levels except for the low profitability level and for conventional banks and the overall sample. Based on this, as the role of banks with medium and high profitability in the

economy increases, the use of sukuk decreases. Therefore, it can be said that the banking sector and sukuk are interchangeable.

Ultimately, the GDP growth rate coefficient is positive and significant for the entire sample as well as for the sub-samples of Islamic and conventional banks. Accordingly, the higher the GDP growth rate in a country, the greater the profitability of banks. In other words, economic prosperity, through improved management practices, leads to reduced banking costs and lower default risks.

5Conclusion and Recommendations

The present study examines the effect of Sukuk on the profitability of Islamic banks compared to conventional banks and investigates whether the impact of Sukuk on banks' profitability differs significantly during a crisis and in the absence of a crisis.Accordingly, using a panel dataset of 12 conventional banks and 24 Islamic banks across 10 member countries of the Organization of Islamic Cooperation during the period from 2003 to 2023, the study employs dynamic panel quantile regression. The results indicate that in non-crisis conditions, except for banks with medium profitability levels (regardless of whether the bank is Islamic or conventional, and even for the overall sample), the impact on the profitability of all three bank samples at low and high quantiles is negative, confirming the substitution effect between the banking system and the volume of issued Sukuk.However, this should not be interpreted as a negative issue, because if this leads to the strengthening of the capital market relative to the banking system, it will benefit the countries' economies and reduce their over-reliance on the banking system. During a crisis, however, increased issuance of Sukuk positively affects the profitability of the overall sample of banks at all profitability levels, indicating that Sukuk and the banking system complement each other. When examining whether the bank is conventional or Islamic, some important discrepancies are observed. Although Sukuk has an adverse impact on the performance of Islamic banks at all profitability levels, this effect is less pronounced at the higher profitability levels of Islamic banks compared to non-crisis conditions, indicating that highly profitable Islamic banks are capable of competing with Sukuk as they have implemented all necessary reforms after the crisis. Conversely, Sukuk has a positive effect on conventional banks at all profitability levels.Since the findings of this study are of particular importance to financial policymakers, they should consider that, given Sukuk competes with bank loans, it reduces the profitability of Islamic banks. Therefore, policymakers should seek to

develop strategies to stimulate the growth of the Sukuk market while simultaneously mitigating the negative impact of disintermediation caused by Sukuk development on Islamic banks.

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