sciendo

Zagreb International Review of Economics & Business, Vol. 28, No. 2, pp. 7-22, 2025

Faculty of Economics and Business, University of Zagreb and Sciendo. Printed in Croatia.
ISSN 1331-5609; UDC: 33+65
DOI: 10.2478/zireb-2025-0013

Regulatory Capital Adequacy Ratio is an Elixir For Efficiency in Islamic Banks

Amina Malik [*]
Bilal Latif [**]
Babar Zaheer Butt [***+]

Abstract: *This study assesses the impact of regulatory capital on the efficiency of Islamic and commercial banks with Islamic windows listed on the Pakistan stock exchange for the period from 2010 to 2019. More specifically, the influence of the Basel accord capital adequacy requirement has been assessed on the earnings of the bank by using the proxy of net interest margin along with control variables, including bank policy rate, credit growth, the fee charged by the banks, and non-performing loans. Data has been retrieved from the State Bank of Pakistan reports. Panel regression has been deployed, and based on the Hausman test, the fixed effect model was selected, and its results have been retained. Results reveal that the overall implementation of the Basel accord capital regulatory requirement in the shape of the capital adequacy ratio is an elixir that increases efficiency in the form of interest margin in Pakistani Islamic banks. Moreover, it reveals that well-capitalized Islamic banks are efficient. This study offers practical insights for regulators in tailoring capital adequacy regulations to the unique framework of Islamic banking. It also lays the groundwork for future research into additional efficiency drivers, such as governance mechanisms, digital transformation, and market dynamics.*

Keywords: Capital adequacy ratio; efficiency; net interest margin

JEL Classification: G1, G11, G17

[*] PhD Scholar, National Defence University, Islamabad, Pakistan.
[**] National Defence University, Islamabad, Pakistan.
[***] Tohoku University of Community Service and Science, Sakata, Yamagata, Japan.
[+] Corresponding Author E-Mail: babarzb@gmail.com

Introduction

The significance of regulatory capital plays a central role in global financial discourse, especially in the wake of the 2008 global financial crisis (GFC). As crises uncovered structural weaknesses in the global banking system, they highlighted the need for stable as well as robust banking regulations to handle unexpected financial and economic problems (Abbas, Ali, & Rubbaniy, 2021).The significance of regulatory capital has emerged as a fundamental pillar of financial stability after the global financial crisis. In response, international standards like the Basel Accords were developed and implemented to raise capital buffers, improve sensitivity of risk, and safeguard banks during periods of stress. More specifically, the significance of regulatory capital, particularly in the banking sector, has become a cornerstone of financial stability, especially in the aftermath of global financial crises. In this context, the Capital Adequacy Ratio (CAR) serves as a key indicator of a bank's ability to absorb losses and maintain solvency during periods of financial turmoil (Supervision, 2011). Thus, maintaining the regulatory capital ratio mirrors a bank's capacity to handle difficult periods. Furthermore, it is closely tied to the bank's resilience in facing financial stress (Purwasih & Wibowo, 2021), thereby directly impacting its profitability.

The Global Financial Crisis (GFC) of 2008 served as a key transition point in global banking regulation by exposing the vulnerabilities and triggering a wave of reforms. Thus, in its aftermath, the Basel frameworks were introduced to strengthen capital foundations, improve risk sensitivity, and reduce systemic risk (Banks, 2010; Butt et al., 2022). Moreover, the capital adequacy ratio for banks is a pivotal and central component of prudential regulation, as the banking public cannot fully safeguard itself due to imperfect information as well as agency problems. Hence, capital adequacy is built to ensure the soundness of the banks and maintain public confidence, stability, and growth of banks (Torbira & Zaagha, 2016). In the aftermath of the global financial crisis, the Basel Accords were formulated to strengthen the capital framework (Hafez, 2018). A growing body of research examined how strengthened capital regulation affects banking performance as well as stability (Brei & Gambacorta, 2016; Ozili, 2019).

Banks' financial performance, especially in the context of capital adequacy and efficiency, is deeply rooted in classical financial theories, which explain how capital and profit dynamics influence firm efficiency. In this regard, the earnings theory of capitalization offers critical insight into the association of the variables under study. More specifically, considering the lens of Islamic banking, this theory explains how capital adequacy may affect financial efficiency, particularly net interest margin. The earnings theory of capitalization posits that the true value of an enterprise is fundamentally determined by its earning capacity. In light of this viewpoint, firm capitalization may show the present value of its expected earnings, which are grounded in empirical comparison with industry norms (Webb, 2000). In the Islamic

banking context, this theory holds significant relevance, as Islamic banks focus on profit-and-loss sharing, their capital structure must also be closely aligned with the income-generating potential in Islamic banks, which highlights the critical need for efficient capital allocation. Thus, the earnings theory of capitalization reinforces the expectation that proper capitalization will help in improving financial performance and stability, which may lead to a stronger net interest margin. Further, the earning theory of capitalization mentions that the factual value of capitalization is dependent on the earning capacity of the company. Therefore, the capitalization of a company is based on the actual value of its earnings (Torbira & Zaagha, 2016).

Capital plays a vital role in creating a buffer against unexpected losses (Karim, Hassan, Hassan, & Mohamad, 2014).In this regard, new insights into Islamic banks have brought attention to the critical role of capital adequacy in promoting economic stability as well as growth by increasing resilience. As higher capital buffers help in mitigating the risks and fostering more sustainable lending practices, which in turn, support improvements in gross domestic product. Further, capital ratios also promote growth even when loan expansion is restrained in Islamic and conventional banks within muslim countries (Ghroubi, 2025; Stewart, Chowdhury, & Arjoon, 2021). Thus, these findings reveal that regulatory capital has a stabilizing effect on credit markets and its subsequent impact on GDP growth. In response to global regulatory evolution, Pakistan has also gradually implemented Basel standards, starting with Basel I in 1997 and culminating in the phased rollout of Basel III between 2013 and 2019. In this regard, the State Bank of Pakistan (SBP) has made significant efforts to tailor these regulations ("Basel Accord and Implementation," 2013).

Despite the enforcement of stringent capital adequacy requirements, limited empirical evidence focused on how CAR affects efficiency in Pakistan's Islamic banking context. Earlier studies in Pakistan have mostly focused on the impact of capital adequacy requirements and liquidity (Rafique, Toor, & Bashir, 2020), the performance of credit (Shrestha & Niraula, 2021), financial steadiness (Waqas & Bahrain, 2019) and factors influencing the performance of banks (Gul, Irshad, & Zaman, 2011). However, these findings raise a key question of whether these capital foundations also influence efficiency, particularly in terms of increasing net interest margins (NIM), a critical measure of profitability in the banking sector. While the existing literature underscores the importance of capital in stabilizing banks and promoting growth, its direct impact on NIM and operational efficiency remains an area for further exploration. Thus, based on studying the literature, this study makes a novel contribution by extending the existing literature through its focused analysis of capital adequacy regulations impact on efficiency within the context of Pakistan's Islamic banking sector.

This study addresses this gap by evaluating whether capital adequacy acts as an elixir of efficiency in Islamic banks and conventional banks with Islamic windows in Pakistan. Specifically, it investigates the relationship between CAR and NIM from 2010 to 2019 by utilizing panel data and controlling macro-financial variables,

including policy rate, credit growth, non-performing loans, and fee-based income. By focusing on a unique segment of Pakistan's banking sector, the study offers practical insights for regulators aiming to design more effective capital frameworks.

The remainder of the research study is structured as follows. Section 2 embarks upon the literature review. Section 3 includes data, estimation methodology, specification of the model, and variable construction. In section 4, empirical results are discussed. Finally, Section 5 wraps up with a conclusion outlining policy implications and avenues for future research.

Literature Review

The significance of capital adequacy ratios (CAR) in banking has been a subject of global concern, especially after the implementation of international regulatory frameworks, i.e., Basel Accords, designed to ensure that banks maintain adequate capital buffers to absorb financial stresses as well as reduce the likelihood of bank failure. Most of the earlier research has focused on conventional banks. Whereas the rise of Islamic banking has necessitated further investigation as to how capital requirements affect banks operating under a profit-and-loss sharing model. This literature review first highlights key global studies that have explored the relationship between capital adequacy and bank performance, particularly in the pre- and post-Basel III era. Following this, the focus has been shifted to emerging markets like Pakistan, where the unique regulatory framework provides valuable insights into the effectiveness of international capital adequacy standards, especially in Islamic banks.

Global Perspectives on Capital Adequacy and Bank Performance

The capital adequacy ratio (CAR) is the cornerstone of global banking regulations, especially after the adoption of the Basel Accords. Earlier research has revealed that well-capitalized banks are better in terms of their efficiency as compared to less capitalized banks (Kwan & Eisenbeis, 1997). Moreover, the same is also supported and witnessed by (Pasiouras, Tanna, & Zopounidis, 2009). In this regard, Aiyar, Calomiris, and Wieladek (2014) also revealed that higher capital buffers increase a bank's resilience to financial crises and also constrain lending capacity, especially in periods of economic stress. Altunbas, Gambacorta, and Marqués-Ibáñez (2014), who examined the connection between capital regulation and bank risk-taking tendencies in the scope of the Basel III framework, also showed that stronger capital requirements improve bank stability. To mitigate credit risks, the capital adequacy ratio plays an important role as a breaker for stakeholders and regulators. Further, the implementation of requirements helps in compliance with governance standards (El-Ansary &

Hafez, 2015). So, adequate capital helps financial institutions in discharging their duties efficiently and protects against the risk of bankruptcy and failure. Further, capital adequacy also serves as a defense shield against shocks and increases the probability of better earnings in terms of profitability.Abbas, Butt, Masood, and Javaria (2019) studied the influence of capital, equity and tier buffer on profitability as well as risk and found different results in different periods. The study of Eurozone countries also found that regulations have a positive link with the bank's profitability. Moreover, Osei-Assibey and Asenso (2015a) also found a positive linkage between capital and profitability in the commercial banks of Ghana. Additionally, Cruz-García and Fernandez de Guevara (2020) also indicated that stringent capital also increased net interest margin in OECD countries. Thus, CAR enhances financial stability, profitability and operational efficiency.

Global Perspectives on Capital Adequacy and Bank Performance in Islamic Banks

Islamic banks are also impacted by capital adequacy requirements, particularly under the Basel Accords framework. Al-Hares and Saleem (2017) explored the influence of Basel III on the financial performance of Islamic banks in the GCC region, which revealed that Islamic banks demonstrated resilience, stricter capital requirements under Basel III, and have resulted in mixed effects on profitability. Octrina and Mariam (2021) found that capital adequacy ratio, bad loans, finance to deposit ratio, and bank size impact the efficiency of Islamic banks. In this regard, recent research in the Islamic microfinance of Indonesian banks has also revealed that capital adequacy has a positive effect on performance (Akbar, 2021). Whereas, a study on the CAR determinants and their impact on bank efficiency in MENA's Islamic and conventional banks concluded that high capital levels are mostly linked with improved operational efficiency, though institutional and regulatory differences affect this outcome (El-ghonemey, 2023). Moreover, the study on the association between capital regulation, banking lending, and economic growth in a dual market revealed that higher loan growth contributes to economic expansion in the case of Islamic banks (Ghroubi, 2025). Tran and Nguyen (2025) studied the consequences of capital buffers on risk-taking behavior, with moderating effects of Basel II capital regulations and shadow banking activities in the Vietnamese banks. The study revealed a U-shaped nonlinear relationship, as moderate capital buffers reduce risk-taking, whereas high buffers may lead to riskier behavior. Moreover, Basel II regulations intensify the downward pressure of capital buffers on risk exposure, encourage prudence. Thus, capital adequacy in Islamic banks works as a dynamic yet multifaceted factor that influences risk-taking behavior, performance, and efficiency, especially in the post-Basel setting. Moderate capital buffers usually enhance operational efficiency and reduce risk, whereas excessively high buffers may limit profitability or even increase risk-taking.

Capital Adequacy and Bank Efficiency in an Emerging Context

Previous studies' insights have revealed that the capital adequacy ratio improves the efficiency of the banks in emerging markets. According to Torbira and Zaagha (2016), demonstrated in their study on the effect of capital adequacy indicators on financial performance that notable long term connection between indicators of capital adequacy and performance measures such as net profit margin (NPM), earnings per share (EPS), and return on assets (ROA). The study revealed that a higher capital base, denoted by the ratio of shareholders' funds to total assets, positively impacted the profitability of banks in Nigeria, which enhanced their ability to absorb shocks and improve efficiency. In Pakistan, Bashir and Hassan (2017) explored the association among Basel capital regulations, risk, and efficiency of commercial banks from 1997 to 2015. The study revealed that capital regulation helps reduce bank risk but also has a negative impact on bank efficiency. Moreover, the impact also varied across the Basel accords, as Basel II proved more effective than Basel I in mitigating risk. Similarly, Haris, Tan, Malik, and Ain (2020) investigated the association between capitalization and profitability of Pakistani banks during 2007–2018 and found that increased capitalization enhances profitability up to a certain threshold. Drawing on these empirical insights, the hypothesis below is proposed that the capital adequacy requirement has a affirmative association with the bank earnings in terms of net interest margin.

H1: *There is a significant relationship between Capital Adequacy Ratio (CAR) and Net Interest Margin (NIM), suggesting that capital strength may influence the operational efficiency of Islamic banks.*

Data and Research Methodology

The sample includes twenty-seven Islamic banks, including stand-alone branches from the year 2010 to 2019, listed on the stock exchange of Pakistan, formally known as the Karachi Stock Exchange. The aggregate data has been collected from the source. The aggregate data pertaining to the bank has been retrieved from an analysis of financial statements published by the State Bank of Pakistan on a yearly basis. Capital adequacy ratios data have been taken from annual reports of banks. Data on bank policy rates has been taken from the country's economic website.

Panel regression has been used to ascertain the association between capital adequacy and profitability along with control variables. Further, the macroeconomic variable bank policy rate has also been modeled to assess its impact on efficiency. Panel regression has been employed to tackle the endogeneity issue in explanatory variables as well as the cross-sectional nature of the data (Latif, Voordeckers, & Lambrechts, 2024). We have deployed panel regression, fixed and random, to ascertain the

relationship among variables. More specifically, (Osei-Assibey & Asenso, 2015a) The OLS regression model has been customized to assess the relationship among the variables.

To study the influence of regulatory capital on efficiency in Islamic banks, we propose a dynamic net interest margin model based on the study of (Osei-Assibey & Asenso, 2015b), to test the hypothesis:

$$NIM_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 BPR_{it} + \beta_3 CR_{it} + \beta_4 FEES_{it} + \beta_5 NPL_{it} + \varepsilon_{it} \quad (1)$$

Regulatory capital (CAR_{it})

Based on the above equation, the association of regulatory capital with efficiency has been worked out by using the net interest margin of the bank at time t ($NIM_{it)}$ along with control variables. It has been taken as an endogenous variable and is named interest rate spread. It is the difference between income from interest and expenditure to total earning assets. It has been used as an efficiency indicator as it is widely used due to its simplicity and easy availability of data. Earlier studies have shown a positive linkage between the adequacy of capital and profitability (Kwan & Eisenbeis, 1997; Osei-Assibey & Asenso, 2015b). The higher regulatory capital might give rise to the equity funds cost, which also gives rise to the lending rates and has a affirmative impact on profitability. Therefore, we expect a positive relationship between regulatory capital and earnings in terms of net interest margin.

Credit allocation (CR_{it})

Credit allocation is the level of bank gross advances in year t. The risk profile of the banks is portrayed through outstanding advances (Osei-Assibey & Asenso, 2015b; Taktak, Zouari, & Boudriga, 2010). Further, when the banks have a higher tendency to extend loans, it positively impacts the profitability of the banks in the form of net interest margin. Therefore, we expect a positive relationship between NIM_{it} and CAR_{it}.

Bank-specific control variables

Fee and bad loans in the shape of non-performing loans have been included in the model as bank-specific control variables, whose details are as under:

$$FEE_{it}$$

Fee and commissions charged by the bank for rendering their services to the customers have also been taken as a bank-specific variable to study their impact on net interest margin (Osei-Assibey & Asenso, 2015b). It includes the non-markup income

of the bank i in year t. Further, we expect a positive linkage between fees collected by the bank and the net interest margin.

Non-performing loans (NPL_{it})

Based on the model, NPL_{it} is obtained through the ratio of non-performing loans to total gross advances of the bank i in the year t. Further, the risk profile of the banks is depicted through total outstanding loans (Osei-Assibey & Asenso, 2015b; Taktak et al., 2010). It portrays the risk exposure of the banks. The study conducted in Turkish banks revealed that non-performing loans decrease the net interest margin (Yuksel & Zengin, 2017). In line with the existing research, the research conducted in twenty-four Indonesian banks also found a negative association between the capital adequacy ratio and non-performing loans (Swandewi & Purnawati, 2021). Therefore, we expect a negative relationship between non-performing loans and net interest margin, as high non-performing loans reduce net interest margin.

Controlling for macroeconomic variables

We have also regressed an important macroeconomic variable, i.e., bank policy rate (BPR) on net interest margin (NIM). The details are as under:

$$BPR_{it}$$

The bank policy rate is utilized by the central banks at the time of extending loans, as it has implications for the earnings of the banks. As per the findings of the earlier research, we expect a positive linkage between the bank policy rate and net interest margin. It is also witnessed by earlier studies, which also show that the bank policy rate gives rise to the net interest margin (Busch & Memmel, 2015; Osei-Assibey & Asenso, 2015a).

Results and discussion

Descriptive Statistics

Table 1 presents descriptive statistics of all the variables used in the net interest margin model of Pakistani Islamic banks and standalone branches of Islamic banks. The net interest margin (NIM) is 0.03%, the minimum is zero percent, and the maximum is 0.08%, whereas the standard deviation is 0.01%, which represents that there is significant variation in the earnings. The mean of CAR is 14.5%, which is almost one-third of banks with a minimum of 0% and a maximum of 39.70%, which shows that

banks are well-capitalized in Pakistan. The CAR standard deviation of 4.5% shows that there is quite a difference in terms of capital adequacy.

Table 1: Descriptive statistics

Variables	Obs	Mean	S. D.	Min	Max
NIM	214	0.03	0.01	0.00	0.08
CAR	214	14.50	4.50	0.00	39.70
BPR	214	10.88	4.02	5.88	20.25
CR	214	233.00	234.00	38.00	1150.00
FEE	214	6.69	7.76	-0.66	36.25
NPL	214	0.11	0.08	0.00	0.52

Source: The Authors

All values are in percentages except CR and Fee.

The mean of BPR is 10.88%, the minimum of 5.88 %, and maximum of 20.25%, and the standard deviation of 4.02%. The mean ratio of CR is 233M with a minimum of 38 M and a maximum of 1150 M, which represents the risk behavior of banks in terms of advances being extended. The standard deviation of CR is 234M, which shows the differences in gross advances extended by Islamic banks. The mean of FEE is 6.69M, and the standard deviation is 7.76 M, with a minimum of -0.66 M and a maximum of 36.25 M. The mean of NPL is 0.11%, and the standard deviation is 0.08% with a minimum of zero percent and a maximum of 0.52%, which shows better performance of banks in terms of their lower bad loans.

Correlation Matrix

Table 2 portrays a pairwise relationship among all the variables, including NIM, BPR, CAR, CR, FEES, and NPL in Pakistani Islamic banks as well as conventional banks with Islamic windows listed on the stock exchange of Pakistan for the period from 2010 to 2019.

Table 2: Correlation Matrix

Corr	NIM	CAR	BPR	CR	FEE	NPL
NIM	1	0.3449	0.0848	0.0751	0.1295	(0.2968)
CAR	0.3449	1	(0.1321)	0.1534	0.1821	(0.3677)
BPR	0.0848	(0.1321)	1	(0.2058)	(0.1096)	0.2374
CR	0.0751	0.1534	(0.2058)	1	0.9025	(0.1329)
FEE	0.1295	0.1821	(0.1096)	0.9025	1	(0.0338)
NPL	(0.2968)	(0.3677)	0.2374	(0.1329)	(0.0338)	1

***Statistical significance at the 1% level, **Statistical significance at the 5% level, *Statistical significance at the 10% level. Correlation tables show p-values. Further, negative values are shown in parentheses.

The results reveal that regression does not have any serious issue of multicollinearity. CAR has a positive association with NIM, which shows that regulatory imposition of capital adequacy augments the efficiency of Islamic banks, which is also in accordance with our testable statement. Further, CR, FEE, and BPR also have a positive relationship with NIM. Whereas NPL has a negative association with NIM.

Table 3 presents the estimation results of the net interest margin model. The panel regression estimation technique has been used to study the association among variables. Further, this technique has been employed to handle probable endogeneity problems in data. The results of the equation are specified below: -

Table 3: Capital adequacy and Net efficiency

Variables	Sign	Fixed Effect
Constant		0.0368 **(0.0000)***
CAR	+/-	0.0004 **(0.0025)***
BPR	+/-	0.0002 **(0.0924)**
CR	+	0.0000 **(0.0000)***
FEES	+/-	0.0000 **(0.0033)**
NPL	+/-	-0.0507 **(0.0000)***
Adj R-square		0.7853
F-statistic		30.9618
Hausman Test $\chi 2$	5 (0.0008)	

Source: The Authors.

Table 3 shows that the impact on net interest margin has been taken as an endogenous variable in Islamic banks of the Pakistani emerging economy. Whereas exogenous variables include capital adequacy ratio (CAR), bank policy rate (BPR), gross advances (CR), bank fees (FEE) and non-performing loans (NPL). ***, ** and * statistical significance indicate the significance level of 1%, 5% and 10% respectively. Whereas fixed effect results are portrayed in Column 3.

To analyze the impact of regulatory capital on efficiency, both fixed and random effects were considered. The fixed effect has been adopted from the study of (Latif, Voordeckers, Lambrechts, & Hendriks, 2020). Additionally, the Hausman test has been employed to retain the results from fixed and random effect options. The findings indicated a significant p-value (χ^2=5, p-value = (0.0008)), supporting the choice of the fixed effect model. Whereas the results of OLS and random effects are presented in Table 4.

The net interest margin model results reveal that regulatory capital requirements for Islamic banks in terms of capital adequacy ratio positively impact profitability. It has a positive and significant relationship at a 1% significance level, which shows that regulatory requirements of capital have increased the profitability of the banks by increasing the net interest margin, which also confirms the findings of the earlier studies (Kwan & Eisenbeis, 1997).Therefore, the results of this study have confirmed the hypothesis that the stringent capital adequacy ratio has made a affirmative and significant effect on the efficiency of the Islamic banks in Pakistan.

The bank policy rate has been included in this study to ascertain its impact on net interest margin, as it is usually used as a reference rate while deciding their base rates. The bank policy rate is positively and significantly related to net interest margin at a 10% significant level, which also confirms that a rise in bank policy rate also amplifies the interest spread of banks. Our results are in line with the research (Busch & Memmel, 2015). Moreover, Osei-Assibey & Asenso (2015) also supported that the bank policy rate gives rise to net interest margin.

Credit growth has been included to study its impact on the net interest margin. It has been proved that credit expansion increases the profitability of the banks in terms of net interest margin at a 10% significance level. Therefore, it reveals that quality credit expansion has an encouraging impact on efficiency.

FEE has been taken as a control variable due to its relevance with the income of the bank, to determine the actual impact of the capital adequacy ratio on the net interest margin. The result of the study has revealed that it has a positive and significant association with net interest margin at a 1% significant level. The result is in contradiction with the study of (Hoang & Nguyen, 2021).

NPLs assess the probability of bank default. As per the expectation, non-performing loans have a negative and significant linkage with net interest margin at a 1% significant level. It reveals that non-performing loans reduce interest rate spread and, hence, lower the profitability of the banks. Further, the same result is also witnessed in an earlier study in the Turkish banking sector (Yuksel & Zengin, 2017). Moreover, the research conducted in twenty-four Indonesian banks also found a negative association between bad loans and regulatory capital (Swandewi & Purnawati, 2021).

Therefore, by and large, the results demonstrate that regulatory requirements of capital, bank policy rate, credit growth, and fees have a positive linkage with net interest margin in Pakistani Islamic banks. More specifically, the results of the study reveal that stringent capital requirement increases the bank spread. Therefore, quality credit expansion also plays a positive role in increasing banks' net interest margins. Whereas non-performing loans shrink the net interest margin. Bank policy rate also increases the interest spread for banks as they adjust their lending rates by controlling their expenditures. Lastly, non-interest income in the shape of fees also plays a positive role by increasing bank net interest margins in the Islamic banking sector.

Conclusion

This study evaluates the association amid imposition of regulatory capital requirement in terms of capital adequacy ratio on efficiency i.e., net interest margin (NIM) along with control variables including bank policy rate, credit growth, bank fees and non-performing loans(NPL) in both Islamic banks as well as commercial banks with Islamic windows listed on the Stock exchange of Pakistan, during the period of 2010 to 2019. In this regard, we employed a panel regression model with fixed and random effects to study the impact of variables. Additionally, the Hausman test has also been applied, which has retained the results of the fixed effect.

Overall, the imposition of stringent regulatory requirements for the capital adequacy ratio has proved to be an elixir and increased the efficiency in the form of interest margin in Islamic banks. Therefore, it shows that Islamic banks with sound capitalization are performing well in terms of their efficiency. Further, the results reveal that the capital adequacy requirement widens the bank spread. Moreover, quality credit expansion also plays a positive role in increasing banks' net interest margins. Whereas non-performing loans decrease the profitability of Islamic banks in terms of net interest margin. On the other hand, bank policy rate increases the interest spread for banks as they adjust their lending rates by controlling their expenditures. Lastly, non-interest income in the shape of fees also plays a positive role by increasing the bank's net interest margin.

This research study offers valuable implications for stakeholders in Islamic banks, particularly concerning the influence of stringent capital adequacy regulations on operational efficiency, as measured through net interest margin. Keeping in view a distinct operational framework and Shariah-compliant principles of Islamic banking such as risk-sharing, profit-loss mechanisms, and the prohibition of interest (riba), both practitioners and policymakers must understand how capital regulations affect efficiency outcomes. The findings of this study can serve as a practical guide for regulators, suggesting the importance of tailoring or customizing capital adequacy frameworks to account for the specific characteristics and operational models of Islamic banks.

Moreover, the study also paves the way for future research to explore other determinants of efficiency in the Islamic banking context more deeply, like the inclusion of governance mechanisms, the impact of digital technological transformation as well and market dynamics. While this research has focused on Pakistani Islamic banks, the scope could be broadened to include Islamic financial institutions in developed, developing, as well as emerging economies. Moreover, comparative studies would offer deeper insights into how contextual factors, such as regulatory reforms, macroeconomic scenarios, and financial maturity and inclusion, shape the relationship between capital adequacy and bank performance. These broader implications could further guide international regulatory bodies and financial institutions in formulating inclusive and effective policy frameworks for the Islamic banking sector.

Declarations

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of interest/Competing interests

There is no conflict of interest/Competing interests

Availability of data and material

The data that support the findings of this study are available from the authors on request.

Code Availability

Results may be provided on request from the authors.

Authors' Contributions

Amina Malik: Conceptualization, Writing – Original draft preparation, Data curation, Methodology, Validation.
Bilal Latif: Methodology, Software, Investigation, Writing – Reviewing and Editing
Babar Zaheer Butt: Supervision, Writing – Reviewing and Editing.

Appendix

Table 4: Capital adequacy and Net efficiency

Variables	Sign	OLS	Random Effect
Constant		0.0215 **(0.0000)*** **	0.0334 **(0.0000)*** **
CAR	+/-	0.0006 **(0.0001)*** **	0.0002 **(0.0851)** **
BPR	+/-	0.0005 **(0.0000)*** **	0.0003 **(0.0406)** **
CR	+	0.0000 **(0.1187)***	0.0000 (0.0177)**
FEES	+/-	0.0000 **(0.0411)** **	0.0000 (0.4763)**
NPL	+/-	-0.0522 **(0.0000)*** **	-0.0461 **(0.0000)*** **
Adj R-square		0.3934	0.1699
F-statistic		28.6282	9.7182
Hausman Test $\chi 2$		5 (0.0008)	

Table 4 also portrays the relationship among endogenous and exogenous variables. ***, ** and * indicate significance level of 1%,5% and 10% respectively.

Source: The Authors.

REFERENCES

Abbas, F., Ali, S., & Rubbaniy, G. (2021). Economics of capital adjustment in the US commercial banks: empirical analysis. *Journal of Applied Economics, 24*(1), 71-90.

Abbas, F., Butt, S., Masood, O., & Javaria, K. (2019). The effect of bank capital buffer on bank risk and net interest margin: Evidence from the US. *Global Journal of Social Sciences Studies, 5*(2), 72-87.

Aiyar, S., Calomiris, C. W., & Wieladek, T. (2014). Does macro-prudential regulation leak? Evidence from a UK policy experiment. *Journal of Money, Credit and Banking, 46*(s1), 181-214.

Akbar, T. (2021). The Effect of Capital Adequacy Ratio, Non-Performing Financing, and Financing to Deposit Ratio on Financial Performance: Study at The Islamic Microfinance Banks in Indonesia. *IAR Journal of Business Management, 2*(1).

Al-Hares, O. M., & Saleem, K. (2017). Islamic banks' financial performance and implications of Basel III standards in the GCC: An empirical analysis. *Review of Economics & Finance, 7*(1), 80-97.

Banks, R. (2010). Banking Systems". *Bank for International Settlements, June*.

Basel Accord and Implementation. (2013). Retrieved from https://www.sbp.org.pk/BS/Bai.asp

Bashir, A., & Hassan, A. (2017). Interrelationship among Basel capital regulation, risk, and efficiency in Pakistani commercial banks. *Business & Economic Review, 9*(2), 165-186.

Brei, M., & Gambacorta, L. (2016). Are bank capital ratios pro-cyclical? New evidence and perspectives. *Economic Policy, 31*(86), 357-403.

Busch, R., & Memmel, C. (2015). Banks' net interest margin and the level of interest rates.

Butt, M. A., Ayub, H., Latif, B., Asif, F., Shabbir, M. S., & Raja, A. A. (2022). Financial risks and performance of conventional and Islamic banks: Do reputational risks matter? *Journal of Islamic Accounting and Business Research, 13*(4), 581-595.

Cruz-García, P., & Fernandez de Guevara, J. (2020). Determinants of net interest margin: the effect of capital requirements and deposit insurance scheme. *The European Journal of Finance, 26*(11), 1102-1123.

El-Ansary, O., & Hafez, H. (2015). Determinants of capital adequacy ratio: An empirical study on Egyptian banks. *Corporate Ownership & Control, 13*(1).

El-ghonemey, A. (2023). *Capital Adequacy Ratio: Determinants and Its Effect on the Bank's Efficiency in the MENA Region Islamic Versus Conventional Banks*. Doctoral thesis. University of Portsmouth, Faculty of Business and Law, UK …,

Ghroubi, M. (2025). Linkages between capital, bank financing and economic growth: the case of Islamic and conventional banks from a panel of Muslim countries. *Journal of Islamic Accounting and Business Research, 16*(3), 585-607.

Gul, S., Irshad, F., & Zaman, K. (2011). Factors Affecting Bank Profitability in Pakistan. *Romanian Economic Journal, 14*(39).

Hafez, M. (2018). Examining the Relationship between Efficiency and Capital Adequacy Ratio: Islamic versus Conventional Banks-An Empirical Evidence on Egyptian Banks. *Accounting and Finance Research, 7*(2), 232-247.

Haris, M., Tan, Y., Malik, A., & Ain, Q. U. (2020). A study on the impact of capitalization on the profitability of banks in emerging markets: A case of Pakistan. *Journal of Risk and Financial Management, 13*(9), 217.

Hoang, T. L. H., & Nguyen, H. L. (2021). Macroeconomics and Banks: Specific Determinants of Vietnamese Commercial Banks' Profitability from 2014 to 2018. In *Recent Developments in Vietnamese Business and Finance* (pp. 117-147): World Scientific.

Karim, M. A., Hassan, M. K., Hassan, T., & Mohamad, S. (2014). Capital adequacy and lending and deposit behaviors of conventional and Islamic banks. *Pacific-Basin Finance Journal, 28*, 58-75.

Kwan, S., & Eisenbeis, R. A. (1997). Bank risk, capitalization, and operating efficiency. *Journal of Financial Services Research, 12*(2), 117-131.

Latif, B., Voordeckers, W., & Lambrechts, F. (2024). Overcommitted to show up on the board? The moderating effect of ownership. *Review of Managerial Science, 18*(1), 131-160.

Latif, B., Voordeckers, W., Lambrechts, F., & Hendriks, W. (2020). Multiple directorships in emerging countries: fiduciary duties at stake? *Business Ethics: A European Review, 29*(3), 629-645.

Octrina, F., & Mariam, A. G. S. (2021). Islamic Bank Efficiency in Indonesia: Stochastic Frontier Analysis. *The Journal of Asian Finance, Economics, and Business, 8*(1), 751-758.

Osei-Assibey, E., & Asenso, J. K. (2015a). Regulatory capital and its effect on credit growth, non-performing loans and bank efficiency. *Journal of Financial Economic Policy.*

Osei-Assibey, E., & Asenso, J. K. (2015b). Regulatory capital and its effect on credit growth, non-performing loans and bank efficiency: Evidence from Ghana. *Journal of Financial Economic Policy, 7*(4), 401-420.

Ozili, P. K. (2019). Basel III in Africa: making it work. *African Journal of Economic and Management Studies, 10*(4), 401-407.

Pasiouras, F., Tanna, S., & Zopounidis, C. (2009). The impact of banking regulations on banks' cost and profit efficiency: Cross-country evidence. *International Review of Financial Analysis, 18*(5), 294-302.

Purwasih, H., & Wibowo, W. (2021). THE DETERMINANTS FACTORS OF PROFITABILITY OF ISLAMIC BANKS IN INDONESIA. *Jurnal Muara Ilmu Ekonomi dan Bisnis, 5*(1), 89-98.

Rafique, Z. Z., Toor, K. N., & Bashir, Z. (2020). Capital Adequacy and Management Quality for Banking Liquidity Management Decision in Pakistan.

Shrestha, B. G., & Niraula, D. (2021). The Consequences of Credit Performance and Capital Adequacy: Evidence from Commercial Banks in Nepal. *The Batuk, 7*(1), 1-12.

Stewart, R., Chowdhury, M., & Arjoon, V. (2021). Bank stability and economic growth: trade-offs or opportunities? *Empirical Economics, 61*(2), 827-853. doi:10.1007/s00181-020-01886-4

Supervision, B. (2011). Basel committee on banking supervision. *Principles for Sound Liquidity Risk Management and Supervision (September 2008)*.

Swandewi, N. K. M., & Purnawati, N. K. (2021). Capital Adequacy Ratio Mediates the Effect of Non-Performing Loan on Returns on Assets in Public Commercial Banks.

Taktak, N. B., Zouari, S. B. S., & Boudriga, A. (2010). Do Islamic banks use loan loss provisions to smooth their results? *Journal of Islamic Accounting and Business Research*.

Torbira, L., & Zaagha, A. S. (2016). Capital adequacy measures and bank financial performance in Nigeria: A cointegration analysis. *Journal of Finance and Economic Research, 3*(1), 15-34.

Tran, D., & Nguyen, T. (2025). Capital buffer and bank risk-taking in Vietnam: the moderating role of capital regulation and shadow banking. *Journal of Financial Regulation and Compliance, 33*(1), 48-66.

Waqas, H., & Bahrain, S. (2019). Risk management, capital adequacy and audit quality for financial stability: Assessment from commercial banks of Pakistan. *Asian Economic and Financial Review, 9*(6), 654-664.

Webb, I. P. (2000). *The effect of banking and insurance on the growth of capital and output*: Georgia State University.

Yuksel, S., & Zengin, S. (2017). Influencing factors of net interest margin in the Turkish banking sector. *International Journal of Economics and Financial Issues, 7*(1).