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THE RELATIONSHIP BETWEEN BANK CAPITAL, RISK-TAKING AND PROFITABILITY: FRESH EVIDENCE FROM PANEL QUANTILE APPROACH

Banka Sermayesi, Risk Alma ve Kârlılık İlişkisi: Panel Kantil Yaklaşımından Yeni Kanıtlar

Selim GÜNGÖR*

Keywords:
Risk-Taking, Bank Capital, Profitability, Commercial Banks, Panel Quantile

JEL Codes:
C33, G21, G32

Abstract

This study aims to reveal the relationship between bank capital (BC), risk-taking, and profitability for commercial banks in Turkey using panel quantile regression models (QRPD) with non-additive fixed effects (NAFE). Accordingly, we consider the data of 18 commercial banks for 2012-2022. Firstly, we concluded a positive relationship between banks' risk-based capital (RBC) and traditional capital ratios (CR) and return on assets (ROA); in contrast, there is a negative relationship between RBC and risk-weighted assets (RWATA). Secondly, we found a positive relationship between RBC and the loan loss provision ratio (LLPTA) in other periods except the contraction period and between CR and LLPTA in other periods except the expansion period. The findings also showed an inverted U-shaped relationship between RBC and the LLPTA and return on equity (ROE) and an N-shaped relationship between CR and ROE. Lastly, we discovered a positive relationship between RWATA and ROA and ROE, whereas a negative relationship exists between LLPTA and ROA. The findings provide valuable insights into the validity of the moral hazard, cost-skimping, regulatory assumptions, agency, portfolio and risk-bearing profit theories in the commercial banking sector and that risk, capital and profitability indicators are leading factors in banks' stability.

Anahtar Kelimeler:
Risk Alma, Banka Sermayesi, Kârlılık, Ticari Bankalar, Panel Kantil

JEL Kodları:
C33, G21, G32

Öz

Bu çalışmanın amacı, Türkiye'deki ticari bankalar için banka sermayesi, risk alma ve kârlılık arasındaki ilişkiyi toplamsal olmayan sabit etkili panel kantil regresyon modelleriyle ortaya koymaktır. Bu doğrultuda, 18 ticari bankanın 2012-2022 dönemine ait verileri dikkate alınmıştır. İlk olarak, bankaların risk bazlı sermaye (RBC) ve geleneksel sermaye (CR) oranları ile aktif kârlılık (ROA) arasında pozitif bir ilişki varken, bankaların risk bazlı sermaye oranları ile risk ağırlıklı varlıkları (RWATA) arasında negatif bir ilişkinin olduğu sonucuna ulaşılmıştır. İkinci olarak, daralma dönemi hariç diğer dönemlerde RBC ile kredi zararları karşılığı oranı (LLPTA) arasında ve genişleme dönemi hariç diğer dönemlerde CR ile LLPTA arasında pozitif bir ilişkinin olduğu bulunmuştur. Bulgular ayrıca RBC ile LLPTA ve özkaynak kârlılığı (ROE) arasında ters U şeklinde, CR ile ROE arasında ise N şeklinde bir ilişkinin olduğunu göstermiştir. Son olarak, RWATA ile ROA ve ROE arasında pozitif ilişki varken, LLPTA ile ROA arasında negatif bir ilişkinin olduğu tespit edilmiştir. Bulgular, ahlaki tehlike, maliyet cimriliği, düzenleyici varsayımlar, vekâlet, portföy ve risk barındıran kâr teorilerinin ticari bankacılık sektöründe geçerliliğine ve risk, sermaye ve kârlılık göstergelerinin bankaların istikrarı üzerinde öncü faktörler olduğuna ilişkin değerli bilgiler sunmaktadır.

*Asst. Prof. Dr., Tokat Gaziosmanpasa University, Resadiye Vocational School, Department of Management and Organisation, Türkiye, selim.gungor@gop.edu.tr, ORCID: 0000-0002-2997-1113

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1. Introduction

The financial system in the world has a unique structure. The commercial banking system is one of the most respected areas of the financial system. The basic structure of the commercial banking system consists of banks obtaining funds at lower interest rates to lend at higher margins. Since the late 1980s, liberalization policies have significantly changed the financial system due to the global financial crisis in 2007-2009, international financial integration, technological transformation, and financial innovation. Therefore, authorities and policymakers have made several regulations to stabilize the banking system depending on their weight in the financial system in the last 30 years (Abbas et al., 2022). These standards cover capital adequacy, banks' operating procedures and principles, and banks' risk management methods and regulations.

The basis of the Basel I standard published in 1988 was the increase in the risk level of the international banking market. Basel I standard focuses on credit risk, market risk, and capital adequacy. Accordingly, banks' capital is divided into three categories: Capital reductions, Tier 1 capital, and Tier 2 capital. A maximum of 50% of the bank's capital is stipulated to consist of Tier 1 capital, and the sum of Tier 1 and Tier 2 capital cannot exceed 100%. In this standard, the minimum capital adequacy ratio is set as 8%, and credit risk is evaluated in five categories as 0%, 10%, 20%, 50%, and 100%, according to the degree of weight (Basel Committee on Banking Supervision [BCBS], 1988). In Basel II, the issues specified in Basel I, in terms of capital subcomponents and minimum capital ratio preserved. This standard eliminates the approach of determining capital adequacy for credit risk based on whether the bank is an OECD member. In the standard market, credit and operational risks determine the capital level (Banking Regulation and Supervision Agency [BRSA], 2005; Demir and Kucukkaplan, 2017). In Basel III, with the provision that Tier 2 capital cannot exceed 100% of Tier 1 capital, Tier 3 capital application is abolished. The elements in Tier 1 capital which is high loss-absorbing potential, are called core capital. The capital conservation buffer introduced by Basel III envisaged gradually added to Tier 1, core, and total capital. This ratio was increased from 2016 until 2019 and finalized in 2019. In addition, a simple, understandable, and non-risk-based leverage ratio, net stable funding ratio, and liquidity coverage ratio introduce to support capital ratios in the standard (BRSA, 2010).

These standards provide a framework for determining the minimum capital banks should hold as a buffer against insolvency and losses. The less capital a bank has, the more it has to lend, which can increase its profitability. Still, it can also make the bank vulnerable to losses and failure, resulting in the need for government financial assistance. In addition, the standards stipulate that banks should enable their management mechanisms to perform self-assessments of their risk exposures and comply with the minimum regulatory capital required for each level of risk exposure. Therefore, the financial system must ensure the optimal balance between BC, risk-taking behaviour, and bank profitability to become resilient against possible risks and increase profitability potential. In this respect, various hypotheses in the banking literature provide justifications for the relationship between BC, risk-taking, and bank profitability. For example, consistent with the view in finance that higher risk leads to higher returns, portfolio theory supports the positive relationship between bank returns and risk-taking behaviour (Markowitz, 1991). The regulatory assumption hypothesis suggests that banks increase their capital levels with increased risk (Iannotta et al., 2007). Similarly, the theory of risk-bearing profit argues that the essential function of an entrepreneur is risk-taking, a function that cannot

be delegated to anyone else, and that profit is a reward for risk-taking. The theory also states that there is some risk inherent in every business venture, given the speculative nature of the business. In banking activities, management has to bear the risk to obtain profit, which is the reward for risk-taking. Therefore, although the degree of risk varies in different businesses, a positive relationship exists between risk-taking behavior and profitability (Mendoza and Rivera, 2017). The moral hazard hypothesis claims that bank managers hold less capital and increase their investments in risky assets (Demirguc-Kunt and Kane, 2002). According to the cost-skimping hypothesis, cost-skimping behavior occurs when an increase in banks' cost efficiency temporarily precedes an increase in bankruptcy risk. Although in the same temporal sequence, this reflects the opposite of bad management behavior (Nguyen and Nghiem, 2015). Agency theory proposes that the relationship between management's interests and shareholders' wealth has always been at the center of organizations (Jensen and Meckling, 1976; Myers, 2001). Based on those mentioned earlier, our study aims to identify the relationship between BC, risk-taking, and profitability for commercial banks in Turkey through QRPD with NAFE models.

This study contributes to the existing literature on the relationship between BC, risk-taking, and profitability in two ways. First, We use risk-based and traditional capital ratios to represent bank capital, RWATA ratio, loan losses provision ratio to represent risk-taking, and ROA and ROE to describe profitability. When the studies testing the relationship between BC, risk-taking, and profitability in commercial banks in Turkey are examined, it seems that the traditional capital ratio variable is frequently used to represent the BC indicator in the studies and the number of the studies using the risk-based capital ratio variable (Okuyan, 2013; Aydin, 2019; Celik and Kaya, 2019; Senol et al., 2019; Yazici and Kandil-Goker, 2019) is limited. Second, no study addresses the issue based on panel quantile models. For this reason, we employ a QRPD with a NAFE model that tests for outliers in the series.

In the following stages of this study, firstly, the studies reached as a result of the literature review are summarised; then, the research findings are explained by including the data set and methodology; and lastly, in the conclusion section, the research findings are interpreted theoretically, and policy recommendations are made by revealing the similar and different aspects of the findings from the studies in the literature.

2. Literature Review

This section summarises the studies in the foreign and national literature on the topic, which guides the creation of the research data set. Among the studies in the foreign literature that investigate the relationship between BC and risk-taking specific to commercial banks, Bunyaminu et al. (2021) found a positive relationship between traditional capital and risk-taking, while Bouheni and Rachdi (2015) and Hoque and Liu (2023) discovered a negative relationship between the indicators. In addition, Ashraf et al. (2016) and Rahman et al. (2018) found a negative relationship between RBC and risk-taking. In contrast, Harkati et al. (2020) and Mateev et al. (2022) detected a positive relationship between the variables. Bitar et al. (2018) also determined that the relationship between RBC and risk-taking is insignificant. While Abbas and Bashir (2021) proved a positive relationship between RBC and traditional capital and risk-taking, Dias (2021) asserted an inverted U-shaped relationship between the variables. Abbas et al. (2021) also reported a negative relationship between RBC and risk-taking and a positive relationship between traditional capital and risk-taking.

In the national literature, Okuyan (2013) investigated the relationship between BC and risk-taking in 23 commercial banks, and Yazici and Kandil-Goker (2019) on 43 commercial banks in Turkey. They found that there is a negative relationship between RBC and risk-taking. In the study of Ayaydin and Karakaya (2014) on 23 banks, they stated that the relationship between traditional capital and the variance of ROA is positive; in contrast, the relationship between the variance of ROE is negative. Isik and Belke (2017) studied 13 commercial banks and concluded a negative relationship between traditional capital and risk-taking. In addition, Nur (2022) conducted a study on seven banks traded in Borsa Istanbul and concluded that the relationship between traditional capital and risk-taking is negative.

Among the studies in the foreign literature that investigated the relationship between BC and profitability for commercial banks, Dao and Nguyen (2020) discovered a negative relationship between traditional capital and profitability, while Jabra et al. (2017), Abbas et al. (2019) and Farkasdi et al. (2021) concluded a positive relationship between the indicators. In addition, Lee et al. (2015) reported that while the effect of traditional capital on ROA is positive, its impact on ROE is negative. Abbas and Aziz (2020) found a positive relationship between traditional capital and the profitability of large, medium, and small-sized banks in developed economies. They also stated that only the relationship between traditional capital and the profitability of large-scale banks is negative in emerging economies. While Subhani et al. (2022) determined a positive relationship between RBC and profitability, Bitar et al. (2018), Coccorese and Girardone (2021), and Boamah et al. (2023) detected a positive relationship between RBC and traditional capital and profitability.

Among the studies in the national literature that investigated the relationship between BC and profitability for commercial banks in Turkey, Gunes (2014), Akhmedjonov and Balci-Izgi (2015), Isik et al. (2017), Okuyan and Karatas (2017), Kocaman et al. (2018), and Kilic (2019) stated a positive relationship between traditional capital and profitability. Topak and Talu (2017) and Orgun (2023) reported a negative relationship between traditional capital and profitability. Celik and Kaya (2019) and Yaman (2021) discovered a positive relationship between RBC and profitability, while Senol et al. (2019) proved a negative relationship between the variables. Aydin (2019) noticed an inverted U-shaped relationship between RBC and profitability. In addition, Sanic and Sendeniz-Yuncu (2021) exhibited a positive relationship between RBC and profitability, whereas there was a negative relationship between traditional capital and profitability. Kaya et al. (2022) also found a positive relationship between RBC and traditional capital and profitability. Kaplan et al. (2023) identified a positive relationship between RBC and profitability in large and medium-sized banks; in contrast, the findings differed according to the profitability indicator in small-sized banks.

While Gizaw et al. (2015), Hu and Xie (2016), Van Dooren (2017), Mohsin and Hongzhen (2019), and Dinu and Bunea (2022) found a positive relationship between risk-taking and profitability in foreign literature, Ul Mustafa et al. (2012), Rakshit and Bardhan (2022) and Mujtaba et al. (2022) discovered that the relationship between the indicators was negative.

In the national literature, among the studies investigating the relationship between risk-taking and profitability specific to commercial banks, Gasimova and Karimov (2017) stated a positive relationship between risk-taking and profitability in their research on 13 banks, while Isik (2017) on 26 banks and Kadioglu et al. (2017) on 55 banks reported a negative relationship.

When the literature is reviewed, the relationship between banks' risk-taking behavior, bank profitability, and BC is frequently investigated. However, it is observed that studies conducted in the national environment generally focus on the relationship between BC and profitability. In addition, relatively few studies in Turkey test the relationship between BC and risk-taking, risk-taking and profitability. These facts reveal the importance of the study.

3. Data and Methodology

Our study investigates the relationship between BC, risk-taking, and profitability in commercial banks in Turkey. For this purpose, we consider the annual data of 18 commercial banks for 2012-2022, for which data are available. We obtain the data from the unconsolidated financial statements published by the Banks Association of Turkey and the Banking Regulation and Supervision Agency on a bank basis.

RBC and traditional capital (CR) ratio variables represent BC in this study. We discuss the RWATA and LLPTA representing risk-taking behavior and ROE and ROA variables representing profitability. We also use operating efficiency (OER), loan growth (LGR), bank size (LNBS), and liquidity (LR) variables as control variables.

We measure the RBC as the sum of Tier 1 capital and Tier 2 capital to RWATA. The requirements of the Basel Accord serve as a guide for maintaining the optimum capital adequacy ratio where the excess ratio can cope with liquidity shortage or idle money; in contrast, liquidity shortage is a signal for excessive RWATA in the operational process (Rahman et al., 2018). Accordingly, well-capitalized banks either maintained higher capital ratios by reducing their RWATA or had an increasing risk-weighted asset portfolio thanks to higher capital support (Ashraf et al., 2016).

We estimate the CR as the ratio of total shareholders' equity to total assets. This ratio also called the equity ratio, includes only instruments such as common stock, retained earnings, legal reserves Etc. In contrast, this ratio does not include regulatory items such as RWATA, redeemable preference shares, or treasury shares (Hamza and Saadaoui, 2013). Therefore, this variable is also considered an indicator of risk aversion. A high level of this ratio means that banks have a high level of risk aversion. Moreover, a high level of this ratio may increase banks' profitability by reducing dependence on external resources.

We measure the LLPTA, used to proxy risk-taking behavior, as the ratio of loan loss provisions to total assets. This ratio, which measures credit quality, can be explained as a precautionary provisioning policy and can also be interpreted as the expectation that non-performing loans will be high. In addition, this ratio reflects banks' loan portfolios, even partially, as it may be related to differences between banks, non-performing loans, reserves and different banking policies regarding uncollectible loans. A high level of this ratio can be interpreted as a deterioration in banks' credit quality and an increase in credit risk (Bitar et al., 2018).

We consider the RWATA, which represents risk-taking behavior, as the ratio of RWATA to total assets. RWATA are total assets less loans and advances to banks, government bonds, and cash at market value. This ratio reveals the bank's level of risk-taking through capital constraints (Hu and Xie, 2016). A high ratio level means the capital requirement increases the

total risk level. When this ratio reduces and capital adequacy increases, assets face lower risk, and vice versa (Rahman et al., 2018).

We measure ROA as the net profit to total assets. ROA refers to the returns earned per unit of assets. It also reveals a bank's ability to generate profit by using its available funding resources and reflects the effectiveness of bank management in using the bank's investment and financial resources to generate profit (Harkati et al., 2020; Rakshit and Bardhan, 2022). We calculate the ROE as the net profit to total equity. This ratio reveals how effective bank management is in using shareholders' funds and helps measure banks' efficiency in using investment funds to increase earnings (Shair et al., 2019).

Among the control variables, we estimate OER by the ratio of operating expenses to total assets, which reveals the potential impact of managerial efficiency (inefficiency) (Gasimova and Karimov, 2017). We measure the LGR variable as the ratio of net loans to total assets. This ratio can also indicate liquidity risk or intermediation activities in the literature (Harkati et al., 2020). Banks with a favorable loan portfolio are less sensitive to risk than banks that prefer to invest in non-traditional activities, derivatives, and other types of securities (Bitar et al., 2018). We estimate the LNBS variable as the natural logarithm of total assets. The higher the volume of assets of a bank, the easier it will be to raise the necessary funds offered by the capital market so that it can access different risk-taking incentives than smaller banks (Hamza and Saadaoui, 2013). Finally, we expressed the LR variable as the ratio of liquid assets to total assets. This indicator represents the level of liquidity held by banks rather than the liquidity risk associated with debt payments (Abbas et al., 2019). High liquidity requirements may impair banks' ability to invest in loan portfolios (Ashraf et al., 2016). In this direction, we present detailed information about the data used in the analyses in Table 1.

Table 1. Measurements and Definitions of Variables

Variables	Measurements	References
Bank Capital (BC)		
Risk-Based Capital Ratio (RBC)	The Ratio of Total Tier-1 Capital and Tier-2 Capital to Risk-Weighted Assets	Okuyan (2013); Ashraf et al. (2016); Bitar et al. (2018); Aydin (2019); Celik and Kaya (2019); Abbas and Bashir (2021); Abbas et al. (2021); Coccorese and Girardone (2021); Sanic and Sendeniz-Yuncu (2021); Yaman (2021); Subhani et al. (2022); Boamah et al. (2023); Kaplan et al. (2023).
Traditional Capital Ratio (CR)	Total Shareholders' Equity/Total Assets	Ayaydin and Karakaya (2014); Gunes (2014); Bouheni and Rachdi (2015); Lee et al. (2015); Isik and Belke (2017); Jabra et al. (2017); Okuyan and Karatas (2017); Topak and Talu (2017); Kocaman et al. (2018); Kilic (2019); Abbas and Bashir (2021); Abbas et al. (2021); Coccorese and Girardone (2021); Farkasdi et al. (2021); Sanic and Sendeniz-Yuncu (2021); Kaya et al. (2022); Nur (2022); Boamah et al. (2023).
Risk-Taking		
Loan Loss Provision Ratio (LLPTA)	Loan Loss Provisions/Total Assets	Ul Mustafa et al. (2012); Gizaw et al. (2015); Isik (2017); Kadioglu et al. (2017); Bitar et al. (2018); Abbas et al. (2021); Mujtaba et al. (2022).
Risk-Weighted Assets Ratio (RWATA)	Risk-Weighted Assets/Total Assets	Okuyan (2013); Bouheni and Rachdi (2015); Ashraf et al. (2016); Hu and Xie (2016); Gasimova and Karimov (2017); Abbas and Bashir (2021); Abbas et al. (2021).

Table 1. Continued

Profitability		
Return on Assets (ROA)	Net Profit/Total Assets	Ul Mustafa et al. (2012); Gunes (2014); Lee et al. (2015); Hu and Xie (2016); Gasimova and Karimov (2017); Isik (2017); Kadioglu et al. (2017); Okuyan and Karatas (2017); Topak and Talu (2017); Kocaman et al. (2018); Aydin (2019); Celik and Kaya (2019); Kilic (2019); Coccorese and Girardone (2021); Sanic and Sendeniz-Yuncu (2021); Yaman (2021); Mujtaba et al. (2022); Nur (2022); Kaya et al. (2022); Subhani et al. (2022); Boamah et al. (2023); Kaplan et al. (2023).
Return on Equity (ROE)	Net Profit/Total Equity	Ayaydin and Karakaya (2014); Gizaw et al. (2015); Lee et al. (2015); Jabra et al. (2017); Kadioglu et al. (2017); Okuyan and Karatas (2017); Topak and Talu (2017); Kocaman et al. (2018); Farkasdi et al. (2021); Sanic and Sendeniz-Yuncu (2021); Subhani et al. (2022); Orgun (2023); Kaplan et al. (2023).
Control Variables		
Operating Efficiency (OER)	Operating Expenses/ Total Assets	Gasimova and Karimov (2017).
Loan Growth (LGR)	Net Loans/Total Assets	Jabra et al. (2017); Bitar et al. (2018); Harkati et al (2020); Dias (2021); Nur (2022).
Bank Size (LNBS)	Natural Log of Total Assets	Bouheni and Rachdi (2015); Isik and Belke (2017); Isik et al. (2017); Bitar et al. (2018); Kilic (2019); Abbas and Bashir (2021); Subhani et al. (2022).
Liquidity (LR)	Liquid Assets/Total Assets	Gunes (2014); Okuyan and Karatas (2017); Kocaman et al. (2018); Yazici and Kandil-Goker (2019); Abbas et al. (2021); Kaya et al. (2022); Kaplan et al. (2023).

Since the statistical distribution of data generally exhibits the characteristic of unequal variation, the relationship between variables may differ between positions in the conditional distribution of the dependent variable. Therefore, estimation based on mean values such as pooled least squares may give inaccurate results. The quantile regression model, introduced to the literature by Koenker and Bassett (1978), can evaluate different aspects of the conditional distribution of the dependent variable and offer the possibility of estimation in different quantiles. Thus, the error terms' absolute deviations can be minimised, and the holistic relationship structure between variables can be preserved. (Allard et al., 2018).

When a classical regression model is estimated by the OLS method, it is highly likely that the error terms contain extreme values and do not exhibit a normal distribution. In this case, applying the quantile regression model is recommended, which is less sensitive to extreme values, as the model may yield inconsistent estimators (Guris and Sak, 2019).

When the quantile regression model is expressed as $Y_t = D_t'\beta + u_t$;

$$\min_{\beta \in \mathbb{R}} \left[\sum_{t \in \{t: y_t \geq D_t'\beta\}} \tau |Y_t - D_t'\beta| + \sum_{t \in \{t:\, Y_t < D_t'\beta\}} (1-\tau) \left| Y_t - D_{t\beta}' \right| \right] \quad (1)$$

It is defined by the minimisation calculated as in Equation (1). The values τ, 0 and 1 in Equation (1) indicate different quantile levels. Koenker (2004) made the quantile regression model applicable to panel data. Different panel quantile methods were introduced to the literature until the QRPD was developed by Powell (2022). Existing QRPD methods focus on

estimating fixed effects depending on whether the additive fixed effect is assumed to be constant across quantiles, and the distribution $(Y_{it} - \alpha_i)\backslash D_{it}$ holds in the QRPD with additive fixed effects. In this expression, α_i and $D_{i,t}$ represent additive fixed effects and behavioural variables, respectively. In such a distribution, observations at the bottom of the $(Y_{it} - \alpha_i)$ distribution can move to the top of the (Y_{it}) distribution. In such a case, the heterogeneity present and the distribution of Y_{it} cannot correctly determine. The QRPD with NAFE includes non-additive fixed effects and guides the distribution of the dependent variable $(Y_{it}\backslash D_{it})$. Thus, the effects of explanatory variables on the dependent variable can see. The QRPD with NAFE can be stated in Equation (2) (Powell, 2022):

$$Y_{i,t} = D'_{it}\beta(_{it}^{*}U) \tag{2}$$

In Equation (2), i = cross-section, t = time, $U^*_{i,t} = \lambda\,(U_{it}, \alpha_i)$ is defined to include fixed effects. It is also expressed as $U^*_{i,t} \sim U(0,1)$ in the equation. In addition, by calculating the conditional probabilities of the function, the value of $Y_{i,t}$ in different quantiles can be obtained:

$$P(Y_{it} \leq X'_{it}\beta(\tau)\backslash Z_{it}) = \tau \qquad \tau \in (0,1) \tag{3}$$

In this model, consistent forecasts can be produced even at small T. It is stated that the QRPD model gives good results even when the performance of panel quantile estimators with instrumental variables and additive fixed effects is low (Powell, 2022).

4. Empirical Results and Discussion

We first present the variables' summary statistics and Kernel density functions in Table 2 and Figure 1 in this section, respectively.

Table 2. Summary Statistics

Variables	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera (Prob.)
RBC	0.13289	0.04567	4.18460	31.67204	7360.068*** (0.00)
CR	0.10408	0.03767	3.05210	21.95351	3271.098*** (0.00)
LLPTA	0.01246	0.00779	0.70681	3.69506	20.47230*** (0.00)
RWATA	1.05005	0.16128	-0.82606	3.57166	25.21494*** (0.00)
ROA	0.01383	0.01170	1.61292	9.02054	384.8880*** (0.00)
ROE	0.12854	0.09689	0.42176	7.59318	179.9233*** (0.00)
OER	0.04350	0.02395	6.73195	73.09781	42033.58*** (0.00)
LGR	0.61813	0.09211	-0.71757	3.75016	21.63461*** (0.00)
LNBS	24.43144	2.25787	-1.13403	4.23230	54.96771*** (0.00)
LR	0.24293	0.09501	1.29361	5.56992	109.7109*** (0.00)

Note: *** indicates that the null hypothesis that the variables are normally distributed cannot be accepted at 1% significance level.

When we analyse the skewness and kurtosis values of the variables in Table 2 for quantile regression models, we observe that the negative values of RWATA, LGR and LNBS variables indicate that the variables show negative asymmetry and exhibit a left-skewed distribution. The positive importance of all other variables suggests that the variables exhibit positive asymmetry and a right-skewed distribution. When the kurtosis values of the variables are more significant than 3, the distribution curves are leptokurtic, and the distribution exhibits a fat-tailed characteristic. In addition, the values above 3 for all variables except LLPTA, RWATA and

LGR state that these variables have relatively more extreme fat tail characteristics than the other three variables. According to the Jarque-Bera test result, the probability values of all variables being 0.0000 mean that the variables do not exhibit a normal distribution. Kernel density functions given in Figure 1 also prove that the variables are not normally distributed and contain extreme values.

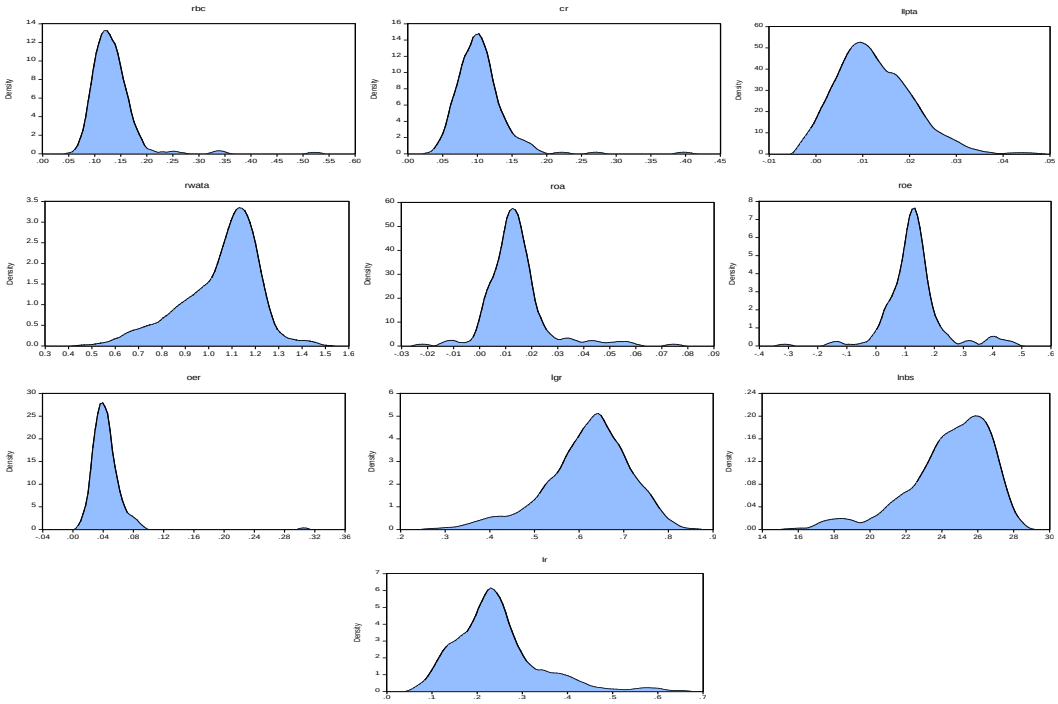
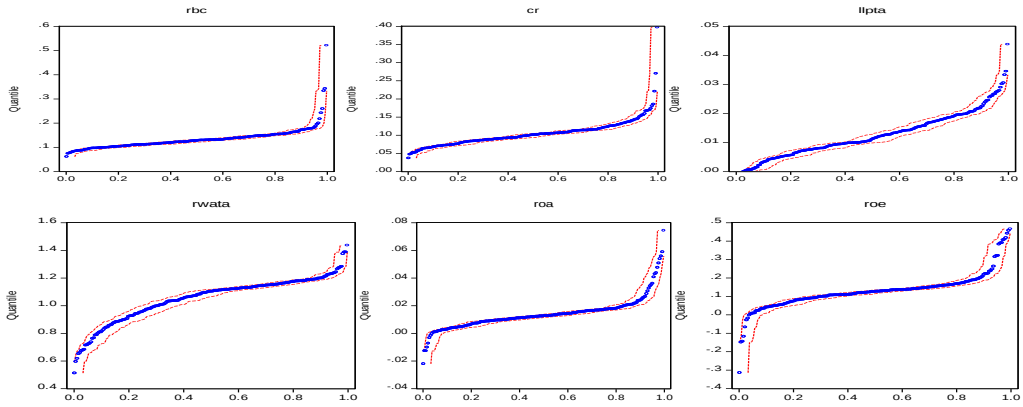


Figure 1. Kernel Density Functions

In cases where the variables do not exhibit a normal distribution and in the presence of extreme values, it would be more appropriate to utilize QRPD that are less sensitive to extreme values since the estimations made by the least squares method will reveal abnormal findings. Therefore, we display the distribution of the variables used in the model according to the quantiles in Figure 2.



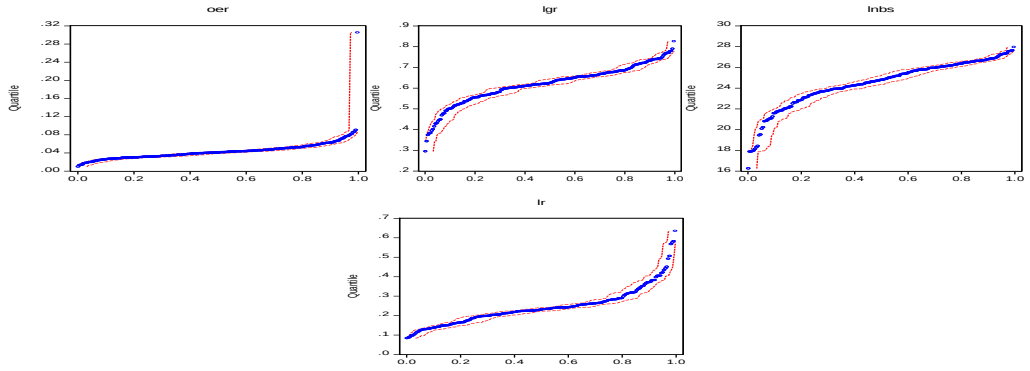
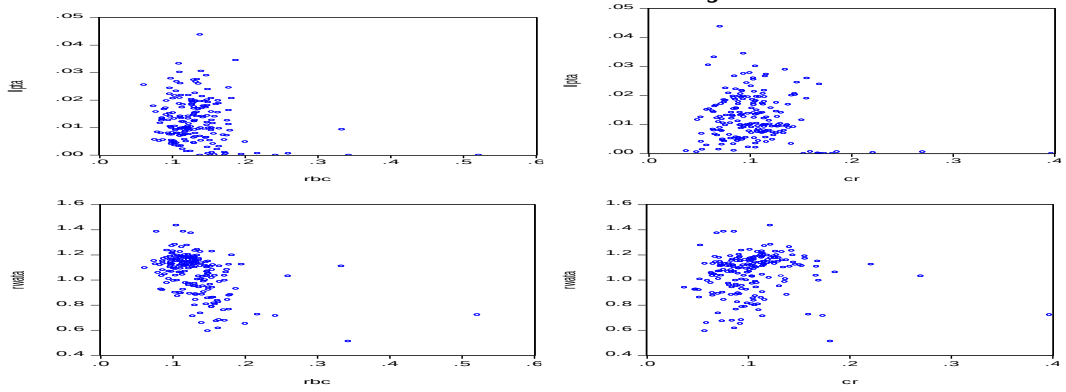


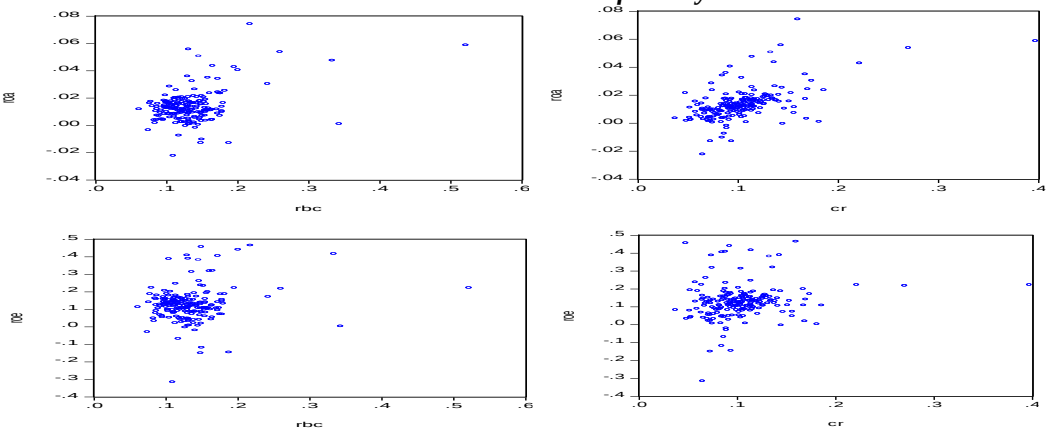
Figure 2. Distributions of Variables on Quantiles

In Figure 3, we show with scatter diagrams the values at which the relationship between BC and risk-taking, BC and profitability, and risk-taking and profitability are concentrated.

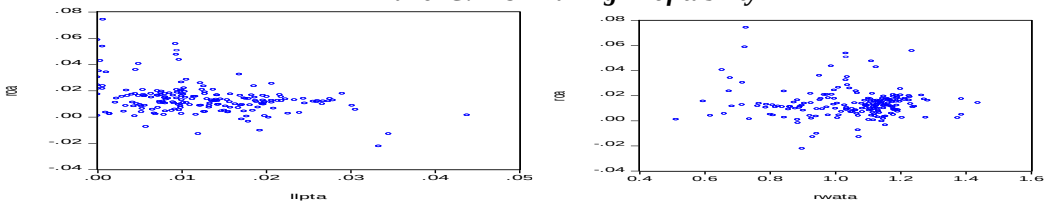
Panel A: BC-Risk-Taking



Panel B: BC-Profitability



Panel C: Risk-Taking-Profitability



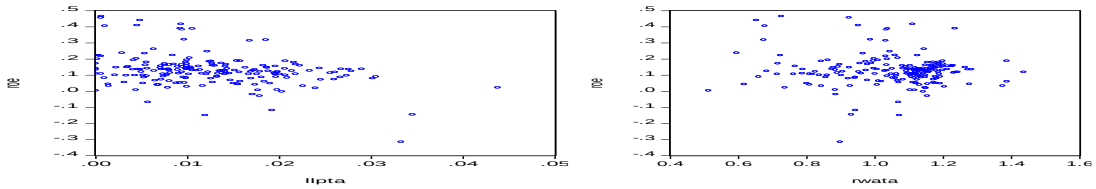


Figure 3. Scatter Diagrams of Variables

After presenting the scatter diagrams, we test the relationship between the variables by QRPD with NAFE models. Accordingly, we report the estimation results obtained for the relationship between BC and risk-taking in Table 3, Table 4, Table 5, and Table 6, respectively. When we analyze Table 3, we find that the effect of the RBC variable on the LLPTA variable in the lower and middle quantiles is statistically significant and positive at the 5% level. The findings reveal that an increase in banks' RBC levels increases the provision for loan losses ratio in periods of economic expansion and under standard market conditions. The findings obtained in the study differ from those of Bitar et al. (2018) and Abbas et al. (2021). Bitar et al. (2018) found that the RBC ratio does not significantly affect the loan loss provision ratio. Abbas et al. (2021) observed a negative relationship between the variables.

When we examine the effect of the control variables on the model, We discover that an increase in banks' liquidity reduces the LLPTA during periods of economic expansion and under standard market conditions. In addition, we conclude that an increase in bank size increases the LLPTA under all market conditions; in contrast, an increase in banks' loan growth increases the LLPTA only in periods of economic expansion and contraction. The increase in banks' OER level decreases the LLPTA during the expansion periods of the economy, while it increases it during the contraction periods.

Table 3. Panel Quantile Regression Model Estimation Results for RBC-LLPTA

Quantiles	LLPTA	Coefficient	Std. Dev.	Z	Prob.	95% Conf. Interval	
	RBC	0.0054591	0.0021207	2.57	0.010**	0.0013027	0.0096155
	LNBS	0.000889	0.0000536	16.59	0.000***	0.0007839	0.000994
Q=0.25	OER	-0.0086096	0.0028105	-3.06	0.002***	-0.014118	-0.0031012
	LR	-0.0091196	0.0010642	-8.57	0.000***	-0.0112054	-0.0070337
	LGR	0.0141189	0.0011173	12.64	0.000***	0.011929	0.0163088
	RBC	0.0155132	0.0073023	2.12	0.034**	0.0006032	0.0298255
	LNBS	0.0011729	0.0002907	4.04	0.000***	0.0006032	0.0017426
Q=0.50	OER	0.0309399	0.0314067	0.99	0.325	-0.0306161	0.0924959
	LR	-0.0149552	0.0057512	-2.60	0.009***	-0.0262273	-0.003683
	LGR	0.0069954	0.0096929	0.72	0.470	-0.0120022	0.0259931
	RBC	-0.0024447	0.0113959	-0.21	0.830	-0.0247802	0.0198907
	LNBS	0.0014088	0.0003101	4.54	0.000***	0.000801	0.0020165
Q=0.75	OER	0.2084856	0.052794	3.95	0.000***	0.1050112	0.3119599
	LR	0.0057811	0.0072094	0.80	0.423	-0.008349	0.0199111
	LGR	0.0411905	0.0095416	4.32	0.000***	0.0224893	0.0598918

Note: ***, ** and * state statistical significance at 1%, 5% and 10% levels, respectively. Moreover, Q= 0.25, Q= 0.50 and Q= 0.75 represent the lower quantiles (economic expansion periods), the middle quantiles (standard market conditions), and the upper quantiles (economic contraction periods), respectively.

When we analyse Table 4, we observe that the effect of the RBC variable on the RWATA variable in all quantiles is statistically significant and negative at the 5% level. The findings

indicate that, under all market conditions, an increase in banks' RBC levels reduces the share of RWATA in total assets. The results obtained are consistent with the findings of Okuyan (2013), Ashraf et al. (2016), and Abbas et al. (2021). However, it is different from the results of Abbas and Bashir (2021). Abbas and Bashir (2021) reported a positive relationship between the variables.

When we examine the effect of the control variables on the model, we find that the increase in bank size decreases the RWATA in periods of economic expansion; in contrast, it increases it in standard market conditions and periods of economic contraction. Moreover, we identify that the increase in banks' loan growth increases the RWATA; in contrast, the increase in banks' liquidity level increases the RWATA only in periods of economic expansion and contraction. We also discover that, during periods of economic expansion and under standard market conditions, an increase in banks' OER reduces the RWATA.

Table 4. Panel Quantile Regression Model Estimation Results for RBC-RWATA

Quantiles	RWATA	Coefficient	Std. Dev.	Z	Prob.	95% Conf. Interval	
	RBC	-2.189054	0.0166502	-131.47	0.000***	-2.221688	-2.15642
	LGR	0.4814569	0.0034499	139.56	0.000***	0.4746951	0.4882186
Q=0.25	OER	-0.75821	0.062583	-12.12	0.000***	-0.8808705	-0.6355496
	LNBS	-0.0015265	0.0006152	-2.48	0.013**	-0.0027324	-0.0003206
	LR	0.1916524	0.0245381	7.81	0.000***	0.1435587	0.2397461
	RBC	-1.579153	0.034502	-45.77	0.000***	-1.646775	-1.51153
	LGR	0.2025658	0.0288649	7.02	0.000***	0.1459917	0.25914
Q=0.50	OER	-1.066542	0.0745105	-14.31	0.000***	-1.21258	-0.9205044
	LNBS	0.0054729	0.0007035	7.78	0.000***	0.0040941	0.0068518
	LR	-0.0133345	0.0206886	-0.64	0.519	-0.0538834	0.0272145
	RBC	-0.9763878	0.0608975	-16.03	0.000***	-1.095745	-0.857031
	LGR	0.2477793	0.0548676	4.52	0.000***	0.1402407	0.3553179
Q=0.75	OER	-0.0636825	0.0961956	-0.66	0.508	-0.2522224	0.1248575
	LNBS	0.0105916	0.0028898	3.67	0.000***	0.0049277	0.0162555
	LR	0.2279774	0.0343473	6.64	0.000***	0.1606578	0.2952969

Note: ***, ** and * state statistical significance at 1%, 5% and 10% levels, respectively. Moreover, Q= 0.25, Q= 0.50 and Q= 0.75 represent the lower quantiles (economic expansion periods), the middle quantiles (standard market conditions), and the upper quantiles (economic contraction periods), respectively.

Table 5 shows that the effect of the CR variable on the LLPTA variable is statistically significant and positive at the 5% level in the middle and upper quantiles. At the same time, it is negative in the lower quantiles. In other words, the findings suggest that an increase in banks' traditional capital levels increases the provision for loan losses ratio under standard market conditions and in periods of economic contraction. At the same time, it decreases in periods of economic expansion. The findings differ from those of Abbas et al. (2021). They determined a positive relationship between variables in general. When we evaluate the effect of control variables on the model, we find that an increase in bank size increases the LLPTA in all market conditions. In contrast, growing banks' liquidity level decreases the LLPTA. In addition, we observe that while the increase in banks' OER level decreases LLPTA during economic contraction periods, it increases it during standard market conditions and economic contraction periods. We also conclude that the increase in banks' loan growth in both periods of economic expansion and contraction increases the LLPTA.

Table 5. Panel Quantile Regression Model Estimation Results for CR-LLPTA

Quantiles	LLPTA	Coefficient	Std. Dev.	Z	Prob.	95% Conf. Interval	
	CR	-0.0153831	0.0007802	-19.72	0.000***	-0.0169123	-0.0138539
	OER	-0.0150089	0.001328	-11.30	0.000***	-0.0176117	-0.012406
Q=0.25	LNBS	0.0010038	0.0000333	30.10	0.000***	0.0009385	0.0010692
	LR	-0.0160723	0.0003947	-40.72	0.000***	-0.0168459	-0.0152986
	LGR	0.0054868	0.0004467	12.28	0.000***	0.0046112	0.0063623
	CR	0.022758	0.0094529	2.41	0.016**	0.0042306	0.0412853
	OER	0.090992	0.0281911	3.23	0.001***	0.0357386	0.1462455
Q=0.50	LNBS	0.0012756	0.0007387	1.73	0.084*	-0.0001722	0.0027235
	LR	-0.0237303	0.0071085	-3.34	0.001***	-0.0376627	-0.0097979
	LGR	-0.0078782	0.0132521	-0.59	0.552	-0.0338518	0.0180955
	CR	0.0117884	0.0029298	4.02	0.000***	0.0060462	0.0175307
	OER	0.0774643	0.0077292	10.02	0.000***	0.0623154	0.0926132
Q=0.75	LNBS	0.000771	0.0001339	5.76	0.000***	0.0005085	0.0010336
	LR	-0.0104496	0.0017964	-5.82	0.000***	-0.0139704	-0.0069287
	LGR	0.0452647	0.0043656	10.37	0.000***	0.0367082	0.0538212

Note: ***, ** and * state statistical significance at 1%, 5% and 10% levels, respectively. Moreover, Q= 0.25, Q= 0.50 and Q= 0.75 represent the lower quantiles (economic expansion periods), the middle quantiles (standard market conditions), and the upper quantiles (economic contraction periods), respectively.

When we analyze Table 6, we observe that while the effect of the CR variable on the RWATA variable in the middle quantiles is statistically significant and negative at the 5% level, the impact is statistically significant and positive in the upper quantiles. However, the positive effect in the lower quantiles is not statistically significant. The findings prove that the increase in banks' traditional capital levels decreases the share of risk-weighted assets in total assets under standard market conditions but increases it during economic contractions. The findings differ from those of Bouheni and Rachdi (2015) and Abbas and Bashir (2021). While Bouheni and Rachdi (2015) found a negative relationship between the variables in all periods, Abbas and Bashir (2021) stated that there was a positive relationship.

Table 6. Panel Quantile Regression Model Estimation Results for CR-RWATA

Quantiles	RWATA	Coefficient	Std. Dev.	Z	Prob.	95% Conf. Interval	
	CR	0.933484	0.7718538	1.21	0.227	-0.5793217	2.44629
	OER	0.5636066	0.6412943	0.88	0.379	-0.6933071	1.82052
Q=0.25	LR	0.0667303	0.4068082	0.16	0.870	-0.7305991	0.8640598
	LGR	0.1115034	0.1884916	0.59	0.554	-0.2579335	0.4809402
	LNBS	-0.0090694	0.008967	-1.01	0.312	-0.0266444	0.0085056
	CR	-0.6239694	0.2376076	-2.63	0009***	-1.089672	-0.158267
	OER	0.8620982	0.7356782	1.17	0.241	-0.5798045	2.304001
Q=0.50	LR	-0.0868421	0.1270661	-0.68	0.494	-0.3358872	0.162203
	LGR	0.0966657	0.0893901	1.08	0.280	-0.0785356	0.271867
	LNBS	0.0259796	0.0073857	3.52	0.000***	0.011504	0.0404553
	CR	0.3669325	0.078186	4.69	0.000***	0.2136908	0.5201742
	OER	-0.2076189	0.1086821	-1.91	0.056*	-0.4206319	0.005394
Q=0.75	LR	0.4209809	0.0469672	8.96	0.000***	0.3289268	0.513035
	LGR	0.6090252	0.1142417	5.33	0.000***	0.3851156	0.8329347
	LNBS	0.0311507	0.0059935	5.20	0.000***	0.0194037	0.0428977

Note: ***, ** and * state statistical significance at 1%, 5% and 10% levels, respectively. Moreover, Q= 0.25, Q= 0.50 and Q= 0.75 represent the lower quantiles (economic expansion periods), the middle quantiles (standard market conditions), and the upper quantiles (economic contraction periods), respectively.

Reviewing the effect of control variables on the model, we find that the increase in banks' OER levels decreases the RWATA during economic contraction periods, while the rise in banks' loan growth and liquidity levels increases the RWATA. Moreover, we observe that the increase in bank size increases the RWATA in standard market conditions and periods of economic contraction. We present the estimation results obtained regarding the relationship between BC and profitability in Table 7, Table 8, Table 9, and Table 10, respectively.

According to Table 7, the RBC variable's effect on the ROA variable in all quantiles is statistically significant and positive at the 5% level. The findings reveal that increased banks' RBC levels increase ROA under all market conditions. The findings are consistent with the findings of Celik and Kaya (2019), Coccorese and Girardone (2021), Sanic and Sendeniz-Yuncu (2021), Yaman (2021), Kaya et al. (2022), Subhani et al. (2022), Boamah et al. (2023), and Kaplan et al. (2023). However, the findings differ from the findings reported by Aydin (2019). Aydin (2019) suggested an inverted U-shaped relationship between RBC and ROA. When we analyze the effect of control variables on the model, we detect that the increase in bank size increases the ROA in periods of economic expansion. At the same time, it decreases in standard market conditions and periods of economic contraction. In addition, we observe that the increase in banks' OER decreases the ROA in periods of economic expansion; in contrast, it increases in standard market conditions and periods of economic contraction. We also discover that whereas the increase in the liquidity level of the banks increases the ROA under standard market conditions, it decreases during the economic contraction periods, and the increase in the banks' credit growth decreases the ROA in all market conditions.

Table 7. Panel Quantile Regression Model Estimation Results for RBC-ROA

Quantiles	ROA	Coefficient	Std. Dev.	Z	Prob.	95% Conf. Interval	
Q=0.25	RBC	0.0230495	0.0029993	7.68	0.000***	0.0171709	0.028928
	LNBS	0.0003708	0.0000557	6.65	0.000***	0.0002616	0.0004801
	LR	-0.0017181	0.0017921	-0.96	0.338	-0.0052305	0.0017944
	LGR	-0.0242524	0.0011475	-21.13	0.000***	-0.0265015	-0.0220033
	OER	-0.0257503	0.002441	-10.55	0.000***	-0.0305347	-0.020966
Q=0.50	RBC	0.0512856	0.000295	173.85	0.000***	0.0507074	0.0518638
	LNBS	-0.0000237	5.62e-06	-4.22	0.000***	-0.0000347	-0.0000127
	LR	0.0061558	0.0002155	28.56	0.000***	0.0057334	0.0065782
	LGR	-0.0380645	0.0001584	-240.38	0.000***	-0.0383748	-0.0377541
	OER	0.0146983	0.0001637	89.78	0.000***	0.0143774	0.0150192
Q=0.75	RBC	0.0616913	0.0006365	96.92	0.000***	0.0604438	0.0629389
	LNBS	-0.0012209	0.0000125	-98.03	0.000***	-0.0012453	-0.0011965
	LR	-0.0032616	0.0004753	-6.86	0.000***	-0.0041932	-0.0023299
	LGR	-0.0652287	0.0004739	-137.64	0.000***	-0.0661575	-0.0642998
	OER	0.0078056	0.0004681	16.67	0.000***	0.0068881	0.0087232

Note: ***, ** and * state statistical significance at 1%, 5% and 10% levels, respectively. Moreover, Q= 0.25, Q= 0.50 and Q= 0.75 represent the lower quantiles (economic expansion periods), the middle quantiles (standard market conditions), and the upper quantiles (economic contraction periods), respectively.

When we analyze Table 8, we observe that the effect of the RBC variable on the ROE variable in the lower quantiles is statistically significant and positive at the 5% level. In contrast, the impact is statistically significant and negative in the middle and upper quantiles. The findings show that whereas the increase in banks' RBC levels increases the ROE during

economic expansion periods, the increase in banks' RBC levels decreases the ROE during standard market conditions and economic contraction periods. In other words, there is an inverted U-shaped relationship between the variables. The findings differ from those of Yaman (2021), Subhani et al. (2022), and Kaplan et al. (2023). Yaman (2021) and Subhani et al. (2022) detected a positive relationship between the variables in all periods. In addition, Kaplan et al. (2023) concluded that while there is a positive relationship between the variables in large and medium-sized banks, there is no significant relationship between the variables in small-sized banks.

When we investigate the effect of control variables on the model, we find that while the increase in bank size increases the ROE in periods of economic expansion, the increase in bank size decreases the ROE in standard market conditions and periods of economic contraction. Moreover, growing banks' loan growth, liquidity and OER levels decrease the ROE in all market conditions.

Table 8. Panel Quantile Regression Model Estimation Results for RBC-ROE

Quantiles	ROE	Coefficient	Std. Dev.	Z	Prob.	95% Conf. Interval	
	RBC	0.1441183	0.0386026	3.73	0.000***	0.0684587	0.219778
	LNBS	0.0045481	0.0012731	3.57	0.000***	0.0020529	0.0070434
Q=0.25	LR	-0.0937415	0.0327814	-2.86	0.004***	-0.1579919	-0.0294911
	LGR	-0.3085661	0.0373576	-8.26	0.000***	-0.3817856	-0.2353467
	OER	-0.3857482	0.0690461	-5.59	0.000***	-0.5210761	-0.2504203
	RBC	-0.0358818	0.0022849	-15.70	0.000***	-0.0403601	-0.0314035
	LNBS	-0.0103163	0.0000352	-293.31	0.000***	-0.0103852	-0.0102474
Q=0.50	LR	-0.0659481	0.0015382	-42.87	0.000***	-0.068963	-0.0629332
	LGR	-0.3138513	0.0022774	-137.81	0.000***	-0.318315	-0.3093876
	OER	-0.0211735	0.0023636	-8.96	0.000***	-0.0258061	-0.0165409
	RBC	-0.2780531	0.0008702	-319.51	0.000***	-0.2797587	-0.2763474
	LNBS	-0.0218279	0.0000133	-1647.14	0.000***	-0.0218539	-0.021802
Q=0.75	LR	-0.1388812	0.0003352	-414.28	0.000***	-0.1395383	-0.1382242
	LGR	-0.4709652	0.0008945	-526.49	0.000***	-0.4727185	-0.469212
	OER	-0.0455396	0.0016178	-28.15	0.000***	-0.0487105	-0.0423687

Note: ***, ** and * state statistical significance at 1%, 5% and 10% levels, respectively. Moreover, Q= 0.25, Q= 0.50 and Q= 0.75 represent the lower quantiles (economic expansion periods), the middle quantiles (standard market conditions), and the upper quantiles (economic contraction periods), respectively.

When we analyze Table 9, we identify that the effect of the CR variable on the ROA variable in all quantiles is positive and statistically significant at 5%. The findings show that an increase in the traditional capital ratio increases the ROA in all market conditions. The results obtained in the study are consistent with the findings of Gunes (2014), Lee, Ning and Lee (2015), Okuyan and Karatas (2017), Kocaman et al. (2018), Kilic (2019), Coccorese and Girardone (2021), Kaya et al. (2022), and Boamah et al.(2023); however, it differs from the findings of Nur (2022) and Topak and Talu (2017). They found a negative relationship between the variables.

When we examine the effect of control variables on the model, we find that while the increase in banks' OER level decreases ROA in periods of economic expansion and standard market conditions, it increases in periods of economic contraction. In addition, whereas the increase in bank size increases ROA in periods of economic expansion, it decreases it in

standard market conditions and periods of economic contraction. We also discover that while the increase in banks' liquidity levels decreases the ROA only in standard market conditions and during the economic contraction periods, the increase in the banks' loan growth decreases the ROA in all market conditions.

Table 9. Panel Quantile Regression Model Estimation Results for CR-ROA

Quantiles	ROA	Coefficient	Std. Dev.	Z	Prob.	95% Conf. Interval	
Q=0.25	CR	0.1511059	0.006253	24.17	0.000***	0.1388502	0.1633617
	OER	-0.035819	0.0068543	-5.23	0.000***	-0.0492533	-0.0223848
	LGR	-0.0228456	0.0045225	-5.05	0.004***	-0.0317096	-0.0139816
	LR	0.0024943	0.0037142	0.67	0.502	-0.0047854	0.0097741
	LNBS	0.0008021	0.0003222	2.49	0.013**	0.0001707	0.0014336
Q=0.50	CR	0.1899274	0.004465	42.54	0.000***	0.1811762	0.1986786
	OER	-0.0202158	0.0055341	-3.65	0.000***	-0.0310625	-0.0093691
	LGR	-0.0393068	0.00109	-36.06	0.000***	-0.0414432	-0.0371704
	LR	-0.0161176	0.0007581	-21.26	0.000***	-0.0176035	-0.0146316
	LNBS	-0.0013094	0.0000507	-25.82	0.000***	-0.0014088	-0.0012101
Q=0.75	CR	0.1548996	0.0002699	573.89	0.000***	0.1543706	0.1554286
	OER	0.0040514	0.0001952	20.76	0.000***	0.0036689	0.0044339
	LGR	-0.046214	0.0001813	-254.89	0.000***	-0.0465693	-0.0458586
	LR	-0.0163112	0.000123	-132.61	0.000***	-0.0165523	-0.0160701
	LNBS	-0.0016058	3.85e-06	-416.58	0.000***	-0.0016133	-0.0015982

Note: ***, ** and * state statistical significance at 1%, 5% and 10% levels, respectively. Moreover, Q= 0.25, Q= 0.50 and Q= 0.75 represent the lower quantiles (economic expansion periods), the middle quantiles (standard market conditions), and the upper quantiles (economic contraction periods), respectively.

According to Table 10, we can declare that the effect of the CR variable on the ROE variable is statistically significant and positive at the 5% level in the lower and upper quantiles and negative in the middle quantiles. The findings reveal that whereas the increase in banks' traditional capital levels increases the ROE during periods of economic expansion, it decreases it under standard market conditions and increases it during periods of economic contraction. In other words, there is an N-shaped relationship between the variables. The findings are different from the findings of Ayaydin and Karakaya (2014), Lee et al. (2015), Jabra et al. (2017), Okuyan and Karatas (2017), Topak and Talu (2017), Kocaman et al. (2018), Farkasdi et al. (2021), and Sanic and Sendeniz-Yuncu (2021). Ayaydin and Karakaya (2014), Lee et al. (2015), Topak and Talu (2017), and Sanic and Sendeniz-Yuncu (2021) found a negative relationship between the variables; in contrast, Jabra et al. (2017), Kocaman et al. (2018), and Farkasdi et al. (2021) reported a positive relationship. Okuyan and Karatas (2017) could not determine a significant relationship between the variables. When we evaluate the effect of control variables on the model, we find that the increase in bank size increases the ROE in periods of economic expansion; in contrast, it decreases in standard market conditions and periods of economic contraction. Moreover, we can assert that the increase in the activity level of banks falls the ROE during periods of economic expansion and under standard market conditions; in contrast, it increases during periods of economic contraction. We observe that the increase in banks' loan growth reduces the ROE under all market conditions; at the same time, the increase in banks' liquidity level reduces the ROE only under standard market conditions and during periods of economic contraction.

Table 10. Panel Quantile Regression Model Estimation Results for CR-ROE

Quantiles	ROE	Coefficient	Std. Dev.	Z	Prob.	95% Conf. Interval	
	CR	0.4014711	0.5133253	7.26	0.000***	0.2930633	0.509879
	LNBS	0.0064577	0.0012811	5.04	0.000***	0.0039468	0.0089686
Q=0.25	LR	0.017359	0.0525288	0.33	0.741	-0.0855956	0.1203135
	LGR	-0.1745874	0.0462588	-3.77	0.000***	-0.265253	-0.0839219
	OER	-0.5133253	0.1459014	-3.52	0.000***	-0.7992868	-0.2273638
	CR	-0.4457255	0.040625	-10.97	0.000***	-0.525349	-0.366102
	LNBS	-0.0078917	0.0005841	-13.51	0.000***	-0.0090366	-0.0067469
Q=0.50	LR	-0.2169228	0.0191462	-11.33	0.000***	-0.2544487	-0.1793969
	LGR	-0.4545769	0.0206157	-22.05	0.000***	-0.4949829	-0.4141708
	OER	-1.129672	0.1074439	-10.51	0.000***	-1.340258	-0.9190861
	CR	0.2561393	0.0046126	55.53	0.000***	0.2470988	0.2651798
	LNBS	-0.0145863	0.0001056	-138.17	0.000***	-0.0147933	-0.0143794
Q=0.75	LR	-0.2359594	0.0029426	-80.19	0.000***	-0.2417267	-0.2301921
	LGR	-0.5818548	0.0036799	-158.12	0.000***	-0.5890672	-0.5746424
	OER	0.0918177	0.0049414	18.58	0.000***	0.0821328	0.1015027

Note: ***, ** and * state statistical significance at 1%, 5% and 10% levels, respectively. Moreover, Q= 0.25, Q= 0.50 and Q= 0.75 represent the lower quantiles (economic expansion periods), the middle quantiles (standard market conditions), and the upper quantiles (economic contraction periods), respectively.

We show the estimation results obtained for the relationship between risk-taking and profitability in Table 11, Table 12, Table 13, and Table 14, respectively. When we review Table 11, we observe that the effect of the LLPTA variable on the ROA variable in all quantiles is statistically significant and negative at a 5% level. The findings demonstrate that increasing the provision for loan losses decreases the ROA in all market conditions. The results obtained are consistent with the findings of Ul Mustafa et al. (2012), Isik (2017), Kadioglu et al. (2017), and Mujtaba et al. (2022). However, it differs from the findings of Gizaw et al. (2015). They found that there is a positive relationship between the variables.

Table 11. Panel Quantile Regression Model Estimation Results for LLPTA-ROA

Quantiles	ROA	Coefficient	Std. Dev.	Z	Prob.	95% Conf. Interval	
	LLPTA	-0.2469343	0.0033673	-73.33	0.000***	-0.2535341	-0.2403345
	LR	-0.0006079	0.000301	-2.02	0.043**	-0.0011978	-0.000018
Q=0.25	LGR	-0.0300116	0.0002667	-112.55	0.000***	-0.0305342	-0.029489
	OER	-0.0205285	0.0013304	-15.43	0.000***	-0.0231359	-0.017921
	LNBS	0.0003266	6.56e-06	49.79	0.000***	0.0003137	0.0003394
	LLPTA	-0.1405775	0.0027726	-50.70	0.000***	-0.1460116	-0.1351434
	LR	0.000455	0.0003237	1.41	0.160	-0.0001795	0.0010895
Q=0.50	LGR	-0.0377919	0.0005447	-69.38	0.000***	-0.0388595	-0.0367242
	OER	0.0019252	0.0007466	2.58	0.010**	0.0004619	0.0033885
	LNBS	0.0003312	0.0000141	23.52	0.000***	0.0003036	0.0003588
	LLPTA	-0.2654669	0.0063425	-41.86	0.000***	-0.277898	-0.2530358
	LR	-0.0133178	0.0009193	-14.49	0.000***	-0.0151195	-0.0115161
Q=0.75	LGR	-0.0553762	0.0006627	-83.56	0.000***	-0.0566751	-0.0540772
	OER	0.0053292	0.0006142	8.68	0.000***	0.0041254	0.0065331
	LNBS	-0.0028405	0.0002067	-13.74	0.000***	-0.0032457	-0.0024353

Note: ***, ** and * state statistical significance at 1%, 5% and 10% levels, respectively. Moreover, Q= 0.25, Q= 0.50 and Q= 0.75 represent the lower quantiles (economic expansion periods), the middle quantiles (standard market conditions), and the upper quantiles (economic contraction periods), respectively.

When we analyze the effect of the control variables on the model, we determine that the increase in bank size increases ROA during periods of economic expansion and under standard market conditions, while it decreases it during periods of economic contraction. We also find that the increase in banks' OER levels decreases the ROA in periods of economic expansion; in contrast, it increases in standard market conditions and periods of economic contraction. Moreover, we discover that an increase in banks' liquidity levels decreases the ROA during periods of economic expansion and contraction but increases it during standard market conditions; an increase in banks' loan growth decreases the ROA under all market conditions.

Table 12 shows that the effect of the LLPTA variable on the ROE variable in the lower quantiles is statistically significant and positive at a 5% level; in contrast, its impact is negative in the middle and upper quantiles. The findings indicate that while the increase in the provision for loan losses ratio increases the ROE in the expansion periods of the economy, it decreases it in standard market conditions and the contraction periods of the economy. In other words, the findings state an inverted U-shaped relationship between the variables. The results differ from those of Gizaw et al. (2015) and Kadioglu et al. (2017). Whereas Gizaw et al. (2015) found a positive relationship between the variables in all periods, Kadioglu et al. (2017) estimated a negative relationship. When we investigate the effect of control variables on the model, we observe that an increase in banks' OER level decreases the ROE only in periods of economic expansion and under standard market conditions. We also find that banks' loan growth and the increase in bank size reduce the ROE in all market conditions. Furthermore, we determine that the increase in banks' liquidity levels increases ROE during periods of economic expansion; in contrast, it decreases it under standard market conditions and during periods of economic contraction.

Table 12. Panel Quantile Regression Model Estimation Results for LLPTA-ROE

Quantiles	ROE	Coefficient	Std. Dev.	Z	Prob.	95% Conf. Interval	
Q=0.25	LLPTA	0.832394	0.0833824	9.98	0.000***	0.6689675	0.9958205
	OER	-0.1668049	0.007567	-22.04	0.000***	-0.181636	-0.1519738
	LNBS	-0.0014746	0.0001178	-12.51	0.000***	-0.0017055	-0.0012437
	LR	0.0739083	0.0097271	7.60	0.000***	0.0548436	0.0929731
	LGR	-0.1359076	0.0084308	-16.12	0.000***	-0.1524315	-0.1193836
Q=0.50	LLPTA	-1.994996	0.2244267	-8.89	0.000***	-2.434864	-1.555128
	OER	-0.1771178	0.065566	-2.70	0.007***	-0.3056249	-0.0486107
	LNBS	-0.0063251	0.0007856	-8.05	0.000***	-0.0078648	-0.0047853
	LR	-0.1863839	0.0207129	-9.00	0.000***	-0.2269804	-0.1457874
	LGR	-0.4303974	0.0236791	-18.18	0.000***	-0.4768077	-0.3839872
Q=0.75	LLPTA	-0.5647688	0.0319937	-17.65	0.000***	-0.6274752	-0.5020624
	OER	0.0056159	0.0047536	1.18	0.237	-0.0037009	0.0149327
	LNBS	-0.0153473	0.0001949	-78.74	0.000***	-0.0157293	-0.0149653
	LR	-0.1266836	0.002764	-45.83	0.000***	-0.132101	-0.1212663
	LGR	-0.4580675	0.0046118	-99.33	0.000***	-0.4671065	-0.4490286

Note: ***, ** and * state statistical significance at 1%, 5% and 10% levels, respectively. Moreover, Q= 0.25, Q= 0.50 and Q= 0.75 represent the lower quantiles (economic expansion periods), the middle quantiles (standard market conditions), and the upper quantiles (economic contraction periods), respectively.

According to Table 13, the effect of the RWATA variable on the ROA variable in all quantiles is statistically significant and positive at a 5% level. The findings infer that an increase in the RWATA ratio increases the ROA under all market conditions. The results are consistent

with the findings of Hu and Xie (2016) and Gasimova and Karimov (2017). When we evaluate the effect of control variables on the model, we find that the increase in bank size increases the ROA in periods of economic expansion; at the same time, it decreases it in standard market conditions and periods of economic contraction. We observe that the increase in banks' liquidity levels increases ROA during periods of economic expansion and contraction, while it decreases it during standard market conditions. In addition, we discover that the increase in banks' OER levels decreases the ROA during periods of economic expansion, while it increases under standard market conditions and during periods of economic contraction. We also conclude that raised banks' loan growth decreases the ROA under all market conditions.

Table 13. Panel Quantile Regression Model Estimation Results for RWATA-ROA

Quantiles	ROA	Coefficient	Std. Dev.	Z	Prob.	95% Conf. Interval	
	RWATA	0.0023962	0.0009275	2.58	0.010**	0.0005784	0.0042141
	LNBS	0.0005018	0.0000497	10.10	0.000***	0.0004044	0.0005992
Q=0.25	LR	0.0116153	0.0006815	17.04	0.000***	0.0102795	0.0129511
	LGR	-0.0237415	0.0004133	-57.45	0.000***	-0.0245515	-0.0229315
	OER	-0.0355178	0.0041782	-8.50	0.000***	-0.0437068	-0.0273287
	RWATA	0.0045767	0.0001359	33.69	0.000***	0.0043105	0.004843
	LNBS	-0.000332	0.000017	-19.58	0.000***	-0.0003653	-0.0002988
Q=0.50	LR	-0.0045377	0.0008242	-5.51	0.000***	-0.006153	-0.0029223
	LGR	-0.0434274	0.0005217	-83.24	0.000***	-0.04445	-0.0424048
	OER	0.0115745	0.0003776	30.65	0.000***	0.0108344	0.0123147
	RWATA	0.0023368	0.0001385	16.87	0.000***	0.0020653	0.0026083
	LNBS	-0.0012701	0.0000134	-94.80	0.000***	-0.0012963	-0.0012438
Q=0.75	LR	0.0020102	0.0005435	3.70	0.000***	0.0009449	0.0030755
	LGR	-0.0566051	0.0002733	-207.08	0.000***	-0.0571409	-0.0560694
	OER	0.0023213	0.0002432	9.55	0.000***	0.0018447	0.0027979

Note: ***, ** and * state statistical significance at 1%, 5% and 10% levels, respectively. Moreover, Q= 0.25, Q= 0.50 and Q= 0.75 represent the lower quantiles (economic expansion periods), the middle quantiles (standard market conditions), and the upper quantiles (economic contraction periods), respectively.

In Table 14, we observe that the effect of the RWATA variable on the ROE variable in all quantiles is statistically significant and positive at a 5% level. The findings reveal that an increase in the RWATA ratio increases the ROE under all market conditions. The results obtained are consistent with the findings of Hu and Xie (2016). When we analyse the effect of the control variables on the model, we conclude that the increase in bank size increases the ROE in periods of economic expansion; at the same time, it decreases it in standard market conditions and periods of economic contraction. In addition, we find that banks' loan growth and the increase in banks' liquidity and OER levels decrease the ROE under all market conditions.

Table 14. Panel Quantile Regression Model Estimation Results for RWATA-ROE

Quantiles	ROE	Coefficient	Std. Dev.	Z	Prob.	95% Conf. Interval	
	RWATA	0.0353463	0.0091098	3.88	0.000***	0.0174914	0.0532012
	LNBS	0.00208	0.0006901	3.01	0.003***	0.0007274	0.0034325
Q=0.25	LR	-0.1998137	0.0328327	-6.09	0.000***	-0.2641646	-0.1354628
	LGR	-0.3693673	0.0382618	-9.65	0.000***	-0.444359	-0.2943756
	OER	-0.5727412	0.0564612	-10.14	0.000***	-0.6834031	-0.4620793
	RWATA	0.0329097	0.0026398	12.47	0.000***	0.0277358	0.0380836
	LNBS	-0.0091669	0.0005958	-15.39	0.000***	-0.0103346	-0.0079991
Q=0.50	LR	-0.0598048	0.0039249	-15.24	0.000***	-0.0674974	-0.0521121
	LGR	-0.3191918	0.0123685	-25.81	0.000***	-0.3434336	-0.29495
	OER	-0.11295	0.0252515	-4.47	0.000***	-0.162442	-0.0634579
	RWATA	0.0118265	0.0008215	14.40	0.000***	0.0102164	0.0134366
	LNBS	-0.018179	0.0000871	-208.65	0.000***	-0.0183497	-0.0180082
Q=0.75	LR	-0.1369179	0.0020775	-65.90	0.000***	-0.1409898	-0.132846
	LGR	-0.5357694	0.002531	-211.69	0.000***	-0.54073	-0.5308088
	OER	-0.0338159	0.0044801	-7.55	0.000***	-0.0425968	-0.0250351

Note: ***, ** and * state statistical significance at 1%, 5% and 10% levels, respectively. Moreover, Q= 0.25, Q= 0.50 and Q= 0.75 represent the lower quantiles (economic expansion periods), the middle quantiles (standard market conditions), and the upper quantiles (economic contraction periods), respectively.

5. Conclusion and Policy Recommendations

This study wants to investigate the relationship between BC, risk-taking and profitability in Turkish commercial banks. Therefore, we consider the traditional and RBC ratios to represent BC, the provision for loan losses ratio and the RWATA ratio to describe risk-taking behaviour, and the ROA and ROE to represent profitability indicators. We perform the analyses based on QRPD with NAFE models. Firstly, we identify the following findings from the models testing the relationship between BC and risk-taking:

During periods of economic expansion and under standard market conditions, the increase in banks' RBC ratios increases the provision for loan losses. The findings suggest that during periods of economic expansion and under standard market conditions, commercial banks increase loan loss provisions to hedge against credit default when RBC ratios increase. While the increase in banks' traditional capital ratios increases the provision for loan losses under standard market conditions and in periods of economic contraction, it decreases it in periods of economic expansion. The findings indicate that commercial banks keep their loan loss provisions at low levels during periods of economic expansion due to the low probability of default from market conditions. In addition, the findings state that in standard market conditions and periods of economic contraction, they increase their provisions for loan losses due to the high probability of default due to increased risk and funding costs. Under all market conditions, the increase in banks' RBC ratios reduces the share of RWATA in total assets. The findings reveal that bank managers interpret the increased risk differently, increase their investments in risky assets, and hold less capital to benefit from the advantages of the deposit insurance system. The results support the moral hazard hypothesis. While the increase in banks' traditional capital ratios decreases the share of RWATA in total assets under standard market conditions, it increases it during periods of economic contraction. The findings imply that commercial bank managers reduce their investments in risky assets to maintain high capital levels under standard

market conditions; during economic contractions, increased capital levels motivate them to take high-risk groups.

Secondly, we obtain the following findings from the models testing the relationship between BC and profitability. Under all market conditions, increasing banks' RBC ratios increase ROA. The findings show that the efforts to develop more risk-sensitive regulations and create a secure financial system with Basel implementations are welcomed positively by investors, and banks increase their profit margins by investing more in riskier assets due to their cost-efficient position. The results support the cost-skimping hypothesis. Under all market conditions, increasing banks' traditional capital ratios increase ROA. The results support the regulatory assumption hypothesis that bank managers can reflect private information about good bank prospects by raising capital, which can attract investors and positively affect the ROA. Consistent with the agency theory, the findings also reveal that bank managers may prefer high leverage levels in the event of bankruptcy or bail-in because of the high returns obtained from agency costs rather than closing the bank's deficit. Banks' RBC ratios and ROE have an inverted U-shaped relationship. The findings suggest that during periods of economic expansion, banks have sufficient equity to cover their risk levels; low default risk reduces the cost of capital and increases the ROE. In addition, the findings indicate that the increase in the cost of capital due to increased risk under standard market conditions and during economic contractions reduces banks' willingness to hold capital, reducing the ROE. Banks' traditional capital ratios and ROE have an inverted N-shaped relationship. The findings indicate that banks use their capital prudently and increase their OER by reducing external dependence during periods of economic expansion. In addition, the results mean that under standard market conditions, banks increase their level of external support and capital costs to engage in risky investment areas, reducing banks' willingness to hold capital and operational efficiency. In periods of economic contraction, we can also interpret that bank managers increase their OER levels due to the agency costs arising from the difference between banks' and supervisory authorities' risk perception.

Finally, we conclude the following findings from the models testing the relationship between risk-taking and profitability. Under all market conditions, increasing banks' provision for loan losses reduces the ROA. The findings state that this situation arises from banks having to set aside high loan loss provisions to cover the risk since they operate in challenging environments and cannot control their credit transactions. Under all market conditions, increasing the RWATA ratio increases the ROA. The findings show that increasing bank managers' risk appetite increases banks' return on assets; therefore, banks' balance between ROA and risk-taking is vital. The findings support the portfolio and risk-bearing profit theories. The provision for loan losses ratio and ROE have an inverted U-shaped relationship. The findings suggest that during periods of economic expansion, bank managers use cost-efficiency advantages in different investment areas by strengthening their credit management capacity and earnings management. The findings also reveal that under normal market conditions and in periods of economic contraction, bank managers use their available capital to cover the risk due to their inability to foresee the trouble arising from their lending activities, negatively affecting the ROE. Under all market conditions, an increase in the RWATA ratio increases the ROE. Consistent with the portfolio and risk-bearing profit theories, the findings state that rising bank managers' risk appetite increases banks' ROE; therefore, banks need to maintain the balance between ROE and risk-taking.

The research findings provide useful information for decision-makers and bank managers to evaluate the relationship between risk, capital, and profitability and to consider that no single factor alone can be sufficient in building bank soundness. In addition, the findings highlight that managers and regulators should focus on bank capitalization and look at profitability, capital ratios, and risk-taking levels to enhance bank stability. This study tests the data of a total of 18 banks consisting of public, private, and foreign capitalized banks for the period 2012-2022. Therefore, future studies can emphasize the issue's importance by extending the period range and comparing two samples of commercial banks and investment and development banks. Furthermore, future studies can investigate the interrelationships between BC, risk-taking, and profitability by including different economic indicators and the mediating role of bank regulation in the analyses to make in-depth predictions.

Declaration of Research and Publication Ethics
This study which does not require ethics committee approval and/or legal/specific permission complies with the research and publication ethics.

Researcher's Contribution Rate Statement
I am a single author of this paper. My contribution is 100%.

Declaration of Researcher's Conflict of Interest
There is no potential conflicts of interest in this study.

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