Effects of ownership on the relationship between bank capital and financial performance: evidence from Bangladesh

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A B S T R A C T

The financial performance of banks relies heavily on properly utilizing their capital. However, bank ownership can have varying effects on the relationship between financial performance and capital. This study delves into this relationship by examining the impact of ownership on financial performance and bank capital. The study analyzes data from 44 commercial banks in Bangladesh and uses a two-step system generalized method of moments to address heteroscedasticity and autocorrelation issues. Unlike previous studies, this study confirms the significant effect of ownership on the relationship between bank financial performance and bank capital. The study's main findings are: (1) an inverted U-shaped relationship exists between bank capital and financial performance, implying that increasing capital can improve and reduce financial performance. (2) Private and Islamic commercial banks perform better than state-owned and conventional banks. (3) private-owned and Islamic commercial banks with higher capital are more likely to achieve higher profitability and financial success, while state-owned and conventional commercial banks with higher capital show lower profitability and weaker financial performance. Overall, this study offers significant practical implications for academics, researchers, and regulators interested in leveraging these findings.

JEL Classification:
C30, G21, G32

Introduction

Financial institutions are essential in promoting economic growth and stability in the global economy. As the most important financial institution, the bank facilitates economic growth and financial stability and acts as the financial intermediary between the surplus and deficit units of the economies (Gupta et al., 2021). However, the Global Financial Crisis of 2007-2008 caused major shocks to many economies worldwide, leading to sudden changes in the value of banks due to insufficient capital and excessive risk-taking, leading them to poor financial performance. Since the banking sector's performance has insinuations for nations' economic welfare (Boamah et al., 2022), regulators worldwide have made concerted efforts to promote a stable banking system (Barth et al., 2013), recognizing that increasing capital levels are vital to ensure stability and safety through better performance (Basel Committee on Banking Supervision, 2010). Despite this, bankers often argue that holding more capital would harm their performance and lead to decreased lending due to the adverse effects of capital on performance (Berger & Bouwman, 2013). However, the literature also suggests the positive impact of capital on bank performance (Zarrouk et al., 2016).
Capital enhances banks' survival probability and increases the ability to compete in the market, thereby boosting its market share (Berger & Bouwman, 2013) and ultimately increasing the value of the bank. Moreover, banks prioritize profit maximization and enhancing shareholders' value due to their risk-averse nature (Ho & Saunders, 1981). The allocation of value among equity owners is heavily influenced by the ownership structure (Farooq et al., 2019), which can also aid in mitigating agency problems through active monitoring of agent activities by owners (Franks et al., 2001). Given divergent views in the literature, the question of the effects of capital on bank performance and its relationship with ownership presence ultimately comes down to an empirical question, which we address in this paper. Therefore, this paper delves into how ownership impacts the connection between capital and financial performance to provide valuable insights.

Recent research has revealed a gap in exploring the impact of ownership on the relationship between bank capital and financial performance, specifically in the commercial banks of Bangladesh. While Boamah et al. (2022) studied the effects of capital regulation on the performance of the banks of emerging economies, they did not consider the ownership effect. Similarly, Haris et al. (2020), Gazi et al. (2022), and Chowdhury et al. (2022) have investigated various aspects of this relationship, but none have considered the effect of ownership. Moreover, Mollah and Rouf (2022) investigated the impact of intellectual capital on the performance of Bangladeshi commercial banks without considering the ownership effects. In this pursuit, the objective of the study is to explore the relationship between bank capital and financial performance in an emerging economy like Bangladesh, considering the effects of ownership. However, this study also aims to address a few research questions. The three key questions are: (i) How does capital impact banks financial performance? (ii) Is there a non-linear relationship between capital and bank financial performance? (iii) Does ownership play an imperative role in mediating this relationship?

This study seeks to answer the research questions by observing how ownership affects the relationship between bank performance and capital. The contribution of this investigation to the banking industry's knowledge is significant in several ways. Firstly, unlike prior studies that focused on the link between financial performance and capital, this study is the first, to the best of our knowledge, to demonstrate the impact of ownership on this relationship. Secondly, we have explored the non-linear association between bank capital and financial performance. Thirdly, this study complements previous research by examining the influence of bank capital on financial performance, such as Haris et al. (2020) study that found an inverted U-shaped relationship between capital and profitability, and Chowdhury et al. (2022) study that found a positive association between capital and bank performance. Finally, our model has been developed empirically, and the results have been estimated using a two-step generalized method of moments (2sGMM).

The rest of the paper is organized in the following manner: Section 2 discusses the relevant literature and hypotheses development. Section 3 outlines the data and methodology. Section 4 presents the empirical findings and analysis. Lastly, Section 5 brings the paper to a conclusion.

**Literature Review**

**Theoretical and Conceptual Background**

Business owners enlist agents to manage their firms and handle daily operations (Berle & Means, 1932). However, these agents may misuse company resources for personal gain, leading to a conflict between owners and agents. The agency theory states that agency problems exist between the principal and the agent, leading to agency costs (Jensen & Meckling, 1976). According to Fama and Jensen (1983), there is an apparent dichotomy of ownership and control within organizations, resulting in a split of decision-making and control. They observed that separating decision-making and risk-bearing functions is routine in large corporations and organizations like professional partnerships, financial mutuals, and non-profits. However, Stewardship theory provides an alternative to agency theory by positing that responsible behavior emerges organically when organizations foster selless principles or when principals and agents share a convergence of values (Dicke, 2000; Mang/Unyi, 2011). This theory suggests that managers who are intrinsically motivated and committed to their organizations are more likely to prioritize the organization's goals, resulting in benefits for both parties. Whether managers adopt the role of steward or agent depends on their psychological motivations and situational perceptions (Davis et al., 1997).

As per the signaling hypothesis, banks can utilize their capital levels to convey confidential information regarding their forthcoming performance (Berger, 1995). This proposition implies that banks with greater capital levels are expected to perform better as they can signal their anticipation of higher revenues, lesser costs, or decreased risks compared to what is generally known to the public.

The ownership structure of a company intensely influences corporate governance. The concept of the grabbing-hand theory posits that government intervention during fiscal and political stress periods can harm bank capital efficiency (Liu et al., 2020; Wang et al., 2021). Wang et al. (2021) argued that government involvement does not enhance the banking market's competitiveness. However, if government intervention improves bank capital efficiency in a more competitive banking market, it lends credence to the helping hand view of government ownership.
Empirical Review and Hypothesis Development

Relationship between bank capital and performance

Research has shown that bank capital plays a key role in enhancing the performance and survival of banks (Berger & Bouwman, 2013). This is because holding more capital helps reduce risk-shifting inclinations and increases efficiency, leading to better overall performance. In addition, fulfilling shareholders’ expectations requires that the return or margin surpasses the capital cost, improving company performance (Nahar et al., 2016). In banking, there is a widely accepted belief that higher capital leads to lower profitability (Berger, 1995), which indicates lower performance of banks. However, despite the traditional view, several studies have demonstrated that bank capital boosts financial stability and performance. Using generalized methods of moments (GMM), Chowdhury et al. (2022) found that capital is a significant determinant of financial performance and has a positive relationship with the financial performance of Bangladeshi commercial banks. The positive effects of bank capital on financial performance are also evidenced by (Khalifaturofi’ah, 2021; Abbas et al., 2019; Bitar et al., 2018; Boamah et al., 2022; Coccorese & Girardone, 2021; Ekinci & Poyraz, 2019; Iannotta et al., 2007; Islam & Nishiyama, 2016; Kanga et al., 2020; Lee et al., 2015; Mehran & Thakor, 2011; Twum et al., 2022; Zheng et al., 2017).

While higher capital requirements can increase bank profitability (Ben Naceur & Kandil, 2009), recent research has shown that regulatory capital can decrease banks' financial performance (Gazi et al., 2022; Oino, 2018). This negative effect has also been demonstrated in the study by Giordana and Schumacher (2017). In their study on capitalization's effects on commercial banks' profitability in Pakistan, Haris et al. (2020) discovered an inverted U-shaped relationship between capital and banks' profitability. This means that financial performance increases with increased capitalization up to a certain point, but beyond that point, further increases in capitalization can decrease financial performance. This inverted non-linear U-shape relation between bank capital and financial performance has also been confirmed by Nsanyan Sadow et al. (2021).

Abbas et al. (2023) studied the relationship between bank capital, liquidity, and profitability in selected Asian countries using two-stage least squares methods. Their findings showed mixed evidence of a relationship between bank capital and financial performance, with significant positive effects for all banks under study but differing effects for large, medium, and small banks. The mixed relationship is also evidenced by Saleh and Abu Afifa (2020). However, Berger and Bouwman (2013) found no clear association between them.

Based on the preceding discussion, we have formulated the following hypothesis that illustrates the correlation between the bank's capital and its financial performance:

H1: Bank capital has a significant positive effect on the financial performance of commercial banks in Bangladesh.

The impact of ownership on the relationship between bank capital and financial performance.

The dealership model of Ho and Saunders (1981) presented banks as risk-averse entities striving to enhance the value of both their shareholders and stakeholders. To achieve this, banks often pursue profit maximization. However, because ownership is separated from management in the banking industry, a potential conflict of interest arises due to the agency problem. This conflict may impede the achievement of value maximization and profit maximization (Boachie, 2023). Ownership concentration can mitigate agency conflicts (Shleifer & Vishny, 1986) since most owners are incentivized to monitor managers' performance (Orazalin et al., 2016). Businesses’ decision-making relies on interest margin, capital, ownership, and agency cost Fleming et al. (2005), with banks optimizing financing and investment decisions to enhance the firm’s value and overcome the agency problem (Kraimer, 2002).

In an exploration of Nigerian commercial banks from 2006 to 2015, Ozili and Uadiaye (2017) investigated the correlation between bank profitability and ownership concentration. Their analysis, which employed fixed effect OLS and first difference GMM, revealed that bank ownership has varying effects on profitability. Specifically, they found that higher ownership concentration led to higher profitability, while dispersed ownership resulted in lower returns on assets and higher returns on equity. Agoraki and Kouretas (2019) discovered that domestic private ownership positively impacted the net interest margin, but government ownership did not have significant effects. The effects of foreign ownership on the net interest margin were mixed. However, Sensarma and Ghosh (2004) provided evidence of a positive relationship between foreign ownership and net interest margin. Shaban et al. (2014) concluded that Islamic banks in Indonesia have higher profitability than traditional commercial banks. Khasawneh (2016) also found that Islamic banks are more profitable, while conventional banks are more stable. Shawtari (2018) exposed that foreign banks had superior resources as they had ties with international banks. Additionally, their research revealed that Islamic banks performed better than conventional banks. Contrarily, Saghir et al. (2019) discovered that conventional banks showed better financial performance than Islamic banks in their study. Megginson (2005) revealed that private banks outperformed state-owned banks. Claessens and van Horen (2012) advocated that foreign banks generally had better financial performance than domestic ones. Gropp and Köhler (2010) found a positive relationship between ownership concentration and financial performance, while Mustafa and Doğan (2021) discovered a noteworthy negative correlation between bank profitability and ownership concentration, which followed a linear pattern. Moreover, Iannotta et al. (2007) found an insignificant effect of ownership concentration on bank financial performance. Gupta et al. (2020) found that private-sector banks in India were more profitable than public-sector banks.; and small and well-
capitalized banks performed better than their larger and low-capitalized counterparts. Similarly, Osama Al-Hares et al. (2013) discovered that Islamic banks in the Gulf Cooperation Council (GCC) region were more profitable than traditional commercial banks.

After examining previous research papers, we have categorized the impact of bank ownership into several areas, such as profitability (Lin et al., 2016; Ozili & Uadiale, 2017), performance (Alishammar, 2022; Boachie, 2023; Cornett et al., 2010; Migliardo & Forgione, 2018; Shartari, 2018), capital (Ding & Sickles, 2018; Gupta et al., 2023; Javaid et al., 2021; Lee & Hsieh, 2014; Moudud-Ul-Huq, Ahmed, et al., 2022), bank risk and stability (Ashraf et al., 2016; ElBannan, 2015; Grassa et al., 2021; Haque, 2019; Liu et al., 2020; Ozili & Outa, 2018; Tacneng, 2015), efficiency (Doan et al., 2018; Girardone et al., 2009; Haque & Brown, 2017; Jiang et al., 2013; Lin et al., 2016; Mamunov & Vernikov, 2017; Mutarindwa et al., 2021), liquidity (Toh & Jia, 2021; Yeddo & Pourroy, 2020), competition (Alexakis & Samantas, 2020; Yildirim et al., 2021), bank diversification (Mili et al., 2019), earning management (Lassoued et al., 2017), dividend policy, (Mehdi et al., 2017), capital allocation (Taboada, 2011), relationship between capital and risk (Chalermchatvichien et al., 2014), transparency disclosure (Bhimavarapu et al., 2023), relationship between competition and risk (Moudud-Ul-Huq, Biswas, et al., 2022), credit placement (Yuan et al., 2022), relationship between concentration and profitability (Atahau & Cronje, 2019), working capital, relationship between investment, and loan (Atahau & Cronje, 2020), financial stability of the banking industry (Boulouanour et al., 2021), relationship between risk and performance (Haque & Shahid, 2016), and relationship between income structure and risk (Grassa, 2016).

From the discussion above, it is observed that none have considered the effect of ownership on the relationship between bank capital and financial performance. This paper attempts to fill this gap by constructing the following hypothesis:

$$H_2:$$ Ownership significantly impacts the relationship between bank capital and financial performance.

**Research and Methodology**

**Data, Variables, and Methodology**

**Data**

This study analyzed the relationship between bank capital and financial performance in Bangladesh, focusing on the influence of ownership. Audited annual reports from banks operating in the country are used to gather data, along with macroeconomic and industry-level data from the World Bank's World Development Indicators. Bangladesh has a total of 61 scheduled banks, including six state-owned commercial banks (SOCBs), three specialized banks (SDBs), 43 private commercial banks (PCBs) (33 conventional commercial banks and 10 Islamic Shariah-based commercial banks), and nine foreign commercial banks (FCBs) (Bangladesh Bank, 2022). We initially included all commercial banks in the country as a sample, but we used different screening criteria to generate the final sample list.

FCBs and SDBs were excluded due to non-availability and inconsistent reporting, while banks with less than five consecutive annual reports were also removed. Finally, we excluded extreme outlier values from the dataset. After applying screening criteria from 2010-2021, we obtained 494 unbalanced panel observations from 44 commercial banks. Exclusion of data can be one of the limitations of the study. However, we exclude data to avoid inconsistency and more generalization of data. Moreover, as foreign bank data is in aggregate form, reported in foreign currencies, and unavailable for consecutive years, we exclude the missing data from our dataset for consistency, avoid outliers, and ensure the accuracy of results. However, incorporating foreign banks can uncover a new dimension of ownership, such as foreign and local banks. Future studies can address this limitation based on the availability and conversion of data in local currencies.

**Variables**

This study uses the return on assets (ROA) ratio as the dependent variable to measure financial performance. An alternative proxy of financial performance, net interest margin (NIM), is also utilized for the robustness test. To categorize banking institutions, we follow the methodology of Rahman et al. (2017) and Gupta and Yesmin (2022) and group them into four distinct categories: state-owned commercial banks, private commercial banks, conventional commercial banks, and Islamic commercial banks. Table 1 comprehensively describes all the variables used in this study.
Table 1: Description of the Variables

<table>
<thead>
<tr>
<th>Classification</th>
<th>Variable</th>
<th>Description</th>
<th>Literature References/ Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Performance</td>
<td>ROA</td>
<td>The Ratio of Return on Assets</td>
<td>Kanga et al. (2020)</td>
</tr>
<tr>
<td></td>
<td>NIM</td>
<td>Interest income − interest expenses / Total Average Assets</td>
<td>Rahman et al. (2018)</td>
</tr>
<tr>
<td>Capital</td>
<td>Capital</td>
<td>The ratio of Total Equity to Total Assets</td>
<td>Moudud-Ul-Huq (2021)</td>
</tr>
<tr>
<td>Ownership: Dummy variables</td>
<td>POD</td>
<td>Ownership dummy. Equals one (1) for the private-owned banks and zero (0) for the state-owned commercial banks.</td>
<td>Rahman et al. (2017) Authors Calculation</td>
</tr>
<tr>
<td></td>
<td>IOD</td>
<td>Ownership dummy. Equals one (1) for the Islamic banks and zero (0) for the conventional banks.</td>
<td>Gupta and Yesmin (2022) Authors Calculation</td>
</tr>
<tr>
<td>Risk</td>
<td>NPL</td>
<td>The ratio of nonperforming loans to total loan</td>
<td>Rahman et al. (2015)</td>
</tr>
<tr>
<td>Bank Size</td>
<td>Size</td>
<td>The logarithm of the total deposit</td>
<td>Das Gupta et al. (2021)</td>
</tr>
<tr>
<td>Operating efficiency</td>
<td>Operating Efficiency</td>
<td>Total Operating Expenses to Total Assets Ratio</td>
<td>Khan et al. (2023)</td>
</tr>
<tr>
<td>Liquidity</td>
<td>Liquidity</td>
<td>Loan to Deposit Ratio</td>
<td>Gazi et al. (2022)</td>
</tr>
</tbody>
</table>

Source: Author’s Compilation Using the Mentioned Sources/References.

In line with the approach of Saif-Alyousfi and Saha (2021) and Gupta et al. (2021), this study employed the two-step system generalized method of moments (2sGMM) developed by Arellano and Bond (1991) and Arellano and Bover (1995). The aim of employing 2sGMM is to address the heteroscedasticity (White test for heteroscedasticity) and autocorrelation (Berusch-Godfrey LM test for autocorrelation) concerns in the data. The model’s accuracy is verified through two standard tests, AR 1 and AR 2, and the Hansen test.

Empirical Research Framework

In this segment, we explain the experiential model of the study, which comprises the baseline and extended models of the financial performance and bank capital nexus. The baseline equation is used to establish the correlation between financial performance and bank capital based on the studies conducted by Gupta et al. (2021) and Boamah et al. (2022).

\[
PER_{it} = \beta_0 + \beta_1 PER_{i,t-1} + \beta_2 CAP_{i,t} + \beta_3 \sum_{q=3}^{6} X_{i,m,t} + \beta_7 Y_{i,n,t} + \beta_8 \sum_{s=9}^{10} Z_{i,s,t} + \epsilon_{i,t} \tag{1}
\]

The equation represents the cross-sectional dimensions across banks and time by subscript i and t. The vectors X, Y, and Z comprise bank-specific, industry-specific, and macroeconomic-specific control variables. We use subscript m, n, and s to represent bank, industry, and macroeconomic-specific perspectives. ‘PER_{i,t-1}’ represents the dependent variable – financial performance. PER_{i,t-1} denotes the lagged dependent variable. CAP_{i,t} refers to the main independent variable, which is capital. Bank-level control variables presented by X_{i,q,t}. include risk, size, operating efficiency, and liquidity. Y_{i,r,t} presents industry-level variable, which includes BSD (Banking Industry Asset to GDP). Z_{i,s,t} denotes macroeconomic variables, including the GDP growth and inflation.

Based on the research of Hussain and Bashir (2020) and Kayani et al. (2021), we have expanded our baseline equations by including quadratic terms of the dependent variable and ownership dummies. This enables us to thoroughly examine the nonlinear effects of capital on financial performance and the impact of ownership. Our extended models are outlined below:

\[
PER_{it} = \beta_0 + \beta_1 PER_{i,t-1} + \beta_2 CAP_{i,t} + \beta_3 CAP_{i,t}^2 + \beta_4 \sum_{q=3}^{7} X_{i,m,t} + \beta_8 Y_{i,n,t} + \beta_9 \sum_{s=9}^{10} Z_{i,s,t} + \epsilon_{i,t} \tag{2}
\]

\[
PER_{it} = \beta_0 + \beta_1 PER_{i,t-1} + \beta_2 CAP_{i,t} + \beta_3 \sum_{q=3}^{6} X_{i,m,t} + \beta_7 OWN_{i,t} + \beta_8 Y_{i,n,t} + \beta_9 \sum_{s=9}^{10} Z_{i,s,t} + \epsilon_{i,t} \tag{3}
\]
\[ \text{PER}_{it} = \beta_0 + \beta_1 \text{PER}_{i,t-1} + \beta_2 \text{CAP}_{i,t} + \beta_3 \sum_{q=3}^{6} X_{i,m,t} + \beta_7 \text{OWN}_{i,t} \times \text{CAP}_{i,t} + \beta_8 \sum_{s=3}^{10} Z_{i,s,t} + \epsilon_{it} \]  

(4)

Equation (2) provides insight into the non-linear effects of capital on financial performance. Equation (3) demonstrates the impact of ownership on the financial performance and bank capital nexus. Lastly, equation (4) showcases the joint effects of ownership and capital on the dependent variable.

**Inflection Point:**

To investigate potential non-linear relationships, we included the squared term of capital in equation (2). To interpret the results of the main independent variable and its squared terms, we followed the approach outlined by Hussain and Bashir (2020) and calculated inflection points. Inflection points represent the point at which the relationship between variables undergoes a meaningful shift, such as a change in direction from positive to negative or vice versa.

\[ \text{Inflection Point (Capital)} = \frac{-\text{coefficient of capital ratio}}{2 \times \text{coefficient of the squared term of capital ratio}} \]  

(5)

**Empirical Findings and Discussions**

In this segment, we provide a comprehensive overview of the statistics listed in Table 2 and the findings of the multicollinearity test in Table 3 and Table 4. The experiential results in Table 5 and Table 6 are achieved using the 2sGMM panel estimator. Also, we conducted the Hansen over-identification test to confirm the credibility of the instruments employed. Our applied models are scrutinized by AR (2), which tests the null hypothesis that error terms are not serially correlated. The AR (2) results in all of the models used in the study show no second-order serial correlation, as indicated by the P-values.

The correlation matrix utilizing Pearson's correlation coefficient is showcased in Table 3, while Table 4 showcases the variance in the inflation factor concerning financial performance. The correlation analysis aims to detect the presence of multicollinearity. Upon examination of Table 3, we can infer there is no sign of multicollinearity, as none of the correlations between independent variables exceed 0.70. Furthermore, the variance inflation factor is below 10, which aligns with prior research (see, e.g., (Gupta & Moudud-Ul-Haq, 2020)).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>494</td>
<td>0.899</td>
<td>1.103</td>
<td>-7.490</td>
<td>6.050</td>
</tr>
<tr>
<td>Capital</td>
<td>494</td>
<td>0.100</td>
<td>0.089</td>
<td>-0.077</td>
<td>0.808</td>
</tr>
<tr>
<td>Risk</td>
<td>494</td>
<td>0.078</td>
<td>0.103</td>
<td>0.000</td>
<td>0.598</td>
</tr>
<tr>
<td>Size</td>
<td>494</td>
<td>12.036</td>
<td>1.017</td>
<td>8.508</td>
<td>14.355</td>
</tr>
<tr>
<td>Operating Efficiency</td>
<td>494</td>
<td>2.224</td>
<td>0.748</td>
<td>0.909</td>
<td>6.289</td>
</tr>
<tr>
<td>Liquidity</td>
<td>494</td>
<td>0.850</td>
<td>0.167</td>
<td>0.021</td>
<td>2.621</td>
</tr>
<tr>
<td>BSD</td>
<td>494</td>
<td>48.044</td>
<td>2.856</td>
<td>41.054</td>
<td>51.11</td>
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<tr>
<td>GDP</td>
<td>494</td>
<td>5.122</td>
<td>1.082</td>
<td>2.271</td>
<td>6.688</td>
</tr>
<tr>
<td>Inflation</td>
<td>494</td>
<td>6.539</td>
<td>1.532</td>
<td>5.514</td>
<td>11.395</td>
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<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
</tr>
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<tbody>
<tr>
<td>(1) ROA</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Capital</td>
<td>0.136</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Risk</td>
<td>-0.572</td>
<td>-0.052</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(4) Size</td>
<td>-0.159</td>
<td>-0.669</td>
<td>0.135</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(5) Operating Efficiency</td>
<td>0.123</td>
<td>0.144</td>
<td>-0.107</td>
<td>-0.300</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6) Liquidity</td>
<td>0.126</td>
<td>-0.161</td>
<td>-0.205</td>
<td>0.067</td>
<td>0.017</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7) BSD</td>
<td>-0.028</td>
<td>0.167</td>
<td>-0.009</td>
<td>-0.177</td>
<td>0.100</td>
<td>-0.168</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(8) GDP</td>
<td>-0.059</td>
<td>-0.018</td>
<td>0.064</td>
<td>0.028</td>
<td>0.043</td>
<td>0.055</td>
<td>-0.225</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>(9) Inflation</td>
<td>0.310</td>
<td>0.073</td>
<td>-0.149</td>
<td>-0.208</td>
<td>0.056</td>
<td>-0.066</td>
<td>0.023</td>
<td>-0.151</td>
<td>1.000</td>
</tr>
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</table>
Table 4: Variance Inflation Factor

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIF</th>
</tr>
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<tbody>
<tr>
<td>Capital</td>
<td>1.89</td>
</tr>
<tr>
<td>Risk</td>
<td>1.098</td>
</tr>
<tr>
<td>Size</td>
<td>2.084</td>
</tr>
<tr>
<td>Operating Efficiency</td>
<td>1.121</td>
</tr>
<tr>
<td>Liquidity</td>
<td>1.115</td>
</tr>
<tr>
<td>BSD</td>
<td>1.124</td>
</tr>
<tr>
<td>GDP</td>
<td>1.088</td>
</tr>
<tr>
<td>Inflation</td>
<td>1.104</td>
</tr>
</tbody>
</table>

Descriptive Statistics

Table 2 displays the descriptive of the variables under study. The mean value of return on assets (ROA) and bank capital for the sample banks from 2010 to 2021 is 0.899 and 0.10, respectively. The sample also shows an average risk of 0.078, size of 12.036, operating efficiency of 2.224, and liquidity of 0.85. The industry-specific variable, BSD (Banking Sector Development), has an average value of 48.044. The mean values for GDP and inflation are also 5.122 and 6.359, respectively.

Determinants of Financial Performance and Examining the Impact of Capital and Ownership

The regression results of equations (1) to (4) across six models are presented in Table 5. Model I examines the factors determining financial performance and how bank capital affects it. Model II explores the non-linear relationship between bank capital and financial performance. Models III to VI investigate how different types of ownership impact the relationship between bank capital and financial performance. Specifically, Models III and V analyze the effects of ownership on the nexus, while Models IV and VI examine the combined impacts of bank ownership and capital on financial performance. The regression coefficient of the lag-dependent variable of all models holds significance, indicating that the past year's data has a bearing on the current year's financial performance ratio. Model I of Table 5 highlights a significant and positive relationship, implying that an increase in a bank's capital improves its financial performance. The capital coefficient, in particular, suggests that a standard deviation in increase in capital (which equals 0.089, as detailed in Table 2) results in a 7.14 percent rise in ROA \((0.089 \times 0.8025) \times 100\). This finding suggests that banks with well-maintained capital levels tend to outperform their counterparts in generating profits and enhancing financial performance. This finding is consistent with the results of Chowdhury et al. (2022).

The negative impact of bank risk on financial performance is significant. This suggests that banks' profitability decreases as bank risk increases, adversely affecting their financial performance. On the other hand, larger banks tend to outperform their smaller counterparts in generating profits. This finding contradicts the "Too-big-too-fail" hypothesis, opposing the findings of Berger and Bouwman (2013). Operating efficiency and financial performance have a significant positive association. This suggests that banks may be efficiently expanding their investment and operations, as increased operating costs are linked with improved financial performance. Liquidity has a significant negative correlation with ROA, implying that banks with high liquidity tend to have lower financial performance.

The industry-level variable BSD has a significant association with financial performance, suggesting that the growth of banking infrastructure facilitates higher financial performance for banking organizations. The macroeconomic variable GDP plays a pivotal role in positively impacting the ROA. This suggests that banks can generate more ROA when a country experiences economic growth, thus bolstering their financial performance. Conversely, inflation and financial performance share an inverse relationship, indicating that increasing inflationary pressure can decrease banks' financial performance.
Table 5: Determinants of Financial Performance and Effects of Capital and Ownership

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Model I</th>
<th>Model II</th>
<th>Model III</th>
<th>Model IV</th>
<th>Model V</th>
<th>Model VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA (-1)</td>
<td>0.6558*** (0.000)</td>
<td>0.6675*** (0.000)</td>
<td>0.6296*** (0.000)</td>
<td>0.6162*** (0.000)</td>
<td>0.6297*** (0.000)</td>
<td>0.6277*** (0.000)</td>
</tr>
<tr>
<td>Capital</td>
<td>0.8025*** (0.001)</td>
<td>0.375*** (0.000)</td>
<td>0.5085*** (0.000)</td>
<td>0.7126*** (0.000)</td>
<td>0.2626*** (0.000)</td>
<td>0.3579*** (0.000)</td>
</tr>
<tr>
<td>Capital^2</td>
<td></td>
<td>-0.7127*** (0.000)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflection Point</td>
<td>0.06236</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk</td>
<td>-0.9403*** (0.000)</td>
<td>-0.6127*** (0.000)</td>
<td>-0.5507*** (0.000)</td>
<td>-0.6311*** (0.000)</td>
<td>-0.0163*** (0.000)</td>
<td>-0.9685*** (0.000)</td>
</tr>
<tr>
<td>Risk^2</td>
<td>0.1396*** (0.004)</td>
<td>0.174*** (0.000)</td>
<td>0.1792*** (0.000)</td>
<td>0.1224*** (0.000)</td>
<td>0.1612*** (0.000)</td>
<td>0.1604*** (0.000)</td>
</tr>
<tr>
<td>Operating Efficiency</td>
<td>0.0408 (0.49)</td>
<td>0.0693*** (0.001)</td>
<td>0.0381 (0.316)</td>
<td>-0.0068*** (0.841)</td>
<td>0.0598* (0.069)</td>
<td>-0.0404*** (0.197)</td>
</tr>
<tr>
<td>Liquidity</td>
<td>-0.3145** (0.035)</td>
<td>-0.4751*** (0.000)</td>
<td>-0.4341*** (0.000)</td>
<td>-0.2761*** (0.000)</td>
<td>-0.3177*** (0.000)</td>
<td>-0.3741*** (0.000)</td>
</tr>
<tr>
<td>POD</td>
<td>0.1598*** (0.03)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POD*Capital</td>
<td></td>
<td>2.8243*** (0.000)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOD</td>
<td></td>
<td></td>
<td></td>
<td>0.256** (0.026)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOD*Capital</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.4819*** (0.004)</td>
<td></td>
</tr>
<tr>
<td>BSD</td>
<td>0.02197*** (0.012)</td>
<td>-0.0029 (0.505)</td>
<td>0.0129*** (0.000)</td>
<td>0.0124*** (0.000)</td>
<td>0.0104*** (0.000)</td>
<td>0.0096*** (0.000)</td>
</tr>
<tr>
<td>GDP</td>
<td>0.0376*** (0.001)</td>
<td>0.0311*** (0.000)</td>
<td>0.0454*** (0.000)</td>
<td>0.0463*** (0.000)</td>
<td>0.0442*** (0.000)</td>
<td>0.0422*** (0.000)</td>
</tr>
<tr>
<td>Inflation</td>
<td>-0.0462** (0.011)</td>
<td>-0.07131*** (0.000)</td>
<td>-0.0771*** (0.000)</td>
<td>0.0684*** (0.000)</td>
<td>-0.0723*** (0.000)</td>
<td>-0.0741*** (0.000)</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.4485** (0.01)</td>
<td>-2.1399*** (0.000)</td>
<td>-2.7532*** (0.000)</td>
<td>-1.8432*** (0.000)</td>
<td>-2.1934*** (0.000)</td>
<td>-2.1683*** (0.000)</td>
</tr>
<tr>
<td>Hansen test (p-value)</td>
<td>0.256</td>
<td>0.222</td>
<td>0.437</td>
<td>0.433</td>
<td>0.470</td>
<td>0.475</td>
</tr>
<tr>
<td>AR(1) (p-value)</td>
<td>0.008</td>
<td>0.018</td>
<td>0.018</td>
<td>0.017</td>
<td>0.019</td>
<td>0.019</td>
</tr>
<tr>
<td>AR(2) (p-value)</td>
<td>0.408</td>
<td>0.403</td>
<td>0.504</td>
<td>0.543</td>
<td>0.451</td>
<td>0.446</td>
</tr>
<tr>
<td>Observations</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
</tr>
</tbody>
</table>

Notes: The data presented in the table are the results of the 2sGMM analysis, with the return on assets (ROA) serving as the dependent variable. P values are shown in parentheses, while ***, **, and * indicate the corresponding significance level at 1%, 5%, and 10%, respectively. The Hansen test’s p-value is referred to as J statistics. The null hypothesis of the Hansen test suggests that the instruments used are not correlated with residuals (over-identifying restrictions). The Arellano-Bond orders 1 and 2 test for first-order and second-order correlation and is asymptotically N (0,1). When conducting system GMM estimation, these tests are used to test the first-differenced residuals.
The empirical findings of equation (2) – equation (4) related to the financial performance equation presented in the Model (II) to Model (VI) of Table 5. The Model II of the Table 5 reveals that a capital increase positively impacts the bank's financial performance. In contrast, a squared term of capital has a negative impact, resulting in an inverted U-shape relationship. The inflection point of the equation is 0.06236, which occurs at roughly the 23rd percentile of capital distribution. This suggests that profitability increases with increased capital up to the inflection point. However, once the inflection point is surpassed, the relationship becomes negative. Our results align with the study conducted by Haris et al. (2020) and confirm the optimal capital structure theorem. These findings suggest that increasing the capital base of banks sends a positive signal to the market about the higher capital base and lower bankruptcy costs as more reliance on equity prevents banks from using debt (see, e.g., signaling hypothesis of Berger (1995)). However, relying too much on equity may negatively impact the bank's customer base, as the bank may lose investment opportunities and income from diversified sources, ultimately leading to decreased profitability and financial performance. Therefore, we can conclude that our results support (yet also reject) the "signaling hypothesis" of Berger (1995).

Based on Model III to Model VI, profitability positively correlates with private-owned and Islamic commercial banks. This suggests that these banks outperform state-owned and conventional commercial banks in financial performance. Our findings confirm the "political view of state ownership," which indicates that state-owned banks may be subject to political influence that can affect their decision-making. As a result, they need to provide political sponsorship (Sapienza, 2004). Additionally, the interim term between private (state) and Islamic (conventional) ownership dummies and capital shows a significant positive (negative) relationship. This demonstrates that well-capitalized banks in private-owned and Islamic commercial banks are more likely to achieve profitability and financial success. Conversely, well-capitalized banks in state-owned and conventional commercial banks generally demonstrate lower profitability and weaker financial performance.

Robustness Checks

To ensure the utmost accurateness of our main discoveries, we performed a thorough robustness check by following the study of Zheng et al. (2017b) and Berger et al. (2023). By utilizing an alternative specification of the dependent variable, we can confirm the validity of our main findings. Specifically, we opted to use the net interest margin ratio as an alternative proxy for bank financial performance, and we re-estimated our equations from (1) to (4) accordingly. We present the results of this analysis in Table 6, which supports our initial findings in Table 5, albeit with a few exceptions (see, e.g., Zheng et al. (2017b)).
Table 6: Determinants of Financial Performance, and Effects of Capital and Ownership

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Model I</th>
<th>Model II</th>
<th>Model III</th>
<th>Model IV</th>
<th>Model V</th>
<th>Model VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIM (-1)</td>
<td>0.5400***(0.000)</td>
<td>0.5357***(0.000)</td>
<td>0.5999***(0.000)</td>
<td>0.5828***(0.000)</td>
<td>0.5152***(0.000)</td>
<td>0.5157***(0.000)</td>
</tr>
<tr>
<td>Capital</td>
<td>0.0168***(0.000)</td>
<td>0.0228***(0.003)</td>
<td>0.0089***(0.000)</td>
<td>0.0319***(0.000)</td>
<td>0.0195***(0.000)</td>
<td>0.0182***(0.000)</td>
</tr>
<tr>
<td>Capital²</td>
<td>-0.1050***(0.000)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inflection Point</td>
<td>0.001197</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk</td>
<td>-0.0404***(0.000)</td>
<td>-0.0437***(0.000)</td>
<td>-0.0509***(0.000)</td>
<td>-0.0507***(0.000)</td>
<td>-0.0405***(0.000)</td>
<td>-0.0414***(0.000)</td>
</tr>
<tr>
<td>Size</td>
<td>0.0006***(0.003)</td>
<td>0.0006***(0.001)</td>
<td>-0.0007***(0.002)</td>
<td>-0.0004*(0.018)</td>
<td>0.0001(0.639)</td>
<td>0.0001(0.81)</td>
</tr>
<tr>
<td>Operating Efficiency</td>
<td>0.0040***(0.000)</td>
<td>0.0041***(0.000)</td>
<td>0.0020***(0.000)</td>
<td>0.0019***(0.000)</td>
<td>0.0035***(0.000)</td>
<td>0.0033***(0.000)</td>
</tr>
<tr>
<td>Liquidity</td>
<td>-0.0101***(0.000)</td>
<td>-0.0108***(0.000)</td>
<td>-0.0123***(0.000)</td>
<td>0.0091***(0.000)</td>
<td>-0.0075***(0.000)</td>
<td>-0.0074***(0.000)</td>
</tr>
<tr>
<td>POD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0345***(0.000)</td>
<td></td>
</tr>
<tr>
<td>POD×Capital</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0044***(0.000)</td>
</tr>
<tr>
<td>IOD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0651***(0.000)</td>
</tr>
<tr>
<td>IOD×Capital</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSD</td>
<td>0.0001***(0.000)</td>
<td>0.0002***(0.000)</td>
<td>0.0002***(0.000)</td>
<td>0.0002***(0.000)</td>
<td>0.0001***(0.000)</td>
<td>0.0001***(0.000)</td>
</tr>
<tr>
<td>GDP</td>
<td>0.0025***(0.000)</td>
<td>0.0026***(0.000)</td>
<td>0.0026***(0.000)</td>
<td>0.0027***(0.000)</td>
<td>0.0024***(0.000)</td>
<td>0.0025***(0.000)</td>
</tr>
<tr>
<td>Inflation</td>
<td>-0.0002***(0.001)</td>
<td>-0.0003***(0.000)</td>
<td>-0.0001(0.91)</td>
<td>0.0001(0.442)</td>
<td>-0.0002***(0.006)</td>
<td>0.0001(0.337)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.0384***(0.000)</td>
<td>-0.0400***(0.000)</td>
<td>-0.0119***(0.016)</td>
<td>-0.0170***(0.000)</td>
<td>-0.0257***(0.000)</td>
<td>-0.0231***(0.000)</td>
</tr>
<tr>
<td>Hansen test (p-value)</td>
<td>0.203</td>
<td>0.190</td>
<td>0.228</td>
<td>0.123</td>
<td>0.250</td>
<td>0.133</td>
</tr>
<tr>
<td>AR(1) (p-value)</td>
<td>0.021</td>
<td>0.010</td>
<td>0.046</td>
<td>0.055</td>
<td>0.026</td>
<td>0.030</td>
</tr>
<tr>
<td>AR(2) (p-value)</td>
<td>0.410</td>
<td>0.437</td>
<td>0.390</td>
<td>0.342</td>
<td>0.545</td>
<td>0.592</td>
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<tr>
<td>Observations</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
</tr>
</tbody>
</table>

Notes: The data presented in the table are the results of the 2S-GMM analysis, with the net interest margin (NIM) serving as the dependent variable. P values are shown in parentheses, while ***, **, and * indicate the corresponding significance level at 1%, 5%, and 10%, respectively. The Hansen test's p-value is referred to as J statistics. The null hypothesis of the Hansen test suggests that the instruments used are not correlated with residuals (over-identifying restrictions). The Arellano-Bond orders 1 and 2 test for first-order and second-order correlation and is asymptotically N(0,1). When conducting system GMM estimation, these tests are used to test the first-differenced residuals.
Conclusion

Several studies have examined the connections between bank capital and financial performance. However, the influence of ownership on this link has been largely unheeded. To bridge this gap, our study explores the role of ownership in mediating and coalescing with capital to impact financial performance in commercial banks.

Based on empirical evidence, there appears to be an inverted U-shaped correlation between bank capital and financial performance. This means that financial performance tends to improve as capital increases to a certain point (known as the inflection point). However, once the inflection point is surpassed, the correlation becomes negative. Our findings support the optimum capital structure theory, but we have also found evidence supporting and rejecting the signaling hypothesis. Additionally, we have discovered that ownership significantly impacts this relationship, with private and Islamic commercial banks outperforming state-owned and conventional commercial banks. State-owned banks are more likely to possess higher capital levels and provide political patronage, aligning with the political view of state ownership (Sapienza, 2004).

The conclusions drawn from this paper hold significant importance for academics, regulators, and policymakers in emerging countries like Bangladesh. The study has uncovered an inverted U-shaped relationship between bank capital and financial performance, indicating that increasing capital can lead to enhancements and reductions in financial performance. Therefore, banks must exercise prudence in capital formation and strive for an optimal capital structure to maximize profitability. Policymakers must exercise caution with government banks and ensure they make profitable decisions for the betterment of the bank and the nation. Furthermore, private commercial banks, particularly Islamic ones, have demonstrated financial performance and require special attention.

In summary, this paper analyzes the impact of ownership on the financial performance-capital relationship within a single country without considering the cross-country effect. Nevertheless, we plan to explore this aspect further in future research.

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Institutional Review Board Statement: Ethical review and approval were waived for this study because the research does not deal with vulnerable groups or sensitive issues.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to restrictions.

Conflicts of Interest: The authors declare no conflict of interest.

References


https://hust.summon.serialssolutions.com/2.0.0/link/0/eLvHCXMwrvV3PS8MwFH5o58GTo061Yf3ammbTnJGM4pEWZ6lZGmb3MwUmUeU,795baags3PhOSRwPe


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