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Examining the Impacts of Regulatory Framework on Risk in Commercial Banks in Emerging Economies

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Abstract
The relationship between decision-making and risk carries significant implications, particularly within the context of financial institutions. Understanding the causal connection between these two factors is essential, especially when considering the broader implications of social responsibility. This is especially true in sectors where legal and regulatory frameworks are not sufficiently predictive or comprehensive. Recognizing the foundational elements of risk is crucial for problem identification and the effective allocation of resources to mitigate these risks. In our study, we explored this relationship by focusing on 100 commercial banks operating in emerging markets over the period from 2004 to 2023. The aim was to empirically test the effects of various factors, including regulatory frameworks, competitive pressures, and ownership structures, on the risk-taking behaviors of these banks. We specifically examined the behaviors both before (ex-ante) and after (ex-post) the provision of credit. To conduct this analysis, we employed two models i.e. the Z-Score and the Non-Performing Loan ratio, utilizing panel data for our assessments. The Z-Score is a well-established metric that gauges the stability and insolvency risk of financial institutions, while the NPL ratio serves as an indicator of the quality of a bank's loan portfolio, reflecting the proportion of loans that are in default or close to default. Our findings indicate that regulatory measures have a significant impact on the risk-taking behavior of banks. Stricter regulations tend to reduce risk-taking by imposing constraints and ensuring greater oversight. Conversely, high levels of competition can drive banks to take on more risk, as they strive to maintain or expand their market share. Ownership structures also play a critical role, with different ownership models influencing the risk appetite of banks in varying ways. This study underscores the importance of a balanced approach to regulation and competition within the banking sector. Effective regulatory frameworks, coupled with a keen understanding of competitive dynamics and ownership structures, can help mitigate risks and promote more stable financial environments in emerging markets. Our research provides valuable insights for policymakers, regulators, and banking executives aiming to foster safer banking practices and enhance the overall stability of the financial system.
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1. INTRODUCTION

The relationship between decision-making and risk has significant implications for various aspects of life, especially in economics, politics, and social governance. The causal link between these two elements inevitably raises the issue of social responsibility, particularly in areas where legal regulations and scientific advancements cannot fully predict outcomes (Zhong et al., 2020). This interplay underscores the necessity for comprehensive risk assessment and management strategies. Recognizing the roots of risk is essential for identifying problems and their allocation, thus enabling more informed and responsible decision-making. Risk, in this context, has two primary dimensions. The first dimension involves a universe governed by probability laws, where risk is seen as a random danger without an apparent cause. This type of risk is quantifiable and can be analyzed using statistical methods and probabilistic models. It allows for the anticipation of potential outcomes based on historical data, providing a framework for mitigating adverse effects through calculated strategies and interventions. The second dimension, however, involves unquantifiable risk, which is more challenging to anticipate and manage. This type of risk includes unknown variables and uncertainties that cannot be easily measured or predicted. Often associated with unprecedented events or complex systems, these unquantifiable risks pose significant challenges for decision-makers, as traditional risk management tools and models may prove inadequate (Sjöberg, 2020; Koelmans et al., 2022).

The recent financial crisis exposed serious deficiencies in the regulation and control of financial institutions, as highlighted by Saurina (2008). This led to a progressive deterioration in the quality of banks' liabilities and a loss of confidence among stakeholders. Instances of bank runs further underscored the urgency of understanding the drivers behind banks' propensity to take excessive risks. As noted by Bernanke (1983), Keeley (1990), and Calomiris and Mason (1997, 2003a), the risk-taking

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behavior of banks during financial turmoil can significantly impact financial and economic stability. This behavior not only affects individual institutions but also has broader implications for the entire banking sector and the economy. Consequently, international and national regulatory bodies have introduced regulations aimed at curbing excessive risk-taking by banks. Effective regulation is crucial due to the interconnected nature of cash flows within the financial system. Excessive risk-taking by one institution can lead to bankruptcy, triggering systemic repercussions that affect other banks and the economy as a whole. Despite regulatory efforts, a pertinent question arises: why do banks continue to take excessive risks? Through various theoretical frameworks and empirical studies, researchers have sought to identify the factors driving banks' risk-taking behaviors. These factors may include competitive pressures, the pursuit of short-term profits, flawed incentive structures, and regulatory arbitrage opportunities. Competitive pressures within the banking industry compel institutions to seek higher returns and market share, sometimes at the expense of prudent risk management practices. In pursuit of short-term profits, banks may engage in risky investments or excessive leverage to maximize returns in favorable market conditions. Flawed incentive structures, such as performance-based bonuses tied to short-term profitability metrics, can incentivize risk-taking behaviors that prioritize immediate gains over long-term sustainability.

In the modern global landscape, characterized by rapid technological advancements, geopolitical shifts, and environmental changes, the culture of uncertainty has become more pronounced. This amplifies the inconvenience and potential dangers associated with both quantifiable and unquantifiable risks (Wali, 2018; Hasan & Sadat, 2023). For instance, the interconnectedness of global financial markets means that a localized economic disruption can have far-reaching effects, making risk management a critical concern for policymakers and business leaders alike. Furthermore, the impact of climate change exemplifies the dual nature of risk. While some aspects of climate risk can be modeled and predicted using scientific data (e.g., rising sea levels, increased frequency of extreme weather events), other aspects remain uncertain and difficult to quantify (e.g., long-term ecological impacts, socio-economic consequences). This underscores the importance of adopting a multifaceted approach to risk management that incorporates both probabilistic analysis and scenario planning. Addressing these complexities requires a robust framework that integrates risk assessment with decision-making processes. Organizations and governments must develop adaptive strategies that can respond to emerging risks and uncertainties (Hasain, 2018; Shahbaz, 2018). This includes investing in research and development, enhancing data collection and analysis capabilities, and fostering a culture of continuous learning and improvement. Moreover, the ethical dimension of risk management cannot be overlooked. Decision-makers must consider the broader social and environmental implications of their actions, ensuring that risk mitigation efforts do not disproportionately impact vulnerable populations. This calls for a commitment to transparency, accountability, and inclusive governance, where diverse perspectives are considered, and the needs of all stakeholders are addressed (Omri, 2022; Namadi, 2023).

The desirability of competition within the banking sector has been a subject of longstanding debate. Keeley (1990) highlighted that intense competition, coupled with lower profit margins and the inherent values of bank charters, exacerbates the agency problem between banks and depositors (Wang & Ahmad, 2018; Kabir & Rashid, 2019). This dynamic often incentivizes banks to take excessive risks in pursuit of higher returns, thereby increasing the likelihood of bankruptcies. The notion of a negative relationship between competition and financial stability has been prevalent in the literature since the 1990s. However, recent contributions suggest that this relationship is more nuanced and multifaceted than previously understood. Furthermore, academic researchers have focused on the role of market discipline in enhancing systemic stability, as discussed by Crockett (2002). Market discipline implies that depositors and investors hold banks accountable for their risk-taking behaviors through market signals, such as deposit withdrawals or changes in stock prices (Khan, 2018; Ismail & Saeed, 2019). In the absence of effective market discipline, depositors may inadvertently subsidize the risks taken by their banks, thereby raising the probability of bank failures. This underscores the importance of robust risk assessment practices and access to reliable information for banks. However, assessing and managing risks is a challenging task, particularly in emerging markets where information asymmetries and institutional weaknesses prevail. Caprio and Honohan (2004) argue that in such contexts, market discipline may not function efficiently. Consequently, these countries often rely more heavily on capital requirements and stringent banking supervision to mitigate risks and safeguard financial stability. Effective regulatory frameworks are essential for ensuring that banks adhere to prudential norms and maintain adequate capital buffers to absorb potential losses. In practice, balancing competition and stability requires a careful calibration of regulatory policies and market dynamics. While competition can drive innovation, improve efficiency, and benefit consumers through lower costs and better services, excessive competition may incentivize risky behaviors and undermine financial resilience. Regulatory authorities play a pivotal role in fostering a competitive yet stable banking environment by promoting sound governance practices, enhancing transparency, and monitoring systemic risks (Neill, 2024).

The quantification of risk is essential for both social and technical sciences, as well as for society at large. Companies, integral to the economy, face daily risks inherent in their activities. Among these, banking industries stand out as a response to the imperfections and incompleteness of financial markets. It is well recognized that banks are unique in terms of their vulnerability and potential instability within an economic system. Numerous historical crises have underscored the fragility of banks and their tendency to engage in excessive risk-taking behaviors. The fundamental role of banks as intermediaries between savers and borrowers, coupled with their practice of maturity transformation in asset-liability management, highlights their critical function in providing liquidity to depositors (Choudhry, 2022). However, this intermediary role also exposes banks to systemic risks during periods of financial stress and crises. The interconnectedness and leverage within the banking

system can amplify the impact of localized shocks, leading to broader economic repercussions. While the specificity of the banking system and the necessity for regulation have garnered significant attention in academic and policy debates, the question of how competition influences system stability and the efficiency of regulation remains incompletely understood. Competition among banks can enhance efficiency by promoting innovation, reducing costs, and improving customer service. However, intense competition may also incentivize risk-taking behaviors as banks strive to increase market share and profitability. The balance between competition and stability in the banking sector is a critical concern for regulators and policymakers. Effective regulation aims to mitigate systemic risks while fostering a competitive environment that benefits consumers and the economy as a whole (Sulethri et al., 2023). Regulatory frameworks encompass prudential measures to safeguard financial stability, such as capital adequacy requirements, liquidity standards, and stress testing protocols. Additionally, regulatory authorities monitor market conduct and enforce compliance with anti-money laundering laws and consumer protection regulations (Choudhry, 2022).

The evolving landscape of global finance, characterized by technological advancements and globalization, further complicates the regulatory challenge. Innovations such as fintech and digital banking have transformed the financial services industry, introducing new opportunities and risks. Regulators must adapt swiftly to these changes, ensuring that regulatory frameworks remain robust and adaptable to emerging threats. The intricate relationship between decision-making and risk underscores the need for a comprehensive and adaptive approach to risk management. By recognizing the multifaceted nature of risk and embracing uncertainty, decision-makers can better navigate the challenges of the modern world. This, in turn, fosters resilience and sustainability, ultimately contributing to the well-being of individuals and societies.

2. LITERATURE REVIEW

The reform of capital ratios mandates maintaining a specific level of capital relative to risk-weighted assets to ensure financial stability in the banking sector. However, the effect of regulatory capital requirements on risk-taking depends on the type of ratio employed. If defined as the ratio of equity to total assets, capital requirements decrease leverage, thereby constraining a bank's risk-return profile. This often prompts banks to restructure their portfolios of risky assets, potentially leading to increased risk-taking behaviors (Kohen and Santomero, 1980). Conversely, Kim and Santomero (1980) argue that risk-weighted capital ratios reduce overall risk levels, indicating a negative relationship between these variables. Similarly, studies by Furlong and Keeley (1989) and Keeley and Furlong (1990) demonstrate that capital requirements can mitigate credit risk by diminishing the option value of deposit insurance linked to bank leverage. Moreover, capital requirements can influence competition and risk-taking differently. Initially, they may erect barriers to entry, limiting competition and empowering incumbent banks to adopt safer, less risky strategies.

Higher capital requirements entail fixed operational costs that fewer banks can afford. Thirdly, according to Bolt and Tieman (2004), stricter capital adequacy standards prompt banks to enforce stricter loan approval criteria within a dynamic theoretical framework. In contrast, Hellmann et al. (2000) suggest that alongside the impact of venture capital, there exists an opposing effect affecting franchise value. Similarly, Matutes and Vives (2000) and Repullo (2004) argue that while capital requirements are necessary, additional regulations such as deposit rate controls, equity deposit requirements, or asset restrictions may further mitigate risks in competitive environments. Additionally, Agoraki et al. (2011) conclude that capital requirements effectively reduce credit risk, a finding supported by Barth et al. (2004) and Kopecky and Vanhoose (2006). Moreover, higher capital requirements compel banks to hold larger capital reserves, increasing potential losses for shareholders in case of default and thereby reducing incentives for risky investments through more conservative strategies.

Matutes and Vives (2000) propose in their theoretical model that asset restrictions complement deposit insurance and capital requirements by constraining risk-taking in competitive environments. As Beck (2008) discusses, activity restrictions were implemented after the 1930s financial crises to curb competition and enhance stability. However, financial liberalization in the 1970s and 1980s increased competition and was identified as a factor contributing to bank fragility (Keeley, 1990). Empirical evidence presents a mixed picture. Claessens and Laeven (2004) find that relaxed activity restrictions lead to greater competition. Conversely, weaker restrictions may foster the emergence of large financial conglomerates, reducing market competition. Beck et al. (2004) identify a positive correlation between market concentration and activity restrictions in the banking sector. Furthermore, studies explore how diversification across different market segments affects competition and bank behavior.

Lepetit et al. (2008a) suggest that reliance on fee-based activities may underestimate default risks, while Lepetit et al. (2008b) demonstrate that expanding non-interest income activities increases insolvency risks. Agoraki et al. (2011) find that restrictions on banking activities in transition economies are insignificant for credit risk, but stricter activity restrictions effectively reduce insolvency risk, consistent with Fernandez and Gonzalez's (2005) empirical findings. As Claessens (2003) emphasizes, integrating financial services is a critical issue, particularly in emerging economies. Theoretically, fewer activity restrictions increase the potential for risk aggregation and transfer. However, supervising banks offering a wide range of complex services becomes challenging, especially in countries with lower monitoring capacities and lax enforcement. Furthermore, Lepetit et al. (2008a, b) and Agoraki et al. (2011) suggest that engagement in non-interest income activities correlates with higher risk-taking. This heightened risk, stemming from non-interest income activities, may explain why activity restriction indices directly impact overall risk but not necessarily credit risk.

Levine (2003) argues that robust supervision can enhance bank governance and foster competition. Effective oversight can mitigate the risk of banks taking excessive risks when faced with increased competition. However, in transition economies, political influence may compromise supervisory independence, potentially aligning regulatory actions more with the interests of banks than society's interests (Stigler, 1971). This scenario could bolster banks' market power, complicating efforts to curb risk-taking. The interplay of these forces on risk-taking behavior remains uncertain. Strengthening competition through regulatory measures could incentivize banks to make more prudent investment decisions and reduce risk-taking. Conversely, if banks wield political influence to resist stricter oversight, supervisors may struggle to impose effective restrictions. Agoraki et al. (2011) support the view that supervisory authority can mitigate credit risk, underscoring the importance of robust oversight in financial stability.

Empirical evidence from various regions including the U.S., Latin America, Turkey, Asia, and the Middle East highlights that effective and safe banking operations depend crucially on government regulations, regardless of the conscientiousness or intentions of regulators (Kaufman, 2003). These regulations should ideally be complemented by market discipline to enhance financial stability (Caprio and Honohan, 2004). Market discipline in banking refers to the situation where stakeholders, such as depositors, subordinated debt holders, equity holders, and rating agencies, face costs that reflect the risks of banks, and they respond accordingly (Berger, 1991). In emerging markets, however, there is variability in the application of market discipline. While it is recognized that effective market surveillance alone may not prevent banking crises, market discipline can help mitigate their impact by imposing costs on risky behavior and thereby reducing the likelihood and severity of crises (Caprio and Honohan, 2004). Stakeholders in these markets often attempt to distinguish between healthy and weak banks based on factors such as asset quality, earnings, liquidity, and capital structure, adjusting their actions accordingly. For instance, Park and Peristiani (1998) demonstrated market discipline in the U.S. savings and loan sector during the 1980s, where depositors demanded higher interest rates from riskier banks, leading to lower deposit growth for those banks engaging in riskier activities.

The policy of deregulation, which has fostered increased competition in banking, has been linked to reduced profits (Demirgüç-Kunt and Detragiache, 1998), prompting banks to take on higher risks (Fisher et al., 1997) and adopt potentially inadequate funding policies. Additionally, Claessens (2003) highlights that reduced transparency and complex ownership structures can exacerbate governance issues, which are already significant in emerging markets, potentially hampering effective risk management and control by bank managers. Boyd et al. (2009) conducted a comprehensive analysis using cross-national data from 134 countries spanning 1993-2004, along with a U.S. cross-section from 2003. They found a positive relationship between competition and stability. Using metrics such as the Herfindahl-Hirschman Index (HHI) to measure competition and indicators like the Z-score and equity-to-total-assets ratio for stability, the study concluded that banks with higher HHI scores were at greater risk of bankruptcy. Berger et al. (2009) examined data from 89 developed and developing countries, encompassing 9,000 banks, to assess overall risk and stability. They observed that market power, measured by the Lerner index and HHI, increased the risk within loan portfolios but decreased overall risk exposure. Banks tended to mitigate loan risks by increasing capital levels, thereby reducing their overall risk profile.

Numerous studies indicate a negative relationship between bank size and risk, arguing that larger banks can diversify risks similarly to smaller ones. However, an opposing view suggests a positive relationship, attributing increased risk-taking to mechanisms like the "too big to fail" doctrine and deposit insurance aimed at preventing contagion. Several empirical studies have tested these competing theories. Petey (2004), for instance, examined French banks from 1993 to 1996 and found that larger size leads to higher insolvency risks, particularly for banks specialized in riskier loan portfolios. Boyd and Runkle (1993) concluded that while large banks may diversify risks, their bankruptcy probabilities do not decrease compared to smaller banks. They suggested that larger banks might have less profitable and less capitalized assets despite diversification benefits. Goyeau et al. (1998) applied a similar methodology across European countries, the United States, and Japan but did not find a consistent link between bank size and insolvency risk observed in French banks. Additionally, Jimenez et al. (2007) showed that larger banks tend to hurt non-performing loan volumes, which could be attributed to stronger credit quality systems and governance practices. Overall, based on the majority of these findings, it is expected that bank size should be negatively associated with overall bank risk.

Caprio and Klingebiel (1996), Goldstein and Turner (1996), Gonzalez Hermosillo (1999), and Demirgüç-Kunt and Detragiarche (2000) identified interest rates as a significant macroeconomic factor contributing to bank failures in emerging economies. Analyzing the impact of interest rates on short-term risk-taking by banks reveals that monetary policy endogeneity can complicate financial stability. During economic downturns, monetary authorities often lower interest rates to mitigate hardship, which can inadvertently encourage increased risk-taking among banks. Empirical evidence suggests that lower interest rates prompt banks to relax lending standards, leading to increased ex-ante risk-taking. Banks are more likely to extend loans to borrowers with lower credit scores, thereby raising the retrospective credit risk measured by default rates. Furthermore, banks may not adequately assess the additional risks associated with these loans. Overall, in the short term, low interest rates appear to heighten banks' risk appetite. Moreover, in environments where banks are less rigorously monitored and subject to moral hazard, low interest rates not only encourage greater risk-taking but also narrow interest rate spreads for these banks. This phenomenon suggests that risk-sensitive pricing linked to banking fundamentals—such as non-performing loans, liquidity metrics, and profitability—may not be sufficiently reflected in deposit rates.

Another consequence of low interest rates is an expansion in the loan market, which can amplify economic downturns through direct credit channels or indirect transmission via interest rate chains. Thus, risk-based regulations could exacerbate the inherent procyclical nature of bank credit markets and the broader economy. Conversely, a less competitive banking environment might allow banks to charge higher interest rates to borrowers, potentially enhancing loan repayment difficulties and increasing non-performing loan ratios. Competitive banking environments, as suggested by Beck (2008), may foster greater stability in banking systems. Chunxin Jia (2009) examined the relationship between ownership structure and prudent banking in China from 1985 to 2004, finding that state-owned banks exhibited less cautious lending practices compared to private banks. The study posits that accountability to shareholders and depositors provides private banks with stronger incentives for prudent lending. It also suggests that reforms in the banking system have encouraged state-owned banks to adopt more cautious lending behaviors. Similarly, Yalzid and Bazzana (2010) analyzed a sample of 26 Turkish banks from 2001 to 2009, concluding that state-owned banks tend to engage in riskier behaviors compared to private banks.

3. THE MODEL

The theoretical framework underpinning the impact of capital requirements on bank risk-taking behaviors draws extensively from existing literature. Kohen and Santomero (1980) argue that capital requirements, when defined as the ratio of equity to total assets, decrease leverage and constrain a bank's risk-return profile, potentially leading to increased risk-taking. In contrast, Kim and Santomero (1980) suggest that risk-weighted capital ratios reduce overall risk levels, indicating a negative relationship between these variables. Further, Furlong and Keeley (1989) and Keeley and Furlong (1990) demonstrate that capital requirements mitigate credit risk by diminishing the option value of deposit insurance linked to bank leverage. Bolt and Tieman (2004) support the notion that stricter capital adequacy standards prompt banks to enforce stricter loan approval criteria, thereby reducing risk-taking. Complementary regulations, such as those suggested by Hellmann et al. (2000) and Repullo (2004), including deposit rate controls and asset restrictions, further mitigate risks in competitive environments. Agoraki et al. (2011) provide empirical evidence that higher capital requirements effectively reduce credit risk by compelling banks to hold larger reserves, thus reducing incentives for risky investments through more conservative strategies. Overall, this model underscores the multifaceted impact of capital requirements on bank behavior, highlighting the interplay between regulatory measures and market dynamics in shaping risk-taking activities. Based literature review, the model for our study becomes as:

$$r_{it}=f(HH_{it},ER_{it}, RA_{it}, PS_{it},DM_{it},TA_{it},TCT_{it},PUB_{it},PRIV_{it})$$

r is the risk-taking of bank *i* in year *t* is expressed in terms of HH concentration index, the index of regulation (ER, PS, RA), index of market discipline DM, the size of the bank is Ta, the interest rate short-term is TCT, PUB is the share of public shareholders, private share is PRIV and the error term ε. It approximates the behavior of risk-taking by banks, both ratios of nonperforming loans and z-score, in the specifications of the model while correcting the problem of heteroscedasticity due to the heterogeneity of banks by the standard deviation.

The data over the period of 2004 to 2023 for the selected variables have been taken from Yahoo Finance.

4. RESULTS AND DISCUSSIONS

Table 1 provides a regression analysis with the volume of non-performing loans as the dependent variable. The independent variables include HH, ER, PS, RA, DM, TA, TCT, PUB, and PRIV. The coefficients indicate the relationship between each independent variable and the dependent variable, with statistical significance levels denoted by asterisks. The constant term (C) has a coefficient of -1.9250, suggesting that when all independent variables are zero, the volume of non-performing loans is negative, which is not realistic but indicates the baseline level set by the regression model. The coefficient for HH is -1.6443 and is statistically significant at the 5% level. This negative relationship implies that higher household debt is associated with a reduction in non-performing loans, possibly because households with higher debt levels may have better financial management practices or are more likely to receive loan restructurings or other interventions that prevent defaults. ER has a coefficient of -0.2969 and is highly significant at the 1% level. This negative relationship suggests that a stronger exchange rate (or appreciation) is associated with lower volumes of non-performing loans. This might be because a stronger currency improves the ability of borrowers to repay loans, especially those denominated in foreign currencies. PS has a positive coefficient of 0.17333, but it is not statistically significant. This indicates that changes in the size of the public sector do not have a strong or clear impact on the volume of non-performing loans. RA has a positive coefficient of 0.4297, which is also not statistically significant. This implies that the risk assessment scores do not significantly influence the volume of non-performing loans in this model. DM has a positive coefficient of 0.5307 and is statistically significant at the 10% level. This positive relationship suggests that better debt management practices are associated with higher volumes of non-performing loans. This counterintuitive result might indicate that stricter debt management practices are often implemented in response to already rising non-performing loans, rather than preventing them. TA has a negative coefficient of -0.0468, but it is not statistically significant. This suggests that the total assets of the borrowing entities do not have a significant impact on the volume of non-performing loans. TCT has a positive coefficient of 0.0967 and is statistically significant at the 5% level. This positive relationship indicates that higher credit turnover is associated with an increase in non-performing loans, possibly because higher credit activity can lead to a higher probability of defaults. PUB has a positive but not statistically significant coefficient of 0.0142. This suggests that changes in the volume of public loans do not significantly affect the volume of non-

performing loans. PRIV has a positive coefficient of 0.0154 and is statistically significant at the 10% level. This positive relationship implies that an increase in private loans is associated with an increase in non-performing loans, possibly due to the higher risk associated with private-sector lending.

Based on the findings, it has been observed that the volume of non-performing loans in banks from emerging economies is influenced by the regulatory requirements imposed by prudential reforms. The impact of prudential regulation on bank risk-taking behavior is significantly influenced by the definition of the capital ratio. Specifically, when the capital ratio is defined as the ratio of equity to total assets, regulatory requirements decrease leverage, thereby restricting the bank's risk-taking capacity. This may lead banks to restructure their portfolios of risky assets, potentially engaging in regulatory arbitrage to enhance profitability. Theoretical perspectives also suggest that more stringent capital requirements compel banks to adopt stricter criteria for loan approvals. The negative impact of regulatory requirements stems from the capital-weighted risk ratio reducing overall risk exposure. Consequently, there is an increase in credit risk when the proportion of non-performing loans rises, especially if these loans fail to adequately support financial institutions. Empirical evidence corroborates the effectiveness of capital requirements in reducing credit risk, consistent with the studies by Bolt and Tieman (2004), Barth et al. (2004), Kopecky and Vanhoose (2006), and Agoraki et al. (2011).

Table 1: Regression Analysis

Dependent Variable: Volume of non-performing loans

Variables	Coefficients
C	-1.9250
HH	-1.6443**
ER	-0.2969***
PS	0.17333
RA	0.4297
DM	0.5307*
TA	-0.0468
TCT	0.0967**
PUB	0.0142
PRIV	0.0154*

In Table 2, the regression analysis explores the relationship between the volume of non-performing loans and several independent variables, including HH, ER, PS, RA, DM, TA, TCT, PUB, and PRIV. The coefficients reveal how each variable impacts the dependent variable, with statistical significance indicated by asterisks. The constant term has a coefficient of -195.6276, which is statistically significant at the 5% level. This negative baseline suggests that, when all independent variables are held at zero, the volume of non-performing loans is projected to be significantly negative. While this is not realistic, it highlights the baseline level established by the regression model. HH has a coefficient of -28.1177, significant at the 10% level, indicating that an increase in household debt is associated with a decrease in the volume of non-performing loans. This negative relationship might be attributed to the potential for households with higher debt levels to manage their loans more effectively or to receive more support in preventing defaults. ER has a coefficient of 1.3950, but it is not statistically significant. This suggests that fluctuations in the exchange rate do not have a clear or significant impact on the volume of non-performing loans in this model. PS has a positive coefficient of 0.9743, which is not statistically significant. This implies that variations in the size of the public sector do not significantly influence the volume of non-performing loans. RA is positively associated with the volume of non-performing loans, with a coefficient of 16.0836, significant at the 10% level. This positive relationship indicates that higher risk assessments correlate with an increase in non-performing loans, which is expected as higher risk scores typically reflect a greater likelihood of default. DM has a positive coefficient of 2.0226 but is not statistically significant, suggesting that debt management practices do not significantly affect the volume of non-performing loans. TA has a positive coefficient of 4.6873, also not statistically significant. This indicates that the total assets of borrowing entities do not have a meaningful impact on the volume of non-performing loans in this analysis. TCT has a coefficient of 0.4169 but lacks statistical significance, implying that the turnover of credit does not significantly influence non-performing loans. PUB shows a positive coefficient of 1.1888, significant at the 5% level. This positive relationship suggests that an increase in public loans is associated with a higher volume of non-performing loans, possibly due to the riskier nature of public sector lending or inefficiencies in managing public loans. PRIV has a coefficient of 1.1072, also significant at the 5% level. This positive association indicates that an increase in private loans correlates with a rise in non-performing loans, which could be attributed to the higher default risk typically associated with private-sector lending.

Capital requirements can influence competition and risk-taking behavior in several ways. Firstly, they may act as barriers to entry for new entrants, reducing competition and allowing incumbent banks to consolidate power, leading to more prudent and less risky behaviors. Secondly, higher capital requirements increase fixed operating costs for banks, potentially limiting the number of banks able to meet these requirements. Thirdly, theoretical insights suggest that stricter capital requirements prompt banks to apply more rigorous criteria when approving new loans. Empirical evidence indicates that increased market

concentration, resulting from stringent capital requirements, tends to exacerbate the volume of non-performing loans. This suggests that as capital requirements become stricter and market power consolidates, loans may become riskier. Berger et al. (2000) highlighted that the banking sector faces challenges related to various forms of performance persistence over time. One such challenge relates to the interplay between risk-taking behavior in banking and the barriers to competition. For instance, in sectors characterized by informational opacity, networks created within the sector tend to persist, potentially influencing risk levels. Strong competition appears to hurt credit risk, which contrasts with the findings of studies such as Bolt and Tieman (2004), Barth et al. (2004), Kopecky and Vanhoose (2006), and Agoraki et al. (2011). These studies generally support the notion that capital requirements play a crucial role in mitigating credit risk within banking sectors.

Regulatory requirements must be complemented by market discipline, as evidenced by their positive impact on the volume of non-performing loans. Market discipline in the banking sector refers to the situation where stakeholders—such as depositors, subordinated debt holders, equity holders, and rating agencies—impose costs on banks that are directly linked to their risk levels, prompting banks to adjust their behavior accordingly (Berger, 1991). In emerging markets, stakeholders wield significant influence over banks' conduct, despite market surveillance not being sufficient alone to prevent banking crises. Nonetheless, it can mitigate their severity and likelihood (Caprio and Honohan, 2004). Market discipline exerted by these stakeholders, who bear fixed operational costs associated with gathering and processing borrower information in opaque information environments with intense competition, correlates positively with risk. This supports the notion that market discipline enhances risk management. Moreover, the interest rates set by central banks on short-term loans have a counterintuitive effect on non-performing loan volumes. Lowering interest rates to remain competitive can increase loan issuance but also heightens the risk of default among banks. However, empirical estimations indicate that the actual effect of short-term interest rates does not consistently align with this hypothesis.

Based on the estimates reported in Table 2, it is evident that the presence of private shareholders positively influences risk-taking behavior among banks. In many emerging markets, banks are predominantly private or have undergone privatization in response to recent economic crises that have burdened these economies. However, the hypothesis regarding the effect of minority interests in emerging countries is not supported by these findings. These results indicate that increased competition, stemming from liberalized commercial lending in emerging markets, affects the Z-score negatively. This suggests that heightened competition reduces bank profitability as interest rates decrease, thereby increasing the Z-score and lowering the risk of default. Contrary to expectations, concentrated market structures in emerging economies reduce the risk of insolvency. Furthermore, restrictions imposed by authorities on banking activities positively impact the Z-score. Banks subject to such restrictions on lending, portfolio management, and insurance struggle to diversify effectively and compete, potentially increasing their vulnerability to financial instability. However, the estimated effect of the activity restriction index on the Z-score does not consistently support this hypothesis. Moreover, the presence of public and private shareholders positively influences bank risk-taking behavior. Publicly owned banks may take on more risks due to state protection, while privately-owned banks may engage in riskier projects to earn higher returns. Competition among banks also encourages higher interest rates to attract deposits and maintain market share, which can lead to excessive risk-taking behaviors.

Table 2: Regression Analysis

Dependent Variable: Volume of non-performing loans

Variables	Coefficients
C	-195.6276**
HH	-28.1177*
ER	1.3950
PS	0.9743
RA	16.0836 *
DM	2.0226
TA	4.6873
TCT	0.4169
PUB	1.1888**
PRIV	1.1072**

5. CONCLUSIONS

Based on a sample of 100 commercial banks in emerging markets from 2004 to 2023, this study examines the impact of regulation, competition, and ownership structure on risk-taking behavior. The findings indicate that adherence to prudential reforms aimed at emerging markets reduces both credit and default risks. This reduction in credit risk is attributed to banks' management of loan portfolios based on risk-return criteria, aiming to diversify portfolios and lower overall risk. Conversely, increased market concentration leads to riskier lending practices due to stricter capital requirements, thereby reducing credit and default risks. Market discipline, imposed by stakeholders facing costs linked to risk, positively influences risk-taking behaviors, particularly when stakeholders seek to advance their interests. In less competitive banking environments, banks can increase interest rates, potentially leading to higher non-performing loan ratios as borrowers struggle with repayments.

More competitive environments tend to stabilize banking systems. Z-scores exhibit significant dispersion around the average, reflecting the diverse risk profiles of banks in these economies, where higher risk-taking behavior nears the threshold of potential failure. Reducing restrictions on banking activities appears to decrease risks in emerging markets, though tighter restrictions do not consistently mitigate credit risks or enhance stability. Public banks, backed by state guarantees, tend to take more risks compared to private banks, which may pursue less risky projects to maintain a risk premium. While regulation alone may not suffice to control credit risk, restrictions on banking activities can complement regulatory efforts by influencing market concentration and risk-taking behaviors among banks. Future research could delve deeper into how institutional characteristics within each country affect bank risk-taking, and explore inter-industry dynamics such as those in insurance, which also impact financial stability.

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