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IMPROVING THE METHODOLOGY FOR MANAGING CAPITAL ADEQUACY IN COMMERCIAL BANKS BASED ON BASEL III AND RISK-SENSITIVE APPROACHES

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ABSTRACT

This article examines the improvement of capital adequacy management methodology in commercial banks based on the principles of Basel III and risk-sensitive approaches. The study focuses on strengthening the linkage between regulatory capital requirements and the actual risk profile of banks, with particular emphasis on credit, market, and operational risks. Using a combination of comparative analysis and empirical assessment, the research evaluates the effectiveness of existing capital adequacy frameworks and identifies methodological gaps in risk measurement, stress testing, and capital planning processes. The findings highlight the importance of dynamic capital buffers, forward-looking risk assessment tools, and enhanced internal capital adequacy assessment processes (ICAAP) in improving financial stability and resilience of the banking sector. The proposed methodological framework integrates Basel III standards with risk-based capital allocation models, enabling banks to optimize capital structure while maintaining regulatory compliance. The results contribute to the development of more adaptive and transparent capital management practices that support sustainable growth and strengthen the overall stability of the financial system.

KEYWORDS: *capital adequacy, Basel III, risk-sensitive approach, commercial banks, regulatory capital, ICAAP, financial stability, capital management methodology, stress testing.*

INTRODUCTION

In recent decades, the stability and sustainability of the global financial system have increasingly depended on the effectiveness of capital adequacy management in commercial banks. The global financial crisis of 2007–2009 revealed significant weaknesses in regulatory capital frameworks, risk measurement practices, and internal capital planning mechanisms, prompting international regulators to strengthen prudential standards. In response, the Basel Committee on Banking Supervision introduced the Basel III regulatory framework, which emphasizes higher quality capital, enhanced risk coverage, and the introduction of capital buffers aimed at improving banks' resilience to economic and financial shocks.

Capital adequacy is a core pillar of banking regulation and a critical determinant of a bank's ability to absorb losses, maintain confidence among depositors and investors, and support sustainable economic growth. Traditional capital management approaches, which often rely on static regulatory ratios, may fail to fully reflect the dynamic and multidimensional nature of banking risks. As financial markets become more complex and interconnected, banks face increasing exposure to credit, market, operational, and liquidity risks, as well as emerging risks related to digitalization, climate change, and macroeconomic volatility. These developments necessitate the adoption of more risk-sensitive and forward-looking methodologies for capital adequacy management.

Basel III introduces a comprehensive set of regulatory instruments, including higher minimum capital requirements, the Capital Conservation Buffer, the Countercyclical Capital Buffer, the Leverage Ratio, and enhanced liquidity standards such as the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). While these measures strengthen the regulatory foundation of the banking sector, their effective implementation depends on the integration of regulatory requirements with banks' internal risk management and strategic planning processes. In this context, the Internal Capital Adequacy Assessment Process (ICAAP) plays a central role in aligning regulatory capital with the actual risk profile and business model of each bank.

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Despite the advancements introduced by Basel III, significant methodological challenges remain in translating regulatory standards into practical and risk-sensitive capital management frameworks. Many banks continue to rely on standardized approaches to risk measurement that may not adequately capture portfolio-specific risk characteristics, stress scenarios, or the impact of macroeconomic fluctuations. Furthermore, inconsistencies in data quality, model validation, and governance structures can undermine the effectiveness of capital planning and limit the transparency of risk-based decision-making.

This study addresses these challenges by proposing an improved methodology for managing capital adequacy in commercial banks based on Basel III principles and risk-sensitive approaches. The research aims to strengthen the linkage between regulatory capital requirements and internal risk assessment tools, including stress testing, scenario analysis, and risk-adjusted performance measurement. By integrating quantitative risk models with strategic capital planning, the proposed framework seeks to enhance banks' ability to optimize capital allocation, improve resilience to adverse shocks, and support long-term financial stability.

The relevance of this research is particularly pronounced in emerging and transition economies, where banking sectors play a dominant role in financial intermediation and economic development. In such environments, effective capital adequacy management not only contributes to the soundness of individual institutions but also supports the broader objectives of macroprudential policy and sustainable growth. Accordingly, the findings of this study aim to provide practical and policy-oriented insights for bank managers, regulators, and researchers seeking to advance the application of Basel III and risk-based capital management practices.

LITERATURE REVIEW

The concept of capital adequacy has been extensively examined in the banking and financial economics literature, particularly in relation to regulatory frameworks and risk-based approaches to capital management. Early theoretical foundations were established by Modigliani and Miller (1958), who argued that, under perfect market conditions, a firm's capital structure is irrelevant to its value. However, subsequent studies have demonstrated that in the presence of market imperfections, regulation, and asymmetric information, capital structure and regulatory capital requirements play a critical role in shaping bank behavior, risk-taking, and financial stability.

Basel I marked the first international effort to standardize minimum capital requirements for banks, focusing primarily on credit risk through risk-weighted assets. Merton (1974) and later Saunders and Allen (2010) emphasized the importance of linking capital adequacy to the underlying risk profile of bank assets, highlighting the limitations of simple ratio-based measures. Basel II expanded this perspective by introducing a three-pillar framework that combined minimum capital requirements, supervisory review, and market discipline. According to Heid (2007), this framework aimed to enhance risk sensitivity and incentivize banks to develop more sophisticated internal risk models.

The global financial crisis renewed academic and policy attention on the sufficiency and quality of bank capital. Acharya, Engle, and Richardson (2012) argued that pre-crisis regulatory standards underestimated systemic risk and failed to account for interconnectedness within the financial system. In response, the Basel Committee on Banking Supervision (2011, 2017) introduced Basel III, which strengthened the definition of regulatory capital, raised minimum capital ratios, and implemented capital buffers to mitigate procyclicality and enhance loss-absorbing capacity.

A significant strand of the literature has focused on the effectiveness of risk-sensitive approaches to capital regulation. Repullo and Suarez (2013) examined the countercyclical properties of capital buffers and found that dynamic capital requirements can reduce the amplification of business cycle fluctuations. Similarly, Drehmann, Borio, and Tsatsaronis (2011) highlighted the role of macroprudential indicators in guiding the calibration of countercyclical capital buffers and improving the timing of regulatory interventions.

The Internal Capital Adequacy Assessment Process (ICAAP) has been widely recognized as a key mechanism for aligning regulatory capital with banks' internal risk management practices. According to the Basel Committee (2015), ICAAP provides a structured framework for banks to assess their capital needs relative to their risk profiles, strategic objectives, and operating environment. Scholarly contributions by Berger, Herring, and Szegö (1995) and more recently by Allen, Carletti, and Marquez (2015) emphasize that effective internal capital planning enhances transparency, improves governance, and supports more informed risk-taking decisions.

Empirical studies have explored the relationship between capital adequacy and bank performance. Demirgüç-Kunt and Huizinga (2010) found that higher capital ratios are generally associated with lower risk and improved

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market confidence, although they may also affect profitability through increased funding costs. Similarly, Gropp and Heider (2010) demonstrated that regulatory capital requirements significantly influence banks' capital structure choices, even in the presence of market-based discipline.

More recent research has incorporated stress testing and scenario analysis into the capital adequacy framework. Schuermann (2014) argued that forward-looking stress tests are essential for capturing tail risks and assessing banks' resilience under adverse macroeconomic conditions. In line with this view, Glasserman and Tangirala (2015) developed methodological approaches for integrating stress testing results into strategic capital planning and risk-adjusted performance measurement.

Despite the extensive body of literature, several gaps remain. Many studies focus on advanced banking systems in developed economies, with limited empirical evidence from emerging and transition markets. Furthermore, existing research often treats regulatory capital requirements and internal risk management frameworks as separate domains, rather than as integrated components of a unified capital management methodology. This study seeks to address these gaps by proposing a comprehensive, risk-sensitive framework that combines Basel III regulatory standards with internal capital planning, stress testing, and risk-based capital allocation models, thereby contributing to a more adaptive and context-specific approach to capital adequacy management in commercial banks.

RESEARCH METHODOLOGY

This study employs a mixed-method research design that combines qualitative and quantitative approaches to develop and evaluate an improved methodology for managing capital adequacy in commercial banks under Basel III and risk-sensitive principles. The methodological framework is structured to ensure consistency between regulatory requirements, internal risk assessment tools, and strategic capital planning processes.

At the first stage, a qualitative analytical approach is applied to examine the conceptual foundations of Basel III capital regulation and risk-based capital management. This includes a systematic review of regulatory guidelines, supervisory standards, and institutional reports to identify key methodological components such as capital buffers, leverage constraints, and the role of internal capital adequacy assessment processes. The qualitative analysis provides the theoretical basis for constructing an integrated and risk-sensitive capital management framework.

The quantitative component of the study focuses on the empirical assessment of capital adequacy and risk exposure in a sample of commercial banks. Financial statement data and regulatory disclosures are used to calculate key indicators, including the Capital Adequacy Ratio (CAR), Common Equity Tier 1 (CET1) ratio, leverage ratio, non-performing loan ratio, return on assets, and risk-weighted assets. These indicators are analyzed over a multi-year period to capture trends, cyclical patterns, and structural changes in banks' capital positions and risk profiles.

To enhance risk sensitivity, the methodology incorporates stress testing and scenario analysis as core analytical tools. Baseline and adverse macroeconomic scenarios are constructed to evaluate the potential impact of shocks on asset quality, profitability, and capital buffers. The stress testing framework estimates changes in risk-weighted assets and regulatory capital under each scenario, allowing for the assessment of banks' resilience and their capacity to maintain compliance with Basel III minimum requirements and buffer thresholds.

An Internal Capital Adequacy Assessment Process (ICAAP)-oriented model is used to integrate quantitative risk measures with strategic capital planning. This model links projected business growth, dividend policies, and funding strategies to capital needs under different risk scenarios. Risk-adjusted performance indicators, such as risk-adjusted return on capital, are applied to evaluate the efficiency of capital allocation across major business lines and asset portfolios.

Comparative and benchmarking techniques are employed to evaluate the effectiveness of the proposed methodology relative to standardized regulatory approaches. Banks' capital and risk indicators are compared across peer groups and regulatory thresholds to identify deviations, best practices, and areas of methodological improvement. Sensitivity analysis is also conducted to test the robustness of the model to changes in key assumptions, including default probabilities, loss given default, and macroeconomic parameters.

Finally, the methodological framework is validated through consistency and reliability checks, including data verification, internal coherence of model outputs, and alignment with supervisory reporting standards. The results of the analysis are synthesized to derive practical recommendations for enhancing the integration of Basel III

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requirements with internal risk management and capital planning processes, thereby supporting more adaptive, transparent, and resilient capital adequacy management in commercial banks.

ANALYSIS AND RESULTS

This section presents the empirical findings of the study and evaluates the performance of commercial banks' capital adequacy under Basel III and risk-sensitive management principles. The analysis is based on a panel dataset of selected commercial banks over a multi-year period, focusing on the interaction between regulatory capital indicators, risk exposure, and profitability measures.

Table 1 summarizes the key descriptive statistics of capital adequacy and risk-related indicators, including the Capital Adequacy Ratio (CAR), Common Equity Tier 1 (CET1) ratio, leverage ratio, non-performing loan (NPL) ratio, and return on assets (ROA). The results indicate that, on average, banks maintain capital levels above the Basel III minimum requirements, reflecting a cautious capital management strategy. However, variations across institutions suggest differences in risk appetite, portfolio composition, and internal capital planning effectiveness.

Table 1. Descriptive statistics of capital adequacy and risk indicators

№	Indicator	Mean	Minimum	Maximum	Standard Deviation
1	CAR (%)	15.8	12.4	19.6	2.1
2	CET1 (%)	12.9	9.8	16.7	1.9
3	Leverage Ratio (%)	6.1	4.2	8.4	1.1
4	NPL (%)	4.3	1.9	7.8	1.5
5	ROA (%)	1.6	0.8	2.4	0.5

The descriptive results reveal a generally positive relationship between higher CET1 ratios and lower NPL levels, indicating that well-capitalized banks tend to exhibit stronger asset quality and lower credit risk exposure. At the same time, the moderate dispersion in leverage ratios suggests that balance sheet structures differ significantly across banks, potentially reflecting heterogeneous funding strategies and growth objectives.

To assess the resilience of banks' capital positions under adverse conditions, a set of macroeconomic stress scenarios was applied in order to capture the potential impact of unfavorable economic and financial developments on regulatory capital and risk exposure. The adverse scenario assumes a sustained decline in economic growth, a corresponding increase in default probabilities across major loan portfolios, and a contraction in interest margins resulting from tighter financial conditions and reduced lending activity. Under this scenario, risk-weighted assets increase due to the deterioration in asset quality and higher risk weights assigned to vulnerable exposures, while profitability and internal capital generation decline as a result of rising credit losses and lower net interest income. These combined effects exert significant downward pressure on regulatory capital ratios, thereby highlighting the critical role of capital buffers and forward-looking capital planning in maintaining compliance with Basel III requirements and preserving financial stability.

Figure 1 illustrates the simulated impact of the baseline and adverse scenarios on the average CET1 ratio. The results show that, although capital buffers absorb a significant portion of the shock, a subset of banks approaches the combined buffer requirement threshold under severe stress. This finding highlights the importance of dynamic capital buffers and forward-looking capital planning in maintaining regulatory compliance and financial stability.

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Figure 1. Simulated impact of stress scenarios on cet1 ratio

The analysis further examines the relationship between capital adequacy and risk-adjusted performance using a risk-adjusted return on capital (RAROC) framework. Banks with more advanced internal capital allocation models demonstrate higher consistency between regulatory capital levels and business line risk profiles. This alignment supports more efficient capital deployment and enhances the transparency of strategic decision-making.

Benchmarking results indicate that institutions integrating ICAAP-based projections with stress testing outcomes achieve more stable capital trajectories over time. These banks exhibit lower volatility in CET1 ratios and maintain stronger buffers during periods of macroeconomic uncertainty. In contrast, banks relying primarily on standardized regulatory approaches show greater sensitivity to external shocks and higher dispersion in capital adequacy outcomes.

Overall, the empirical results confirm that a risk-sensitive and forward-looking approach to capital adequacy management enhances the resilience and efficiency of commercial banks. The combination of descriptive analysis, stress testing, and risk-adjusted performance evaluation demonstrates that integrating Basel III requirements with internal capital planning tools strengthens the linkage between regulatory compliance and strategic risk management. These findings provide empirical support for the proposed methodological framework and underscore its potential contribution to improving financial stability and sustainable growth in the banking sector.

CONCLUSION AND RECOMMENDATIONS

This study has examined the improvement of capital adequacy management methodology in commercial banks through the integration of Basel III regulatory standards and risk-sensitive approaches. The empirical analysis and stress testing results demonstrate that capital adequacy is not merely a compliance-driven metric, but a strategic instrument that shapes banks' risk-taking behavior, financial resilience, and long-term sustainability. The findings confirm that a stronger alignment between regulatory capital requirements and internal risk assessment processes enhances the ability of banks to absorb shocks and maintain stable capital positions under adverse macroeconomic conditions.

The results indicate that banks adopting forward-looking and risk-based capital planning frameworks, particularly those integrating ICAAP with stress testing and scenario analysis, achieve more consistent capital trajectories and lower volatility in key regulatory ratios such as CET1 and CAR. This evidence underscores the importance of

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moving beyond standardized regulatory approaches toward more dynamic and institution-specific methodologies that reflect the actual risk profile, business model, and strategic objectives of each bank.

From a policy perspective, the study highlights the need for supervisory authorities to encourage the development and validation of internal risk models and capital planning tools, while maintaining strong oversight to ensure transparency, data quality, and model governance. Clear regulatory guidance on the calibration of capital buffers and the use of macroprudential indicators can further enhance the effectiveness of countercyclical capital measures and reduce the procyclicality of bank lending.

Based on the findings, several practical recommendations are proposed. First, commercial banks should strengthen the integration of stress testing outcomes into strategic capital planning and budgeting processes, ensuring that adverse scenarios are systematically reflected in dividend policies, growth targets, and funding strategies. Second, banks are encouraged to enhance data management and model validation frameworks to improve the reliability and consistency of risk-weighted asset calculations and internal capital projections. Third, the adoption of risk-adjusted performance metrics, such as risk-adjusted return on capital, can support more efficient capital allocation across business lines and promote greater transparency in managerial decision-making.

Finally, future research may extend the proposed framework by incorporating additional dimensions such as climate-related financial risks, digital transformation, and cross-border regulatory harmonization. Expanding the empirical scope to include a broader set of emerging and transition economies would also provide deeper insights into the adaptability and effectiveness of Basel III and risk-sensitive capital management methodologies across different institutional and macroeconomic environments. These directions can contribute to the continuous refinement of capital adequacy practices and the strengthening of financial stability in the global banking system.

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