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ORIGINAL RESEARCH PAPER

Banking Risk Supervision, Corporate Governance, Mergers and Acquisitions Performance in Financial and Economic Institutions

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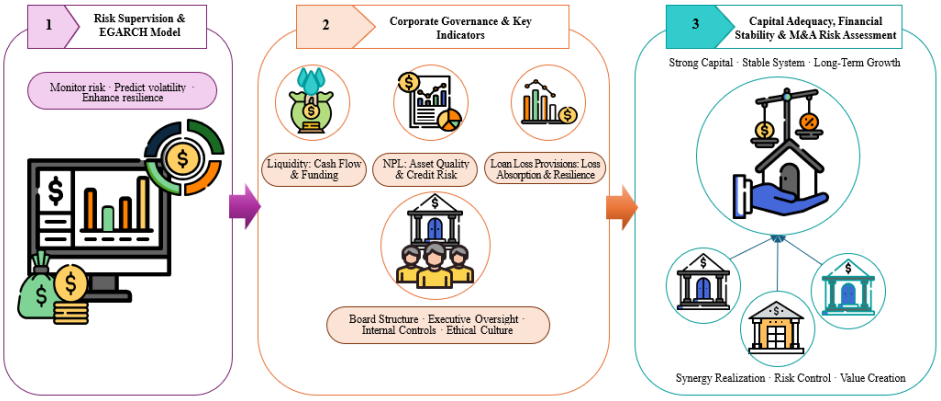
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A B S T R A C T

This study examines the impact of banking risk supervision indicators on the capital adequacy ratio and explains the role of corporate governance and merger and acquisition processes in enhancing the financial stability of financial institutions. Risk was measured and analyzed using the EGARCH model, and data covering the period 1352–1404 were investigated. The results show that the liquidity ratio has a positive and statistically significant effect on the capital adequacy ratio, indicating that banks with higher liquidity levels have greater capacity to meet their obligations, absorb financial shocks, and maintain their regulatory capital. In contrast, loan loss provisions have a negative and significant effect on the capital adequacy ratio, implying that higher credit risk consumes part of the bank's resources and profits and consequently reduces its capital strength. Non-performing loans also have a significant effect on the capital adequacy ratio, demonstrating that changes in the quality of banks' credit portfolios are directly related to their capital position. Moreover, the success of merger and acquisition processes in financial institutions requires a careful evaluation of asset quality, liquidity conditions, the level of non-performing loans, and capital adequacy before the transaction is executed in order to prevent risk transfer.



1. Introduction

Within the fabric of the contemporary financial system, banking risk supervision and corporate governance constitute two fundamental pillars for maintaining financial stability and ensuring the effective management of mergers and acquisitions (M&A). These two mechanisms play a decisive role in shaping the performance of financial institutions and business enterprises. Their importance is particularly pronounced in banks and their affiliated companies due to characteristics such as operational complexity, high financial leverage, significant information asymmetry among managers, depositors, and regulatory authorities, as well as the systemic importance of banking institutions [1]. In such an environment, any weakness in supervisory and control mechanisms, particularly during merger and acquisition transactions, may generate consequences that extend beyond the individual institution, ultimately threatening the stability of the entire financial system and the broader economy. Although mergers and acquisitions can serve as strategic instruments for expanding operational scale, improving efficiency, diversifying financial services, and enhancing competitiveness, they simultaneously expose financial institutions to higher levels of credit, liquidity, operational, and even systemic risks [2,3,4]. Consequently, the success of M&A transactions depends not only on financial and strategic considerations but also on the effectiveness of corporate governance mechanisms and banking risk supervision. In the absence of effective oversight, managers may pursue personal interests, empire-building strategies, or short-term objectives that do not necessarily

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maximize long-term shareholder value or safeguard the financial stability of the institution. Corporate governance mechanisms including board structure, board independence, executive compensation systems, information transparency, and shareholder rights serve as essential instruments for mitigating agency problems and monitoring managerial behavior. Particularly during merger and acquisition activities, these mechanisms strengthen internal oversight, reduce information asymmetry, enhance managerial accountability, and discourage excessive risk-taking and opportunistic decision-making. At the same time, institutional investors, as sophisticated participants in capital markets, play a complementary role in reinforcing corporate governance and banking risk supervision. Owing to their substantial financial resources, analytical expertise, and significant voting power, institutional investors are capable of influencing board composition, corporate risk-taking policies, and strategic decisions related to mergers and acquisitions [5,6]. Their active participation contributes to balancing profitability objectives with prudent risk-taking and regulatory compliance. The complexity of these relationships becomes even more pronounced within modern banking groups and their networks of affiliated companies. Contemporary banks no longer operate solely as financial intermediaries; they are actively engaged in insurance, leasing, investment banking, brokerage services, and financial technology (FinTech), thereby forming highly interconnected and multilayered organizational structures. Such interdependence complicates risk control and financial transparency during merger and acquisition processes while increasing the likelihood of risk transmission among affiliated entities [7]. Under these circumstances, effective banking risk supervision, together with a robust corporate governance framework, can prevent unfair intra-group transactions, concealment of risks, and opaque managerial decision-making [8]. Accordingly, the primary objective of this study is to examine and analyze the interaction between banking risk supervision, corporate governance mechanisms, and the performance of mergers and acquisitions in financial institutions and business enterprises. Specifically, this research seeks to demonstrate how strengthening banking risk oversight and improving corporate governance mechanisms can enhance M&A performance by reducing agency costs, improving information transparency, and promoting financial stability. The significance of this study arises from the growing prevalence of mergers and acquisitions within the financial sector. As M&A activities continue to expand, focusing solely on their financial and legal dimensions is no longer sufficient. Instead, evaluating the role of corporate governance and banking risk supervision in determining the success or failure of these transactions has become a central issue in the fields of corporate finance, banking, and economic policymaking. By adopting a comprehensive analytical perspective, this study aims to demonstrate that establishing an effective corporate governance system alongside sound banking risk supervision can reduce information asymmetry, strengthen organizational discipline, improve merger and acquisition performance, and ultimately contribute to greater financial stability and sustainable economic development [9,10]. The remainder of this study is organized as follows. First, a comprehensive review of the theoretical and empirical literature on banking risk supervision, corporate governance, and mergers and acquisitions is presented to identify existing research gaps. Subsequently, the conceptual framework and research hypotheses are developed, followed by the collection of the required data from reliable sources. The proposed hypotheses are then empirically tested using appropriate statistical and econometric techniques. Finally, the findings are interpreted and compared with previous studies, and policy recommendations are provided to strengthen banking risk supervision and improve the management of merger and acquisition processes in financial institutions and business enterprises (Figure1).

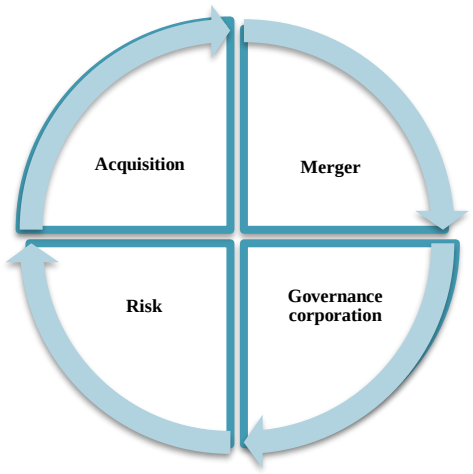


Figure 1. Merger and acquisition processes in financial institutions and business enterprises.

Source: Research findings.

1.1. Literature Review

Table 1. Summary of the Literature Review

Reference	Literature Review
Eslami et al. [7]	mergers can provide stronger support for creditors by increasing the capital base and credibility of the merged institution.
Malek-Mahdi [11]	Bank mergers are regarded as an effective strategy for preventing bankruptcy and enhancing the empowerment and resilience of commercial institutions.
Hakim-Javadi & Pasban [12]	Unlike the United Kingdom, where precise legal criteria (including thresholds and time limits) govern merger control, Iran's legal system lacks such comprehensive regulations or faces significant legal challenges in this area.
Li et al. [13]	The information interactions among investors have a significant positive effect on green mergers and acquisitions (Green M&A).
Niu et al. [14]	The primary risks associated with mergers and acquisitions (M&A) include information asymmetry, corporate performance, legal disputes, and geopolitical factors. Corporate Social Responsibility (CSR) plays a vital role in mitigating these risks.
Hussain et al. [15]	The quality of corporate governance in the acquiring firm determines the post-merger governance quality and performance of the merged entity.
Derasah & Alsharari [16]	Both internal and external factors including revenue, growth, costs, organizational survival, diversification, security, risk, and legal considerations are key determinants of mergers and acquisitions (M&A) in the UAE banking sector. The primary drivers include improving financial performance and responding to competitive pressures.

Source: Research findings

Eslami et al. [7], in a study entitled "The Legal Effects of the Merger of Banks and Financial and Credit Institutions with Respect to Third Parties and the Resulting Civil Liability," examined the legal dimensions of bank mergers within Iran's legal system, the challenges concerning the rights of third parties, and the resulting civil liability using a descriptive, exploratory, analytical, and library-based research approach. The findings indicated that mergers can provide stronger support for creditors by increasing the capital base and credibility of the merged institution. Furthermore, the acquiring bank is legally responsible for settling the debts and obligations of the merged financial institution. Malek Hadi [11], in the study entitled "A Legal Examination of Financial Monopoly Resulting from the Merger of Banks and Financial Institutions," explored the legal challenges associated with bank mergers and the balance between strengthening the financial capacity of institutions and preventing the adverse consequences of financial monopolies within the banking system. The findings indicated that bank mergers are not only an effective mechanism for preventing bankruptcy during periods of economic crisis but also serve as a strategic tool for enhancing the capabilities and competitiveness of commercial institutions. Hakim Javadi and Pasban [12], in their study entitled "A Comparative Analysis of the Procedural Regulations Governing Merger Control from the Perspective of Competition Law in the Legal Systems of England and Iran," compared the regulatory and procedural frameworks governing corporate mergers in the two legal systems using a descriptive and comparative analysis of legal documents. The findings showed that the English legal system employs well-defined regulatory thresholds and structured review procedures, which improve the accuracy and efficiency of merger control. In contrast, the Iranian legal system faces significant implementation challenges due to the absence of clear regulatory thresholds for distinguishing between small and large mergers, as well as the lack of specified timelines for reviewing merger cases. Li et al. [13], in a study entitled " Retail Investor Corporate ESG Information Interactions and Corporate Green Mergers and Acquisitions," investigated the effects of retail investors' information interaction indicators related to environmental, social, and governance (ESG) issues on corporate green mergers and acquisitions using data from Chinese listed companies. The results demonstrated that information interactions among retail investors have a significant positive impact on firms' engagement in green mergers and acquisitions. This relationship is further strengthened through mechanisms such as the recruitment of executives with environmental expertise and the allocation of government green subsidies. Nieto et al. [14], in the study entitled "Trends and Risks in Mergers and Acquisitions: A Review Article," examined the major risk factors associated with merger and acquisition transactions in the recent academic literature using a semi-systematic literature review and keyword co-occurrence analysis. The findings revealed that M&A-related risks can be classified into four major categories: information asymmetry, corporate performance and reputation, legal disputes and investor protection, and geopolitical factors. These categories exhibit complex interdependencies. The study also concluded that Corporate Social Responsibility (CSR) plays a critical role in mitigating these risks by enhancing transparency and strengthening corporate reputation. Hussain et al. [15], in a study entitled "Corporate Governance Transfer: Evidence from Mergers and Acquisitions," examined changes in corporate governance following mergers and acquisitions in financial institutions and business enterprises by comparing

firms' pre-merger and post-merger corporate governance quality. The findings indicated that the corporate governance quality of the acquiring firm plays a decisive role in improving the governance quality of the merged firm. Furthermore, the operational performance of the merged company improves following the transaction. These findings provide empirical support for the Corporate Governance Transfer Theory. Derasah and Alsharari [16], in a study entitled "Determinants of Mergers and Acquisitions in the Banking Sector: An Empirical Study," investigated the internal and external factors influencing merger and acquisition activities in the banking sector of the United Arab Emirates using a quantitative research design and a survey strategy. The results revealed that factors such as revenue, growth, costs, survival, diversification, security, risk, and legal considerations are among the most important determinants of successful bank integration. In addition, improvements in banks' financial position and pressures arising from macroeconomic conditions were identified as the primary drivers of acquisition decisions. Despite the growing body of literature on mergers and acquisitions in the Iranian banking sector, several important research gaps remain. In particular, the role of bank ownership structure including state owned, quasi-governmental (semi-public), and privately owned banks in shaping merger strategies, determining merger success, and influencing post-merger outcomes has received limited empirical attention. Likewise, although institutional investors are among the most influential shareholders in the banking industry, domestic studies have rarely considered them as active participants in banking merger and acquisition processes. A more comprehensive understanding of the interaction between ownership structures and institutional investors' behavior and their combined impact on banks' corporate governance represents a significant research gap. This issue is particularly important because strong corporate governance can both facilitate successful mergers and acquisitions and emerge as a desirable outcome of the integration process itself. Furthermore, evaluating the success of mergers and acquisitions requires assessment criteria that extend beyond conventional financial performance indicators [5,17,18]. A comprehensive evaluation should incorporate governance quality, organizational efficiency, operational performance, and long-term value creation. Therefore, additional empirical studies are needed to identify the factors influencing M&A success from a multidimensional perspective. Addressing these research gaps requires an interdisciplinary approach that integrates legal, financial, and managerial perspectives to provide a comprehensive understanding of how these dimensions interact and jointly influence the outcomes of mergers and acquisitions in Iran's banking sector. Although previous studies have examined certain aspects of bank mergers and acquisitions, they have paid insufficient attention to the diverse role of ownership structures in shaping M&A strategies, determining merger success, and influencing post-merger outcomes. Similarly, the lack of a comprehensive understanding of the interaction between ownership structures and institutional investors in enhancing corporate governance remains an important gap in the existing literature. Since robust corporate governance can serve both as a facilitator of successful mergers and acquisitions and as a desirable outcome of the integration process, further empirical research is essential to evaluate M&A performance beyond purely financial measures and to identify the broader determinants of successful bank mergers and acquisitions [10,15] (Table1).

1.2. Research Questions

- What is the effect of banking risk supervision on the performance of M&A in financial institutions and business enterprises?
- What role does the interaction between banking risk supervision and corporate governance play in the success and sustainability of M&A in financial institutions and business enterprises?
- To what extent can corporate governance mechanisms improve the performance of M&A in financial institutions and business enterprises?
- The interaction between banking risk supervision and corporate governance has a positive and significant effect on the success and sustainability of M&A in financial institutions and business enterprises.

1.3. Theoretical Framework

Corporate governance is not only a monitoring mechanism at the firm level but also a transferable governance mechanism within the M&A process. This perspective is particularly important for financial institutions, credit institutions, and banks, where the quality of corporate governance is directly associated with public confidence, risk management, information transparency, and the efficient allocation of resources. Consequently, mergers and acquisitions in the banking industry should not be viewed merely as ownership restructuring or business expansion strategies; rather, they can also be analyzed as mechanisms for transferring corporate governance standards and improving supervisory and managerial structures. Accordingly, the theoretical framework of the present study draws upon several major theories to explain the relationship among mergers and acquisitions, corporate governance, and the performance of the combined entity [19- 21].

1.3.1. Banking Risk Supervision

Banking risk supervision refers, to the set of mechanisms, regulations, and supervisory processes designed to identify, measure, monitor, control, and mitigate the financial risks faced by banks. Due to their heavy reliance on public deposits, extensive use of financial leverage, and pivotal role in the payment system and the allocation of financial resources, banks are exposed to various types of risks, including credit risk, liquidity risk, market risk, operational risk, and systemic risk. Consequently, both regulatory authorities and banks are required to establish effective supervisory frameworks to manage these risks and safeguard the stability of the financial system [22].

1.3.2. Agency Theory

Agency Theory argues that conflicts of interest inevitably arise between shareholders (principals) and managers (agents) within firms, particularly in the banking sector. Managers may pursue personal interests, expand their managerial authority, or adopt overly conservative and low-risk strategies to preserve their positions rather than maximizing shareholder value. In banks, this agency problem is even more critical because managerial decisions directly affect asset quality, lending policies, capital adequacy, and overall financial stability. Under such circumstances, stronger corporate governance mechanisms can reduce agency costs by enhancing board oversight, strengthening specialized committees, and limiting managerial opportunistic behavior, thereby facilitating value creation. Within the context of M&A, if the acquiring bank possesses more effective corporate governance mechanisms, these governance practices can be transferred to the target bank. As a result, following the merger, the quality of monitoring, internal control, and governance across the combined institution is expected to improve [6] (Table2).

Table2. Agency theory in banking M&A

Concept	Explanation	Implication in Banking M&A
Agency relationship	Shareholders are principals and managers are agents	Managers may not always act in shareholders' best interests
Conflict of interest	Managers may pursue personal goals, job security, or risk avoidance	Can lead to inefficient lending, weak asset quality, or conservative decisions
Agency costs	Costs arising from monitoring managers and controlling opportunistic behavior	Increase when governance is weak
Corporate governance	Board oversight, committees, internal controls, and accountability mechanisms	Reduces agency costs and improves decision-making
In banking sector	Managerial decisions directly affect capital adequacy, credit risk, and stability	Governance failures can threaten financial soundness
In M&A	Strong governance from the acquiring bank may transfer to the target bank	Post-merger governance quality and monitoring can improve
Expected outcome	Better supervision, reporting, and internal control	Higher efficiency and value creation in the merged bank

Source: Research findings.

M&A in financial institutions should be viewed as more than merely a strategy for growth or increasing organizational size. In the banking industry, a successful merger is one that not only generates financial and operational synergies but also enhances the quality of corporate governance. A merged bank can create greater value when it integrates not only the resources, branches, and assets of the combining institutions but also upgrades its supervisory framework, financial reporting standards, accountability culture, and internal control mechanisms. Therefore, in financial institutions, mergers and acquisitions should be regarded as an effective mechanism for transferring superior corporate governance practices, reducing agency costs, and strengthening institutional efficiency [17,23].

1.3.3. Corporate Governance Value Creation Theory in the Context of Mergers and Acquisitions

In the finance and management literature, mergers and acquisitions are considered economically justifiable only when they generate value for the participating firms. According to this perspective, two independent firms may create greater value by combining into a single organizational entity than the sum of their individual stand-alone values. This concept, commonly referred to in the finance literature as value creation through synergy, constitutes one of the principal theoretical foundations for analyzing mergers and acquisitions within the corporate governance framework. From this perspective, mergers and acquisitions are viewed not merely as financial transactions or changes in ownership structure but as strategic instruments for improving organizational efficiency, enhancing competitiveness, and strengthening corporate performance. In addition, effective corporate governance plays a fundamental role in realizing these synergies by improving decision-making quality, strengthening managerial accountability, reducing agency conflicts, and facilitating the integration of organizational resources. Consequently, the value created through mergers and acquisitions depends not only on financial and operational integration but also on the successful integration of governance structures and managerial practices (Figure2).

In financial institutions such as banks and credit institutions, the importance of value creation is even greater because the corporate governance structure plays a decisive role in resource allocation, risk management, and the monitoring of managerial performance.



Figure 2. Conceptual Framework of the Value Creation Theory in the Corporate Governance of Financial Institutions and Business Enterprises

Source: Research findings.

When a financial institution engages in a merger or acquisition, not only are its assets and business operations consolidated, but its supervisory structures, internal control systems, and corporate governance practices also become integrated. Under such circumstances, if the acquiring institution possesses a higher-quality corporate governance framework, its governance standards, managerial practices, and supervisory mechanisms can be transferred to the target institution, ultimately improving the quality of corporate governance within the combined entity. Such governance transfer can reduce agency problems, enhance transparency, and improve managerial efficiency, all of which are key drivers of shareholder value creation. Value creation through mergers and acquisitions may arise from several channels. One of the most important is the realization of economies of scale. By combining two firms, organizations can reduce operating costs, share infrastructure and resources, and improve the efficiency of resource utilization. Moreover, mergers may create opportunities for revenue growth through market expansion, diversification of financial services, and access to a broader customer base. In addition, the integration of the assets and managerial capabilities of the two firms may lead to more efficient resource allocation and higher productivity [17,18,24].

1.3.4. Merger Wave Theory

Merger Wave Theory suggests that merger and acquisition activities tend to occur in waves rather than at a constant rate over time. These waves generally emerge in response to changes in the economic and financial environment. For example, during periods of economic expansion, rising asset values, easier access to financing, capital market growth, and optimistic investor sentiment increase firms' incentives to engage in merger and acquisition transactions. Conversely, during economic downturns or periods of financial distress, firms may pursue mergers or acquisitions to ensure survival, reduce operating costs, or maintain their market share. Therefore, merger waves can be interpreted as organizational responses to changing environmental opportunities and constraints. Merger and acquisition activities do not occur uniformly over time; instead, they experience periods of substantial growth followed by periods of relative decline [12].This pattern suggests that mergers and acquisitions are not merely the result of isolated managerial decisions but are also strongly influenced by macroeconomic conditions and market structures [25]. Another important determinant of merger waves is institutional and regulatory change [26]. When regulations governing ownership, financial supervision, market structure, or antitrust policies are modified, firms adjust their strategic behavior accordingly. For example, the relaxation of legal restrictions or improved access to financing can stimulate merger and acquisition activities. Likewise, technological progress and financial innovation may compel firms to merge with or acquire other companies in order to maintain or strengthen their competitive position. Accordingly, merger waves can be viewed as an adaptive response to structural changes in the business environment [22].

1.4. The Contrast Between Neoclassical and Behavioral Approaches to Mergers and Acquisitions

Within the neoclassical perspective, firms are assumed to be fully rational economic agents whose decisions are fundamentally driven by the objective of maximizing firm value. From this viewpoint, M&A are economically justified only when they are expected to create value for both the firm and its shareholders. According to this perspective, firms continuously seek to improve their efficiency, and because markets are not always perfectly efficient, mergers and acquisitions serve as strategic instruments for correcting market inefficiencies [27]. This objective is achieved through the realization of synergies, the optimal combination of resources, more efficient asset management, and the elimination of duplicated activities, all of which contribute to substantial cost reductions [28]. Accordingly, the neoclassical school views mergers and acquisitions as rational responses to environmental changes and emerging economic opportunities. The theoretical implication of this perspective is that M&A represents a strategic mechanism for optimizing organizational structure, improving profitability and operational efficiency, and ultimately maximizing shareholder wealth. However, the explanation of merger and acquisition activities is not limited to the neoclassical perspective. The behavioral approach provides an alternative theoretical framework that challenges the assumption of perfect rationality. The significance of this theoretical contrast lies in demonstrating that not all merger and acquisition transactions are necessarily driven by rational decision-making or genuine value creation. From the behavioral perspective, the assumption of complete rationality is relaxed, and greater emphasis is placed on psychological and cognitive factors influencing managerial decisions. Within this framework, managers may be affected by managerial overconfidence, hubris, or excessive optimism when evaluating acquisition opportunities. Likewise, financial markets may be influenced by investor sentiment, herd behavior, and psychological biases, leading to the mispricing of corporate assets and shares [29,30]. Consequently, the behavioral approach argues that some mergers and acquisitions may occur not because they maximize economic value, but because they are driven by managerial biases, behavioral motivations, or temporary market inefficiencies. As a result, not all M&A transactions necessarily improve firm performance or shareholder wealth, and in some cases they may even destroy value. Therefore, a comprehensive analysis of mergers and acquisitions requires integrating both the neoclassical and behavioral perspectives to better explain firms' strategic decisions and their economic consequences (Figure3).

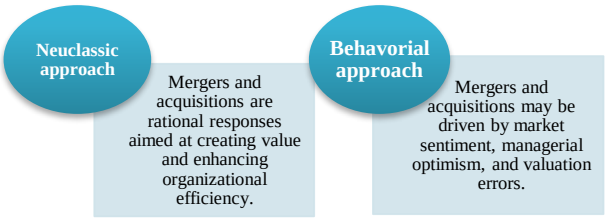


Figure 3. Neuclassic vs. Behavorial approaches

Source: Research findings.

2. Materials and Methods

In the present study, the data consist of annual time-series observations covering the period 1973–2025. The data were collected from official sources, including the Central Bank of the Islamic Republic of Iran (CBI) and the Statistical Center of Iran (SCI). The primary objective of this study is to examine the impact of banking risk supervision indicators on banks' Capital Adequacy Ratio (CAR) and to analyze the dynamic behavior of the volatility and risk associated with this variable over time.To investigate the relationships among the variables, the Augmented Dickey Fuller (ADF) and Phillips Perron (PP) unit root tests were first employed to determine the order of integration and assess the stationarity of the variables. After confirming the stationarity of the data, the mean equation of the model was estimated as follows:

$$CAR_t = \alpha + \beta_1 NPL_t + \beta_2 LIQ_t + \beta_3 LLP_t + \varepsilon_t \quad (1)$$

After estimating the mean equation, the ARCH-LM test was performed to examine the presence of conditional heteroskedasticity in the error terms. The results confirmed the existence of ARCH effects, indicating the presence of volatility clustering and justifying the use of Generalized Autoregressive Conditional Heteroskedasticity (GARCH) family models for analyzing risk and volatility. To obtain a more accurate measure of banking risk and to examine the asymmetric effects of positive and negative shocks on the volatility of the CAR, the Exponential Generalized Autoregressive Conditional Heteroskedasticity [EGARCH (1,1)] model was employed. This model was selected because of its ability to capture asymmetric volatility dynamics and its advantage of not requiring the imposition of a non-negativity constraint on the conditional variance [31].

The conditional variance equation of the EGARCH (1,1) model is specified as follows:

$$ln(\sigma_t^2) = \omega + \alpha|\varepsilon_t/\sigma_{t-1}| - \gamma + \beta\, ln(\sigma_{t-1}^2) \quad (2)$$

In this equation, σ_t^2 represents the conditional variance, or the level of risk at time t. The parameter α measures the magnitude of the volatility response to new shocks, β reflects the persistence of volatility over time, and γ captures the asymmetric effect of shocks on risk. A statistically significant value of γ indicates that positive and negative shocks do not have identical effects on the volatility of the CAR, implying the existence of an asymmetric volatility pattern. Following the estimation of the EGARCH (1,1) model, a series of diagnostic tests were conducted to evaluate the adequacy and reliability of the estimated model. These tests included the serial correlation test for the residuals, the heteroskedasticity test for the standardized residuals, and the normality test of the error terms. Furthermore, the stability of the model was assessed by examining the persistence parameters and the behavior of the conditional variance throughout the sample period. A review of previous

studies reveals that considerable research has been conducted on capital adequacy, non-performing loans, liquidity, and banking risk management. However, most existing studies have examined these variables separately and have primarily relied on conventional regression techniques. Moreover, insufficient attention has been paid to the dynamic behavior of banking risk, volatility dynamics, and the asymmetric effects of positive and negative shocks on the Capital Adequacy Ratio. Furthermore, within the domestic literature, only a limited number of studies have simultaneously investigated the effects of the non-performing loan (NPL) ratio, liquidity ratio, and loan loss provisions (LLPs) on the CAR using a GARCH-family model over an extended time horizon. Therefore, the principal research gap addressed by the present study lies in the application of the GARCH framework to analyze the dynamics of banking risk while simultaneously examining the effects of key banking supervision indicators on the Capital Adequacy Ratio over the period 1973–2025 in the Iranian economy. This approach is expected to provide a more comprehensive understanding of banking risk dynamics and contribute to a more accurate assessment of the financial stability of Iran's banking system (Figure 4).

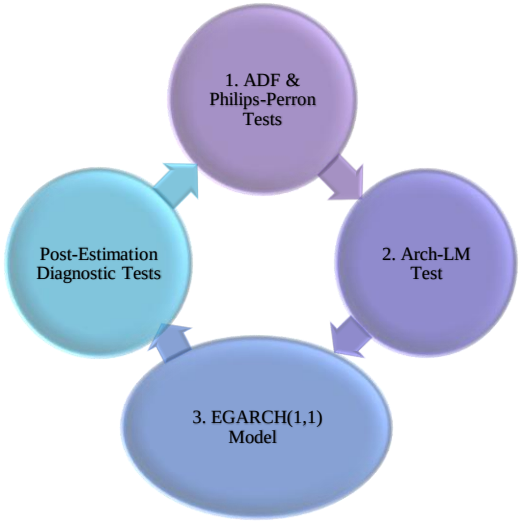


Figure 4. Overview of the Research Methods

Source: Research findings.

2.1. Definition of Concepts and Variables

In the present study, one dependent variable and three independent variables were employed to examine different dimensions of banking risk supervision and to analyze the factors influencing the financial soundness of banks and financial institutions. The dependent variable is the CAR, while the independent variables include the NPL, LIQ, and LLP. The selection of these variables is based on the theoretical literature on banking, the supervisory frameworks developed by the Basel Committee on Banking Supervision (BCBS), and previous empirical studies on banking risk management. Collectively, these variables reflect different aspects of banks' risk exposure, financial strength, and managerial quality, providing a comprehensive assessment of supervisory conditions and banking performance. The CAR, as the dependent variable, is one of the most important indicators used to assess the financial soundness and stability of banks. It measures the amount of regulatory capital available relative to the bank's risk-weighted assets (RWA) and indicates the bank's capacity to absorb potential losses arising from lending activities, investments, and other financial operations. In essence, the Capital Adequacy Ratio serves as a protective buffer against financial shocks and unexpected losses. A higher CAR indicates a stronger ability to withstand financial crises, reduce the likelihood of bank failure, and maintain the confidence of depositors and investors. The NPL is the first independent variable and is widely recognized as one of the key indicators of a bank's credit risk. Non-performing loans are loans for which the repayment of principal or interest is overdue, thereby reducing the likelihood of full recovery. An increase in NPLs reflects a deterioration in the quality of the bank's loan portfolio, weaknesses in borrower credit assessment, adverse economic conditions, and a higher probability of credit losses. Rising non-performing loans increase collection costs, reduce interest income, require higher loan loss provisions, and ultimately weaken the bank's capital position.

The Liquidity Ratio (LIQ) is the second independent variable and measures a bank's ability to meet its short-term obligations and satisfy depositors' withdrawal demands. Liquidity is one of the most critical determinants of banking stability because even profitable banks may encounter financial distress if they are unable to obtain sufficient liquidity when needed. Banks with stronger liquidity positions rely less on costly emergency funding, thereby reducing pressure on their capital resources and enhancing overall financial resilience. The LLP constitute the third independent variable and represent the reserves set aside by banks to cover potential losses arising from loan defaults. LLP is considered one of the principal instruments of credit risk management and reflects the degree of prudence and conservatism adopted by banks in addressing credit risk. Based on their assessment of loan quality and borrowers' default probabilities, banks allocate a portion of their earnings as loan loss provisions. Examining these variables simultaneously provides a comprehensive framework for analyzing the relationship between banking risks and banks' capital strength, thereby contributing to a better understanding of banking risk supervision mechanisms and the determinants of financial stability in the banking sector.

2.2. Statistical Population and Scope of the Study

The statistical population of this study comprises the entire banking sector and financial institutions operating in the Iranian economy, for which data on the variables under investigation are available in the official publications and statistical reports of the Central Bank of the Islamic Republic of Iran (CBI) and the Statistical Center of Iran (SCI). Given the macroeconomic and time-series nature of this research, the unit of observation consists of annual aggregated data for the Iranian economy and the country's banking sector. Accordingly, all variables were analyzed using national-level aggregate data.

The temporal scope of the study covers the period 1973–2025 in the Iranian calendar). This period was selected because it provides consistent and reliable data, encompasses major structural developments in Iran's banking system, captures significant changes in monetary and supervisory policies, and allows for a comprehensive long-term analysis of variables related to banking risk supervision. The geographical scope of the study is limited to Iran, and all data were obtained from official domestic sources, namely the Central Bank of the Islamic Republic of Iran (CBI) and the Statistical Center of Iran (SCI).

3. Result and Discussions

The results of the ADF and PP unit root tests in Table3 indicate that the CAR and the NPL are stationary at their levels, implying that both variables are integrated of order $I(0)$. In contrast, the LLP and the LIQ are non-stationary at their levels but become stationary after first differencing. Therefore, these variables are integrated of order $I(1)$.

Table 3. Results of the Stationarity Tests for the Variables

Variable	ADF Test (Level)	ADF Test (First Difference)	PP Test (Level)	PP Test (First Difference)
Capital Adequacy Ratio (CAR)	0.0000	0.0000	0.0000	0.0000
Liquidity Ratio (LIQ)	1.0000	0.0000	1.0000	0.0000
Non-Performing Loan Ratio (NPL)	0.0000	0.0000	0.0000	0.0000
Loan Loss Provisions (LLP)	0.9995	0.0000	0.9562	0.0000

Source: Research findings

Subsequently, the estimation results of the EGARCH (1,1) model indicated that the LIQ has a positive and statistically significant effect on the CAR, whereas LLP have a negative and statistically significant effect on capital adequacy. In addition, the NPL was found to have a statistically significant impact on the Capital Adequacy Ratio. In the variance equation, the negative and statistically significant asymmetric coefficient ($\gamma = -0.768$) indicates that negative shocks resulting from increased credit risk and reduced liquidity exert a stronger effect on the volatility of the Capital Adequacy Ratio than positive shocks. Furthermore, the volatility persistence coefficient ($\beta = 0.532$) suggests that banking risk exhibits moderate persistence, implying that the effects of shocks persist in the short run but gradually converge over the long run. Therefore, the EGARCH model successfully captures the asymmetric and dynamic behavior of banking risk, confirming the presence of volatility clustering and the banking system's high sensitivity to adverse shocks(Tables 4 and 5).

Table 4. Estimation Results of the EGARCH Mean Equation

Variable	Coefficient	z-Statistic	p-value
Liquidity Ratio (LIQ)	0.00025	7.0469	0.0000
Loan Loss Provisions (LLP)	-0.00061	-17.0465	0.0000
Non-Performing Loan Ratio (NPL)	0.000001	5.5419	0.0000
Constant	0.09695	15.4560	0.0000

Source: Research findings.

Table 5. Estimation Results of the EGARCH(1,1) Variance Equation

Parameter	Coefficient	z-Statistic	p-value
C(5)	-2.8500	-1451.561	0.0000
C(6)	-1.4688	-15200.49	0.0000
C(7) (γ)	-0.7681	-9.9780	0.0000
C(8) (β)	0.5319	135.37E+00	0.0000

Source: Research findings.

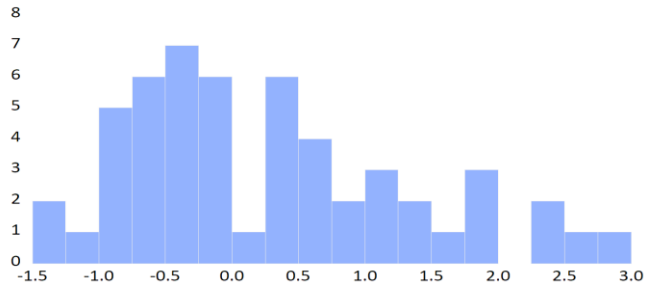
3.1. Diagnostic Tests

Following the estimation of the model, diagnostic tests were conducted to evaluate its adequacy and validity. The results of the ARCH heteroskedasticity Test indicated that the probability value of the F-statistic was 0.1768, while the probability value of the Chi-square statistic was 0.1701, both of which are greater than the 5% significance level. Therefore, the null hypothesis of no ARCH effect cannot be rejected. These findings indicate that no significant conditional heteroskedasticity remains in the residuals, suggesting that the estimated model has successfully captured the volatility dynamics and adequately modeled the conditional variance process. Consequently, the EGARCH model is considered statistically adequate, and the estimated results can be regarded as reliable for inference and interpretation(Table6).

Table 6. Results of the heteroscedasticity test in the residuals

Test Statistic	Prob.	Value
F-statistic	0.176762	1.8773
Obs*R-squared	0.1701	1.8817

Source: Research findings.



Statistic	Value
Skewness	0.642
Kurtosis	2.586
Jarque-Bera	4.021
Probability	0.133

Figure5. Results of the Jarque-Bera test for assessing the normality of residuals

Source: Research findings.

Also, the Jarque-Bera test results for assessing the normality of the standardized residuals showed that the Jarque-Bera statistic was 4.021 and its probability value was 0.1339. Since the probability value is greater than the 5% significance level, the null hypothesis of normality of the residuals cannot be rejected(Figure5). Therefore, it can be concluded that the error terms of the model follow a normal distribution, and the estimated model has acceptable statistical validity in terms of error normality.

Table 8. Ljung-Box Q-statistic test results for residual autocorrelation

Lag	Q-Stat	Prob.
1	2.4707	0.116
2	3.3701	0.185
3	3.7664	0.288
4	3.7798	0.437
5	3.8147	0.576
6	3.8649	0.695
7	4.5597	0.714

Source: Research findings.

Finally, the results of the Ljung-Box test for examining the autocorrelation of the model residuals showed that the probability values of the Q-statistic up to the tenth lag are all greater than the 5% significance level (Table 8). Therefore, the null hypothesis of no autocorrelation cannot be rejected. This result indicates that the model residuals are free of significant autocorrelation, and the EGARCH model has successfully captured the short-term serial dependence structure.

4. Conclusions

The findings of the present study indicate that the liquidity ratio has a positive and statistically significant effect on the CAR. From an economic perspective, banks with stronger liquidity positions are better equipped to meet their short-term obligations, manage cash flows efficiently, absorb financial shocks, and maintain their regulatory capital. Adequate liquidity reserves reduce banks' reliance on costly emergency funding, thereby alleviating pressure on capital resources. This finding suggests that effective liquidity management is not merely an operational tool but also a fundamental pillar of financial stability and a key determinant of banks' resilience against economic and financial fluctuations. Conversely, LLPs exhibit a negative and statistically significant effect on the capital adequacy ratio. This result indicates that an increase in credit risk and the necessity of setting aside higher provisions to cover potential loan losses absorb a considerable portion of banks' earnings and financial resources, thereby weakening their capital position. In other words, as the quality of bank assets deteriorates and the probability of loan default increases, banks are required to allocate larger provisions, which directly reduces capital adequacy.

Furthermore, changes in the quality of banks' credit portfolios have a direct impact on their capital position. An increase in NPLs intensifies credit risk and compels banks to strengthen their capital structure while implementing additional prudential and supervisory measures to mitigate the associated risks. Therefore, the NPL ratio can be regarded as one of the most important early warning indicators for assessing the financial soundness of banks. The effectiveness of banks' internal control and supervisory mechanisms also plays a crucial role in maintaining capital adequacy and mitigating risk volatility. Independent boards of directors, specialized risk committees, transparent financial reporting systems, and effective oversight of lending decisions can prevent the accumulation of hidden risks and enhance banks' financial stability. In this regard, sound corporate governance reduces information asymmetry, limits managerial opportunistic behavior, strengthens financial discipline, and provides a more effective framework for managing credit and liquidity risks. The findings further imply that banks and financial institutions can successfully utilize M&A as a strategic instrument for improving performance and enhancing financial stability only if a comprehensive due diligence process is conducted before the transaction. Such an assessment should include a thorough evaluation of the target institution's asset quality, liquidity position, non-performing loan ratio, loan loss provisions, and capital adequacy. Otherwise, the transfer of financial risks from the target institution to the acquiring bank may increase capital volatility, weaken capital adequacy, and even exacerbate systemic risk within the banking sector. Overall, these findings underscore that maintaining financial stability in the banking sector requires an integrated approach combining effective banking risk supervision, prudent liquidity and credit risk management, robust corporate governance mechanisms, and rigorous pre-merger risk assessment. Strengthening these dimensions can improve the success of mergers and acquisitions while enhancing the resilience and long-term sustainability of financial institutions.

4.1. Policy Recommendations

- The Central Bank and supervisory authorities should strengthen continuous monitoring of the non-performing loan (NPL) ratio as one of the most important early warning indicators of banking risk.
- Banks should enhance their credit assessment procedures and loan portfolio management practices to prevent the growth of non performing loans and reduce the need for substantial loan loss provisions.
- Strengthening liquidity management and maintaining an adequate level of liquid and near-liquid assets should be prioritized as a fundamental pillar of financial stability within banks.
- During merger and acquisition (M&A) processes, a comprehensive risk assessment including the evaluation of asset quality, capital adequacy, liquidity, and loan loss provisions should be conducted to prevent risk transfer and preserve financial stability.
- Strengthening corporate governance mechanisms through greater board independence, enhanced financial reporting transparency, and a more active role for risk committees can reduce banks' vulnerability to adverse shocks and improve financial discipline.
- Given the asymmetric effects of shocks, policymakers should adopt more proactive measures during periods of rising credit risk and declining liquidity, such as increasing capital requirements and imposing stricter limits on banks' risk-taking activities.

Author Contributions

All authors contributed equally to the conception, preparation, and writing of this manuscript.

Conflict of Interest

The authors, while observing publication ethics in the referencing, declare the absence of interest of conflict.

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