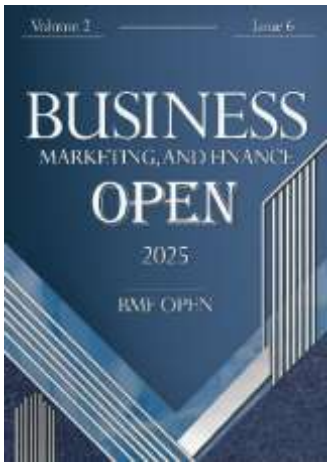
The Role of Financial Condition and Regulatory Capital Requirements in the Relationship Between Held-to-Maturity Classification and the Risk of Failure among Banks Listed on the Iraq Stock Exchange



Raid Albasatini[1], Sahar Sepasi [2,*], Hossein Etemadi [3] and Javad Rezazadeh [4]

[1] Ph.D. Candidate, Department of Accounting, Faculty of Management and Economics, Tarbiat Modares University, Tehran, Iran;
[2] Associate Professor, Department of Accounting, Faculty of Management and Economics, Tarbiat Modares University, Tehran, Iran;
[3] Professor, Department of Accounting, Faculty of Management and Economics, Tarbiat Modares University, Tehran, Iran;
[4] Associate Professor, Department of Accounting, Faculty of Management and Economics, Tarbiat Modares University, Tehran, Iran;

* Correspondence: sepasi@modares.ac.ir

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Abstract: The present study aims to examine the role of banks' financial condition and regulatory capital requirements in explaining the relationship between the classification of securities as held to maturity and the risk of failure among banks listed on the Iraq Stock Exchange. The theoretical premise of the study is that the accounting classification of securities may affect how changes in asset values are reflected in financial statements; however, it does not necessarily eliminate the economic risks arising from interest rate fluctuations, liquidity needs, or the possibility of loss realization. Using panel data for banks over the 2018–2025 period and employing a bank fixed-effects model, the study investigates the relationships among the main and control variables. The descriptive results indicate an increase in the mean use of the held-to-maturity classification from 0.194 in 2018 to 0.371 in 2025, along with an increase in the mean book-risk index from 0.063 to 0.123. In the bank failure-risk regression, the coefficient of the held-to-maturity classification is positive and statistically significant, whereas bank capital has a negative and statistically significant coefficient. Moreover, the interaction coefficient between held-to-maturity classification and bank capital is negative and statistically significant, which is consistent with the moderating role of capital. Nevertheless, the final interpretation depends on the operational definition of failure risk, the consistency of the number of observations, and clarification of the dependent variable used in the regulatory capital model. The findings emphasize the necessity of simultaneously assessing accounting classification, loss-absorption capacity, and capital adequacy.

Keywords: held-to-maturity; bank financial condition; regulatory capital; bank failure risk; moderating effect; panel data; Iraqi banks.

1. Introduction

Bank stability has become a central concern in contemporary financial management because the failure of a banking institution can transmit losses far beyond the boundaries of the individual bank. Banks operate with highly leveraged balance sheets, maturity transformation, interconnected funding structures, and asset portfolios whose values can be sensitive to changes in interest rates, liquidity conditions, and market expectations. These characteristics mean that even accounting classifications that appear primarily concerned with financial reporting may acquire broader implications for risk

management and financial stability when market conditions deteriorate. The interaction between accounting treatment, regulatory capital, liquidity, and bank solvency has therefore become an increasingly important area of research, particularly in periods characterized by sharp monetary tightening and heightened concern over unrealized losses on securities portfolios [1-3].

One of the most important issues in this context concerns the classification of debt securities as held to maturity (HTM). Under this classification, securities that a bank intends and is able to hold until maturity are accounted for differently from securities whose fair-value changes are recognized more directly in reported earnings or equity. From an accounting perspective, HTM classification can reduce the immediate visibility of market-value fluctuations in financial statements. From an economic perspective, however, classification does not eliminate exposure to interest-rate risk, liquidity risk, or the possibility that unrealized losses will become economically relevant if securities must be sold before maturity. Recent evidence has highlighted the importance of HTM securities during episodes of monetary tightening, particularly when rising interest rates reduce the market value of fixed-income assets and banks simultaneously face funding pressures or deposit withdrawals [3, 4].

The distinction between accounting recognition and economic exposure is especially important because banks can remain exposed to substantial interest-rate risk even when changes in market value are not fully reflected in contemporaneous accounting measures. When interest rates rise, the market value of previously issued fixed-rate securities generally declines. If a bank is able to retain those securities until maturity, the decline may remain unrealized; however, if liquidity pressures force asset sales, those losses may become realized and directly affect capital. This mechanism demonstrates why the interaction between HTM classification and bank financial condition deserves careful analysis. A classification decision that appears benign in a well-capitalized and liquid institution may have different implications in a bank with weaker capital buffers, higher leverage, or more fragile funding structures [1, 4, 5].

Interest-rate risk is therefore a critical element in understanding banks' use of HTM classification. Changes in monetary policy can alter the valuation of bank assets, affect funding costs, influence deposit behavior, and modify incentives for balance-sheet management. The consequences are unlikely to be uniform across banks because institutions differ in capital strength, liquidity, asset maturity, funding structure, and ability to hedge interest-rate exposure. Recent research has emphasized that prudential regulation can generate heterogeneous cross-sectional effects when banks face different degrees of interest-rate exposure [3]. In this sense, the relevance of HTM classification cannot be evaluated solely as an accounting choice; it must also be considered in relation to the broader financial capacity of the bank to absorb valuation changes and withstand liquidity shocks.

Bank capital plays a particularly important role in this relationship. Capital provides a buffer against unexpected losses and supports the ability of a bank to continue operating when asset values decline. Higher capitalization can reduce vulnerability to adverse shocks by increasing loss-absorption capacity, while weak capitalization may amplify the effect of asset-value deterioration on solvency. Dynamic models of bank behavior have long emphasized the importance of capital buffers in shaping banks' responses to risk, uncertainty, and regulatory constraints [6]. More recent studies likewise show that the relationship between capital, liquidity, and bank resilience is strongly influenced by crisis conditions and regulatory intervention [2]. Thus, the effect of HTM classification on bank risk may depend not only on the amount of securities classified in this category, but also on the capital position of the institution holding them.

The role of regulatory capital is also complex because higher capital requirements may influence both risk-taking and lending behavior. Prudential regulation is intended to strengthen banks' capacity to absorb losses and reduce

the probability of distress, yet changes in capital requirements can affect portfolio allocation, credit supply, and managerial incentives in ways that are not always linear. Evidence suggests that higher capital requirements can, under certain conditions, generate a "forced safety" effect that supports lending by improving bank resilience [7]. Other research demonstrates that capital regulation interacts with competitive conditions and risk-taking incentives, particularly in banking systems in the Middle East and North Africa, where institutional characteristics and market structures may differ from those of advanced economies [8]. This regional perspective is especially relevant for examining banks operating in Iraq.

Capital regulation should therefore not be regarded merely as an external constraint. It is also part of the mechanism through which bank managers adjust balance sheets in response to changing risks. Banks facing liquidity shortages may alter their capital positions, while stronger capitalization may increase the ability to withstand deposit outflows or valuation losses without engaging in distressed asset sales [5]. At the same time, regulatory capital and liquidity standards introduced under modern prudential frameworks have important implications for lending behavior and overall financial stability in emerging markets [9]. Consequently, examining the interaction between capital and HTM classification can provide a more complete understanding of whether stronger financial capacity mitigates the association between accounting classification and bank vulnerability.

The relationship between capital structure and bank stability is further supported by evidence on leverage. Because banks inherently operate with high levels of debt relative to equity, relatively small changes in asset values can translate into substantial changes in equity values. Regulatory leverage constraints are designed to limit excessive balance-sheet expansion and reduce the probability that losses will erode capital beyond sustainable levels. Empirical research indicates that leverage regulation can influence bank risk-taking and stability, reinforcing the broader argument that capital strength is central to the resilience of financial institutions [10]. This suggests that the effect of HTM classification should be interpreted jointly with leverage and capitalization rather than in isolation.

Liquidity is equally important. A bank may hold securities with substantial unrealized losses and still remain solvent if it has sufficient liquidity and stable funding to avoid forced sales. By contrast, the combination of weak liquidity and deposit withdrawals can transform unrealized losses into realized capital impairment. Integrated stress-testing research has therefore increasingly emphasized the need to assess liquidity and solvency jointly rather than as separate dimensions of bank risk [1]. This integration is directly relevant to HTM securities because the accounting treatment relies, in economic terms, on the institution's ability to continue holding the asset. If liquidity stress undermines that ability, the distinction between unrealized and realized losses becomes less meaningful from a risk-management perspective.

Recent studies of deposit behavior have reinforced this point. Monetary policy tightening can interact with HTM securities and uninsured deposit withdrawals, creating a mechanism through which interest-rate shocks and funding pressure reinforce one another [4]. A bank with substantial HTM holdings may appear less exposed in accounting terms because unrealized losses are not immediately recognized in the same way as fair-value losses, yet depositors and market participants may respond to the bank's underlying economic position rather than to accounting presentation alone. Accordingly, financial condition becomes a critical moderating factor: a well-capitalized, liquid bank may be able to absorb or manage such pressures, whereas a weaker institution may face a greater probability of distress.

The study of bank failure provides an important empirical framework for evaluating these relationships. Bank failure is rarely the result of a single financial indicator; rather, it typically reflects the interaction of capital

weakness, poor profitability, excessive leverage, liquidity constraints, deteriorating asset quality, governance deficiencies, and adverse macroeconomic conditions. Research on failure prediction has consistently shown that financial indicators possess substantial predictive content, while governance variables can also contribute meaningfully to identifying vulnerable institutions [11]. Therefore, any assessment of HTM classification and failure risk should account for broader aspects of bank financial condition rather than treating the accounting classification as an isolated determinant.

The methodological literature on bank failure prediction has also developed rapidly. Traditional econometric approaches have increasingly been complemented by machine-learning methods, cost-sensitive classification, and advanced stress-testing frameworks. Recent research demonstrates that machine-learning algorithms can improve the identification of banks at risk of failure and can be integrated into stress-testing applications [12]. Other work has shown that cost-sensitive approaches can be particularly valuable because the consequences of failing to identify a distressed bank may be substantially greater than those of incorrectly classifying a healthy institution as vulnerable [13]. Reviews of the bank-failure prediction literature likewise emphasize the importance of model specification, variable selection, data quality, and the economic interpretation of predictors rather than reliance on predictive accuracy alone [14].

These developments are important for the present context because they highlight the multidimensional nature of bank vulnerability. Even if HTM classification is statistically associated with higher risk, the interpretation of that relationship requires careful control for capitalization, profitability, leverage, liquidity, size, and market conditions. Moreover, the association may be endogenous: weaker banks may choose HTM classification more extensively, or both financial weakness and classification behavior may respond to common interest-rate shocks. Such considerations make panel-data analysis particularly appropriate because it allows researchers to control for persistent bank-specific characteristics and examine how changes within banks over time relate to changes in financial outcomes.

The importance of capital as a moderating mechanism is also supported by theoretical and empirical work on bank defaults. Capital requirements are designed not only to reduce the probability of individual bank failure but also to limit systemic consequences that can emerge when financial institutions and borrowers simultaneously experience distress. Research on “twin defaults” underscores the importance of bank capital requirements in reducing the amplification of adverse shocks across the financial system [15]. This perspective suggests that the role of capital may extend beyond a simple direct effect on failure risk. Capital may also change the sensitivity of bank risk to other balance-sheet exposures, including the use of accounting categories such as HTM.

The potential moderating effect of capital is particularly important when interest rates rise. Under such circumstances, banks with substantial fixed-income securities may face declining market values, but the consequences of those losses differ depending on capital strength. A strongly capitalized bank may be able to absorb valuation declines without undermining depositor confidence or breaching prudential thresholds. A weakly capitalized bank, by contrast, may face a more severe deterioration in perceived solvency even if accounting rules defer recognition of unrealized losses. The interaction between interest-rate risk and microprudential regulation therefore provides a useful conceptual framework for examining whether capital attenuates the risk associated with HTM classification [3, 15].

This issue is especially relevant in emerging banking systems, where differences in market depth, regulatory implementation, governance structures, liquidity, and access to external financing may increase the importance of bank-specific financial condition. Evidence from emerging economies indicates that Basel III capital and liquidity

regulations can materially influence bank lending and financial stability [9]. Similarly, findings from the MENA region show that capital regulation interacts with competition and risk-taking in ways that have direct policy implications for banking-sector stability [8]. These findings suggest that conclusions derived from the banking systems of advanced economies should not automatically be generalized to Iraq without direct empirical investigation.

The Iraqi banking sector provides a particularly relevant setting for such an analysis because listed banks operate within an environment characterized by evolving regulatory requirements, heterogeneous financial strength, differences in capitalization and liquidity, and exposure to macroeconomic and interest-rate conditions. In such a setting, examining accounting classification alongside financial condition can contribute to a more realistic assessment of bank vulnerability. If greater use of HTM classification is concentrated among banks with weaker capital, lower profitability, or higher book risk, this pattern would suggest that accounting classification choices are closely intertwined with financial constraints. If, in addition, stronger capital weakens the positive relationship between HTM classification and failure risk, regulatory capital would appear to function not merely as an independent determinant of stability but as a moderating buffer against the risks associated with balance-sheet classification.

At the same time, the interpretation of such relationships requires caution. The presence of a positive association between HTM classification and bank failure risk does not necessarily imply that HTM accounting itself causes failure. The classification may instead serve as an indicator of broader balance-sheet strategies, interest-rate exposure, funding pressures, or risk-management limitations. Likewise, a negative relationship between capital and HTM use does not establish opportunistic financial reporting. It may reflect rational differences in portfolio structure, liquidity management, or the capacity to tolerate fair-value volatility. Existing research on capital, liquidity, leverage, bank failure, and prudential regulation therefore provides a strong foundation for examining the issue, but the specific interaction between HTM classification, bank financial condition, and failure risk remains insufficiently explored, particularly in the context of Iraqi listed banks [2, 10, 11, 14].

Furthermore, the existing literature tends to examine several related issues separately. Some studies focus on capital regulation and risk-taking [7, 8], others on liquidity and solvency interactions [1, 5], and others on the prediction of bank failure using financial, governance, or machine-learning indicators [11-14]. More recent research has begun to connect monetary policy, interest-rate exposure, and HTM securities [3, 4], while work on capital buffers and default dynamics continues to emphasize the protective role of capitalization [6, 15]. However, there remains a need for an integrated empirical framework that simultaneously considers HTM classification, financial condition, regulatory capital, interest-rate changes, and bank failure risk.

Such an integrated approach has both managerial and regulatory relevance. For bank managers, the findings can clarify whether securities-classification choices are systematically associated with financial vulnerability and whether stronger capital positions reduce that association. For regulators, the results may help determine whether accounting classification should be evaluated together with capital adequacy, liquidity, and leverage when assessing bank resilience. For investors and other market participants, the study may provide insight into whether reported accounting categories offer sufficient information about underlying risk or whether they should be interpreted in conjunction with broader financial indicators. In this respect, the study contributes to the intersection of financial accounting, bank risk management, and prudential regulation by focusing on the conditions under which accounting classification becomes economically consequential.

Accordingly, the aim of this study is to examine the role of banks' financial condition and regulatory capital in the relationship between held-to-maturity securities classification and the risk of failure among banks listed on the Iraq Stock Exchange during 2018–2025.

2. Methods and Materials

The present study is applied in terms of purpose and quantitative in terms of method, and it is based on panel-data analysis. The unit of analysis consists of banks listed on the Iraq Stock Exchange, and the reported study period covers the years 2018–2025. The main variables include the extent of the use of the held-to-maturity classification, the book-risk index, bank capital, changes in interest rates, and hedging constraints. Bank size, financial leverage, profitability, and liquidity are also included in the models as control variables. In the panel-data models, the choice among pooled estimation, fixed effects, and random effects was examined using the Chow, Breusch–Pagan, and Hausman tests. The Chow test result supports rejection of the pooled model and the use of a structure that accounts for bank-specific heterogeneity. The Breusch–Pagan test also indicates that the pooled model is not appropriate compared with the random-effects model. Finally, the Hausman test, with a chi-square statistic of 24.736 and a significance level of 0.002, supports the use of fixed effects rather than random effects. Accordingly, the reported models are interpreted using bank fixed effects. To assess the assumptions and characteristics of the data, descriptive statistics, Pearson correlations, tolerance indices and variance inflation factors, the Wooldridge test for autocorrelation, the modified Wald test for heteroskedasticity, and the Pesaran test for cross-sectional dependence were examined. Because the diagnostic tests indicate the presence of autocorrelation, heteroskedasticity, and cross-sectional dependence, the use of robust standard errors is necessary for statistical inference. However, because the information provided does not specify the exact type of robust estimator used, this article does not claim that a particular method, such as Driscoll–Kraay standard errors or a clustered estimator, was actually implemented.

The model related to failure risk examines the direct effects of held-to-maturity classification and bank capital, as well as their interaction term. The coefficient of the interaction term indicates how the slope of the relationship between held-to-maturity classification and failure risk changes across different levels of bank capital. If the classification coefficient is positive and the interaction coefficient is negative, this pattern is consistent with a weakening of the positive relationship between classification and failure risk at higher levels of capital; however, calculation of marginal effects is necessary to determine the precise effect at specific values of capital. Two methodological considerations should be observed in the interpretation. First, the "bank book-risk" index and the "bank failure-risk" variable should not be treated as equivalent unless they have the same operational definition. Second, the number of observations reported in the descriptive statistics is 157, whereas the regressions are based on 160 observations. Until the reason for this discrepancy is clarified, the results should be interpreted as reported estimates rather than as a fully reproducible set of results derived from a single, internally consistent sample.

3. Findings and Results

Table 1 presents the descriptive statistics for the principal study variables and the control variables. The statistics for the principal variables are based on 157 observations. These descriptive indicators characterize the sample and identify preliminary patterns in the data; they should not, by themselves, be interpreted as evidence of causal relationships among the variables.

Table 1. Descriptive Statistics for the Main and Control Variables

Variable	N	Minimum	Maximum	Mean	SD	Median
Bank book risk	157	0.010	0.280	0.094	0.052	0.086
Use of held-to-maturity classification	157	0.070	0.580	0.271	0.118	0.258
Hedging constraint	157	0.000	0.390	0.087	0.074	0.068
Bank capital	157	0.060	0.230	0.129	0.035	0.124
Change in interest rate	157	-0.020	0.280	0.073	0.061	0.061
Bank size	—	18.420	25.760	22.148	1.586	22.317
Financial leverage	—	0.680	0.960	0.874	0.057	0.886
Profitability	—	-0.060	0.090	0.024	0.021	0.026
Liquidity	—	0.030	0.420	0.168	0.084	0.151

The mean bank book-risk index is 0.094, with a median of 0.086. The mean being higher than the median is consistent with the presence of some observations with relatively high values. Nevertheless, a conclusion regarding the skewness of the distribution would require either a formal skewness statistic or inspection of the empirical distribution. The range of the book-risk index, from 0.010 to 0.280, also indicates substantial heterogeneity across observations. This heterogeneity strengthens the rationale for employing a panel-data framework, because an analysis based solely on pooled averages may fail to capture variation associated with bank-specific characteristics.

The mean use of the held-to-maturity (HTM) classification is 0.271, with a standard deviation of 0.118. Its range, from 0.070 to 0.580, indicates substantial differences among banks in their reliance on this classification. Economically, such variation may reflect differences in asset composition, business models, balance-sheet management policies, or banks' capacity to absorb fluctuations in market values. However, the descriptive statistics alone cannot identify which of these factors accounts for the observed variation. Such an assessment would require more detailed information regarding securities portfolios, asset maturities, and risk-management policies.

The mean bank-capital variable is 0.129, with a median of 0.124 and a range from 0.060 to 0.230. These figures indicate meaningful differences among banks in the capital measure used in this study. Importantly, this variable should not automatically be equated with the regulatory capital adequacy ratio based on risk-weighted assets unless its operational definition confirms such equivalence. If the capital measure represents book equity divided by total assets, for example, it is conceptually distinct from a regulatory capital adequacy ratio. Accordingly, throughout the regression analysis, "bank capital" refers specifically to the variable operationalized in the dataset and not necessarily to every dimension of regulatory capital.

The mean change in interest rates is 0.073, with a standard deviation of 0.061. The minimum value of -0.020 indicates that the variable also captures negative changes or decreases in interest rates for some observations. Therefore, "change in interest rate" is a more precise description than "increase in interest rate," unless the operational definition confirms that only positive changes were intended to be measured. This distinction is important because a positive regression coefficient should be interpreted according to the actual construction of the variable rather than according to an implication inferred solely from its label.

Among the control variables, mean bank size is 22.148, with a standard deviation of 1.586 and a range from 18.420 to 25.760. The final version of the study should explicitly specify how this variable was constructed. For instance, if bank size is measured as the natural logarithm of total assets, the currency unit and data-transformation procedure should also be reported. Without this information, the economic interpretation of the estimated bank-size coefficient remains limited.

The mean financial leverage ratio is 0.874, which is relatively close to the upper end of its reported range. This pattern is consistent with the debt-intensive financing structure typically observed in banks; however, it is

insufficient by itself to establish whether leverage is excessively risky. Such an interpretation depends on the precise definition of the numerator and denominator, asset quality, and the composition of bank liabilities.

Mean profitability is 0.024, while the minimum value of -0.060 indicates that at least some bank-year observations experienced negative profitability. This variation is relevant to banks' financial condition because operating losses or weak profitability can restrict the accumulation of internally generated capital. Mean liquidity is 0.168, with a standard deviation of 0.084, indicating substantial dispersion in liquidity across the sample.

Table 2 jointly reports the annual developments in HTM classification, changes in interest rates, bank capital, capital adequacy, and book risk. Consolidating these measures facilitates comparison of their temporal patterns over the 2018–2025 study period.

Table 2. Annual Trends in HTM Classification, Interest Rates, Bank Capital, and Book Risk

Year	Banks	HTM Mean	HTM SD	Interest-Rate Change Mean	Interest-Rate Change SD	Interest-Rate Min	Interest-Rate Max	Capital/Assets Mean	Capital/Assets SD	Capital Adequacy Mean	Book-Risk Mean	Book-Risk SD	Book-Risk Min	Book-Risk Max
2018	20	0.194	0.076	0.048	0.018	0.016	0.079	0.136	0.031	0.158	0.063	0.029	0.010	0.130
2019	20	0.207	0.081	0.042	0.016	0.012	0.071	0.134	0.032	0.156	0.067	0.031	0.010	0.140
2020	20	0.221	0.089	0.021	0.015	-0.021	0.052	0.131	0.034	0.153	0.061	0.028	0.010	0.130
2021	20	0.236	0.094	0.028	0.017	-0.006	0.061	0.132	0.033	0.155	0.069	0.032	0.010	0.150
2022	20	0.264	0.102	0.076	0.042	0.012	0.148	0.128	0.035	0.151	0.082	0.038	0.020	0.180
2023	20	0.301	0.117	0.118	0.056	0.026	0.224	0.125	0.036	0.148	0.101	0.047	0.020	0.220
2024	20	0.335	0.124	0.136	0.061	0.031	0.267	0.122	0.037	0.145	0.116	0.051	0.020	0.250
2025	17	0.371	0.131	0.124	0.058	0.024	0.251	0.119	0.039	0.142	0.123	0.055	0.020	0.280

The mean use of HTM classification increased from 0.194 in 2018 to 0.371 in 2025. The absolute difference is 0.177, and the 2025 mean is approximately 91.2% higher than the corresponding value in 2018. This calculation merely describes the relative change between the two reported means and should not be interpreted as a causal effect of changes in interest rates or capital regulations.

The annual figures show a continuous increase in mean HTM classification throughout the study period. Its standard deviation also increased from 0.076 in 2018 to 0.131 in 2025. Accordingly, the increase in the average use of HTM classification was accompanied by greater cross-bank dispersion. This pattern is consistent with the interpretation that reliance on HTM classification did not expand uniformly across banks and that differences among banks became more pronounced over time. Nevertheless, formal confirmation of a statistically significant temporal trend would require a time-trend test or a regression model incorporating year effects; increasing annual means alone do not establish statistical significance.

An important methodological issue is the decrease in the number of observed banks from 20 in each year between 2018 and 2024 to 17 in 2025. The panel is therefore unbalanced in the final year. Consequently, the higher mean reported for 2025 may reflect both changes in bank behavior and changes in the composition of the observed sample. Distinguishing between these two explanations would require a sensitivity analysis based on a balanced panel or an examination of why three banks are absent in the final year.

The mean change in interest rates decreased from 0.048 in 2018 to 0.021 in 2020 and subsequently increased, reaching 0.136 in 2024 before declining slightly to 0.124 in 2025. Thus, interest-rate conditions were not uniform throughout the study period. The corresponding standard deviation also increased considerably during 2022–2025 relative to the early years, indicating greater dispersion in interest-rate changes during the later part of the sample.

This pattern is theoretically relevant to HTM classification because changes in interest rates can affect the market value of fixed-income securities. Nevertheless, the actual valuation effect depends on maturity, coupon structure,

price sensitivity to interest-rate changes, and portfolio composition. Interest-rate changes alone are therefore not a complete measure of market shocks. A positive regression relationship between interest-rate changes and HTM classification, if observed, would be consistent with a balance-sheet response to changing rates, but establishing the underlying economic mechanism would require security-level data and measures of duration.

The mean capital-to-assets ratio declined from 0.136 in 2018 to 0.119 in 2025, while the mean capital adequacy ratio decreased from 0.158 to 0.142. At the same time, the standard deviation of the capital-to-assets ratio increased from 0.031 to 0.039. Descriptively, these results are consistent with both a decline in average capital and increasing differences across banks.

However, the observed decline should not be interpreted as direct evidence that regulatory capital requirements weakened during the study period. Realized capital ratios may be affected by changes in assets, retained earnings, losses, equity issuance, and the composition of risk-weighted assets. Economically, the simultaneous decline in average capital, increase in HTM classification, and increase in book risk strengthens the rationale for examining whether financial condition influences the relationship between accounting classification and risk. Nonetheless, such co-movement does not establish whether greater HTM classification reduced capital or whether weaker capitalization encouraged greater reliance on HTM classification. Identifying the direction of causality would require a stronger empirical design, lagged variables, or an explicit strategy for addressing endogeneity.

The mean book-risk index increased from 0.063 in 2018 to 0.123 in 2025, meaning that the value in the final year was approximately 95.2% higher than the value in the first year. After declining in 2020, the mean began to increase in 2021 and continued rising through 2025. Its standard deviation likewise increased from 0.029 to 0.055, indicating growing dispersion across observations.

The concurrent increases in average book risk and the use of HTM classification are consistent with the proposition that greater reliance on this accounting classification does not, by itself, prevent an increase in banks' economic or accounting risk. A definitive interpretation, however, depends on the precise definition of the book-risk indicator. If it is purely an accounting ratio, it cannot automatically be regarded as equivalent to the actual probability of bank failure. Furthermore, the increase in the annual book-risk measure may also reflect common macroeconomic shocks, changes in portfolio composition, or changes in the sample composition.

Before estimating the regression models, tolerance and variance inflation factor (VIF) statistics were examined. The VIF values were 1.348 for HTM classification, 1.221 for the hedging constraint, 1.458 for bank capital, 1.309 for the change in interest rate, 1.595 for bank size, 1.393 for financial leverage, 1.264 for profitability, and 1.323 for liquidity. The corresponding tolerance values were 0.742, 0.819, 0.686, 0.764, 0.627, 0.718, 0.791, and 0.756, respectively. Thus, the VIF values ranged from 1.221 to 1.595 and the tolerance statistics ranged from 0.627 to 0.819. These results provide no indication of severe linear multicollinearity among the variables examined. Bank size had the highest VIF, at 1.595, which remains well below conventional thresholds associated with problematic multicollinearity.

A reporting limitation should nevertheless be acknowledged. The bank book-risk index, one of the principal variables in the study, was not included in the reported VIF analysis. If this variable enters any explanatory model as an independent variable, its tolerance and VIF should also be calculated and reported. Moreover, VIF diagnostics do not provide evidence regarding endogeneity, cross-sectional dependence, or the overall validity of model specification.

Table 3 reports the Pearson correlation matrix for the study variables.

Table 3. **Pearson Correlation Matrix of the Study Variables**

Variable	1	2	3	4	5	6	7	8	9
1. Book risk	1.000								
2. HTM classification	0.486**	1.000							
3. Hedging constraint	-0.271**	-0.228**	1.000						
4. Capital	-0.338**	-0.284**	0.319**	1.000					
5. Interest-rate change	0.524**	0.571**	-0.187*	-0.246**	1.000				
6. Bank size	0.228**	0.241**	0.176*	-0.217**	0.158*	1.000			
7. Leverage	0.196*	0.173*	-0.094	-0.412**	0.112	0.273**	1.000		
8. Profitability	-0.247**	-0.206**	0.282**	0.356**	-0.179*	0.198*	-0.186*	1.000	
9. Liquidity	-0.184*	-0.161*	0.235**	0.289**	-0.136	0.172*	-0.224**	0.314**	1.000

The correlation between HTM classification and book risk is positive and statistically significant, $r = .486$, $p < .01$. This result is consistent with the hypothesis that greater reliance on HTM classification is associated with higher book risk; however, a bivariate correlation does not demonstrate causality.

The strongest positive correlation among the principal variables is observed between changes in interest rates and HTM classification, $r = .571$, $p < .01$. Theoretically, this pattern is relevant because rising interest rates can strengthen incentives to continue holding securities whose market values have declined. Nevertheless, a substantive explanation requires controlling for bank-specific characteristics and temporal conditions.

Book risk is positively correlated with changes in interest rates, $r = .524$, $p < .01$, and negatively correlated with bank capital, $r = -.338$, $p < .01$. At the bivariate level, therefore, greater interest-rate changes are associated with higher book risk, whereas greater bank capital is associated with lower book risk.

Bank capital is also negatively correlated with HTM classification, $r = -.284$, $p < .01$. This association is consistent with the possibility that less-capitalized banks rely more heavily on HTM classification. However, the relationship may also reflect omitted variables or persistent differences among banks.

Overall, the correlations indicate meaningful but not completely overlapping bivariate relationships among the explanatory variables. The negative correlation between the hedging-constraint measure and book risk, $r = -.271$, $p < .01$, requires particular attention to the operational definition of the hedging variable. If higher values represent greater restrictions on hedging, the theoretical interpretation differs from a specification in which higher values indicate greater hedging capacity. Accordingly, the economic meaning of this relationship cannot be determined conclusively without a precise definition of the variable.

The results of the panel-data diagnostic and model-selection procedures are summarized in Table 4.

Table 4. Panel-Data Diagnostic and Model-Selection Tests

Test	Statistic	df	*p*	Statistical Decision
Wooldridge test for first-order autocorrelation	5.847	1, 19	.026	Evidence of first-order autocorrelation
Modified Wald test for heteroskedasticity	68.426	19	< .001	Evidence of heteroskedasticity
Pesaran test for cross-sectional dependence	2.784	—	.005	Evidence of cross-sectional dependence
Chow test	3.786	19, 129	< .001	Reject pooled model
Breusch–Pagan LM test	42.618	—	< .001	Reject pooled model in favor of random effects
Hausman test	24.736	8	.002	Prefer fixed effects to random effects

The Wooldridge statistic of 5.847, $p = .026$, rejects the null hypothesis of no first-order serial correlation. This result indicates that disturbances for a given bank may be correlated with disturbances from previous periods. In banking panel data, such persistence may arise from structural continuity in financial characteristics, persistent

shocks, or gradual balance-sheet adjustment. Ignoring serial correlation may render conventional standard errors unreliable for statistical inference.

The modified Wald test yielded a statistic of 68.426, $p < .001$, indicating heteroskedasticity. In other words, the variance of the regression disturbances is not constant across banks. Differences in size, asset composition, access to funding, and sensitivity to interest rates may be economically consistent with this heterogeneity, although the test itself does not identify its source. The methodological implication is that heteroskedasticity-robust inference is required.

The Pesaran test also indicates cross-sectional dependence, with a statistic of 2.784, $p = .005$. This result is particularly relevant because banks operating in the same market may be simultaneously affected by common interest-rate movements, macroeconomic conditions, regulatory policies, or liquidity shocks. Bank fixed effects control for time-invariant bank-specific heterogeneity but do not, by themselves, eliminate dependence generated by common time-varying shocks.

Taken together, these diagnostic findings indicate the need for robust standard errors capable of addressing the relevant disturbance structure. However, because the supplied information does not specify whether Driscoll–Kraay, bank-clustered, two-way clustered, or another robust covariance estimator was actually employed, no specific estimator is claimed here as the implemented procedure.

The Chow test indicates that the assumption of identical intercepts across banks is untenable, supporting a panel structure that accounts for bank-specific heterogeneity. The Breusch–Pagan LM test likewise indicates that bank-level random effects are relevant relative to a simple pooled model. Most importantly, the Hausman statistic of 24.736, $p = .002$, rejects the consistency of the random-effects estimator relative to fixed effects. Accordingly, the use of bank fixed effects is supported by the model-selection tests.

This result should be interpreted carefully. Fixed effects control for unobserved characteristics that are assumed to remain constant within each bank over the study period, but they do not necessarily control for omitted variables that vary over time. Moreover, the adoption of fixed effects does not resolve potential endogeneity in HTM classification. Financial risk itself may influence classification decisions, or both variables may respond to a common shock. The regression results are therefore interpreted as conditional associations after controlling for the included variables and bank fixed effects rather than as definitive causal effects.

Table 5 presents the results of the first two regression models. Model 1 examines the relationship of interest-rate changes and hedging constraints with HTM classification, whereas Model 2 incorporates measures of the bank's financial condition.

Table 5. Fixed-Effects Regression Results for the Determinants of HTM Classification

Variable	Model 1: *B*	Robust SE	*t*	*p*	Model 2: *B*	Robust SE	*t*	*p*
Intercept	0.086	0.031	2.774	.006	0.142	0.047	3.021	.003
Change in interest rate	0.418	0.126	3.317	.001	0.372	0.137	2.715	.008
Hedging constraint	-0.236	0.094	-2.511	.013	-0.178	0.082	-2.171	.031
Bank capital	—	—	—	—	-0.357	0.108	-3.306	.001
Profitability	-0.148	0.063	-2.349	.021	-0.284	0.112	-2.536	.012
Bank book risk	—	—	—	—	0.296	0.114	2.596	.011
Bank size	0.057	0.024	2.375	.019	0.064	0.027	2.370	.019
Financial leverage	0.112	0.051	2.196	.030	0.136	0.058	2.345	.021
Liquidity	-0.091	0.042	-2.167	.032	-0.103	0.048	-2.146	.033
Bank fixed effects	Included				Included			
Observations	160				160			

R^2	0.486		0.521	
Adjusted R^2	0.448		0.489	
F statistic	12.764	< .001	13.892	< .001

In Model 1, the coefficient for the change in interest rate is positive and statistically significant, $B = 0.418$, SE = 0.126, $t = 3.317$, $p = .001$. Holding the other model variables and bank fixed effects constant, a one-unit increase in the interest-rate-change variable is associated with a 0.418-unit increase in the HTM-classification measure. Because the variables are expressed as ratios or indices, the economic interpretation depends on their exact scaling. The coefficient should therefore not be described, without further qualification, as a "41.8% increase."

The result is consistent with an economic explanation in which banks reconsider the classification and management of their securities portfolios as interest rates change. Higher interest rates can reduce the market value of securities with fixed cash flows, making HTM classification more consequential for how changes in value are reflected in financial statements. The model, however, does not directly measure managers' motives. The coefficient therefore provides evidence of a positive and statistically significant association between interest-rate changes and HTM classification but does not establish an intention to conceal losses or engage in opportunistic accounting.

The hedging-constraint coefficient in Model 1 is negative and significant, $B = -0.236$, SE = 0.094, $t = -2.511$, $p = .013$. According to the reported coding, a higher value of this variable is associated with lower use of HTM classification. Interpretation of this coefficient requires particular caution. If higher values indicate more severe restrictions on hedging, the negative coefficient may not be consistent with a simple expectation that constrained banks would rely more heavily on HTM treatment. Conversely, if the index reflects hedging capacity or utilization, its meaning would be different. Thus, the statistical direction of the relationship is unambiguous, but its economic interpretation depends on the operational coding of the variable.

Among the control variables in Model 1, bank size ($B = 0.057$, $p = .019$) and financial leverage ($B = 0.112$, $p = .030$) have positive and statistically significant coefficients. Profitability ($B = -0.148$, $p = .021$) and liquidity ($B = -0.091$, $p = .032$) have negative and statistically significant coefficients. These results indicate that the use of HTM classification is related not only to changes in interest rates but also to banks' financial characteristics.

The negative profitability coefficient is consistent with the possibility that more profitable banks possess greater financial flexibility and may therefore have less need to rely on accounting classifications to manage reported volatility. This is a theoretical interpretation rather than direct evidence of the underlying mechanism. The negative liquidity coefficient similarly indicates that, conditional on the other variables, banks with greater liquidity tend to use HTM classification less extensively.

Model 1 has an R^2 of 0.486 and an adjusted R^2 of 0.448. Subject to the way the coefficient of determination is calculated in the fixed-effects estimator used, the model accounts for approximately 48.6% of the variation in the dependent variable. This figure does not by itself establish correct model specification or causal validity. However, the statistically significant overall F statistic, $F = 12.764$, $p < .001$, indicates that the included regressors are jointly statistically informative. Overall, the findings support the first hypothesis concerning a positive relationship between changes in interest rates and reliance on HTM classification, although an inference of opportunistic accounting motivation would extend beyond the evidence provided by the regression.

Model 2 explicitly incorporates indicators of financial condition. Bank capital has a negative and statistically significant coefficient, $B = -0.357$, SE = 0.108, $t = -3.306$, $p = .001$. Because the dependent variable remains HTM

classification, this finding indicates that better-capitalized banks use the classification less extensively after controlling for the other explanatory variables and bank fixed effects.

This relationship is consistent with the interpretation that banks with greater financial capacity may have more flexibility in managing assets and absorbing valuation fluctuations. Conversely, banks with weaker capital positions may be more sensitive to the reporting implications of asset classification. Nevertheless, the statistical result does not establish a specific managerial motive and should not, by itself, be interpreted as evidence of financial-statement manipulation.

Profitability is also negatively associated with HTM classification, B = -0.284, SE = 0.112, t = -2.536, p = .012. Economically, greater profitability may strengthen internally generated funds, reduce financing pressure, and enhance loss-absorption capacity, thereby affecting balance-sheet choices. However, the observed association may also reflect differences in business models or asset composition, and the precise mechanism would require additional testing.

The bank book-risk coefficient is positive and statistically significant, B = 0.296, SE = 0.114, t = 2.596, p = .011. Thus, higher book risk is associated with greater use of HTM classification. Together with the negative capital coefficient, this pattern is consistent with the hypothesis that financially more vulnerable banks may rely more extensively on HTM classification. Nonetheless, reverse causality is possible: higher risk may influence classification decisions, while balance-sheet classification decisions and risk may also evolve simultaneously. The regression therefore does not independently establish the direction of causation.

The interest-rate-change coefficient remains positive and significant in Model 2, B = 0.372, SE = 0.137, t = 2.715, p = .008. Accordingly, the positive relationship between changes in interest rates and HTM classification remains evident after controlling for capital, profitability, and book risk. The persistence of the coefficient's direction and statistical significance provides descriptive evidence of robustness, but it should not be treated as a substitute for formal robustness analysis.

Bank size (B = 0.064, p = .019) and leverage (B = 0.136, p = .021) remain positively associated with HTM classification, whereas the hedging constraint (B = -0.178, p = .031) and liquidity (B = -0.103, p = .033) are negatively associated with it.

Model 2 has an R^2 of 0.521 and an adjusted R^2 of 0.489, while the overall F statistic is 13.892, $p < .001$. Although the coefficient of determination is higher than in Model 1, the set of explanatory variables also differs; therefore, the increase in R^2 cannot be attributed to any single added variable. Overall, the findings from Model 2 indicate that banks' financial condition, particularly capital and profitability, is significantly associated with the use of HTM classification.

Table 6 reports the two interaction models. Model 3 examines the interaction between regulatory capital and HTM classification. Model 4 explicitly models bank failure risk and the moderating role of bank capital.

Table 6. Fixed-Effects Regression Results for the Interaction of Capital and HTM Classification

Variable	Model 3: *B*	Robust SE	*t*	*p*	Model 4: *B*	Robust SE	*t*	*p*
Intercept	0.112	0.041	2.732	.007	0.176	0.059	2.983	.003
HTM classification	0.287	0.109	2.633	.009	0.348	0.121	2.876	.005
Regulatory/bank capital	-0.326	0.102	-3.196	.002	-0.426	0.133	-3.203	.002
HTM × Capital	-0.241	0.095	-2.537	.012	-0.287	0.112	-2.563	.011
Change in interest rate	0.354	0.128	2.766	.006	0.394	0.141	2.794	.006
Bank size	0.061	0.025	2.440	.016	-0.082	0.035	-2.343	.021
Financial leverage	0.124	0.055	2.255	.026	0.216	0.086	2.512	.013

Profitability	0.187	0.074	2.527	.013	-0.247	0.101	-2.446	.016
Liquidity	0.106	0.049	2.163	.032	-0.184	0.079	-2.329	.022
Bank fixed effects	Included				Included			
Observations	160				160			
R^2	0.547				0.583			
Adjusted R^2	0.512				0.551			
F statistic	15.386			< .001	17.642			< .001

In Model 3, regulatory capital has a negative and statistically significant coefficient, B = -0.326, SE = 0.102, t = -3.196, p = .002, while HTM classification has a positive and significant coefficient, B = 0.287, SE = 0.109, t = 2.633, p = .009. Most importantly, the interaction between regulatory capital and HTM classification is negative and statistically significant, B = -0.241, SE = 0.095, t = -2.537, p = .012.

Mathematically, the negative interaction indicates that the marginal association between HTM classification and the dependent variable decreases as regulatory capital increases, conditional on the model specification and coding of the variables. However, its substantive economic interpretation depends critically on the identity of the dependent variable. If the dependent variable is bank failure risk, the negative interaction would be consistent with regulatory capital weakening the positive relationship between HTM classification and failure risk. If the dependent variable is instead HTM classification, the interaction has a different substantive interpretation and cannot be used directly as evidence that capital moderates bank failure risk.

Accordingly, Model 3 is statistically reportable, but it is insufficient for a definitive conclusion about the bank-failure hypothesis until the dependent variable is explicitly identified. The model has an R^2 of 0.547, an adjusted R^2 of 0.512, and an overall F statistic of 15.386, p < .001. These indicators demonstrate overall statistical explanatory power but cannot substitute for correct identification of the dependent variable and validation of the model specification. Before publication, the dependent variable, the definition of regulatory capital, and the construction of the interaction term should be stated explicitly. For a substantive interpretation of the interaction, marginal effects should also be calculated at low, median, and high values of capital.

Model 4 directly examines bank failure risk and the moderating role of bank capital. The coefficient of HTM classification is positive and statistically significant, B = 0.348, SE = 0.121, t = 2.876, p = .005. Assuming that higher values of the dependent variable represent greater failure risk, greater use of HTM classification is therefore associated with higher bank failure risk after the remaining model variables and bank fixed effects are held constant.

This association is consistent with the argument that accounting classification cannot, by itself, eliminate the economic risks generated by interest-rate changes or liquidity pressures. Nevertheless, the interpretation remains conditional on confirmation of the precise operational definition and coding of the bank failure-risk measure.

Bank capital is negatively and significantly associated with failure risk, B = -0.426, SE = 0.133, t = -3.203, p = .002. This finding is consistent with the protective role of capital because greater capitalization can increase loss-absorption capacity and reduce the likelihood that declines in asset values or liquidity pressure develop into financial distress. In the present study, however, this interpretation is limited to the statistical association observed among Iraqi listed banks and should not be presented as a definitive causal effect of increasing bank capital.

The interaction between HTM classification and bank capital is negative and statistically significant, B = -0.287, SE = 0.112, t = -2.563, p = .011. Assuming that the bank failure-risk variable is coded such that higher values indicate greater risk, this result supports the hypothesized moderating role of capital: as bank capital increases, the positive

association between HTM classification and bank failure risk becomes weaker. Economically, this suggests that the relationship between accounting classification and risk is conditional on the bank's capacity to absorb losses.

Thus, the estimated slope relating HTM classification to bank failure risk depends on the level of bank capital. The positive coefficient of 0.348 represents the estimated association between HTM classification and failure risk when the capital variable equals zero, while the negative interaction coefficient of -0.287 indicates that this marginal association decreases as bank capital increases.

However, without calculating the standard errors and confidence intervals of the marginal effects across the observed range of capital, it cannot be concluded that the effect remains positive and statistically significant at every level of capital or whether it becomes statistically indistinguishable from zero at some point. Marginal effects and their confidence intervals should therefore be calculated at representative values of capital in a supplementary analysis.

The coefficient of the change in interest rate is positive and statistically significant, $B = 0.394$, SE = 0.141, $t = 2.794$, $p = .006$. This result is consistent with the proposition that changes in interest rates are associated with greater risk pressure. Financial leverage is also positively associated with failure risk, $B = 0.216$, SE = 0.086, $t = 2.512$, $p = .013$, indicating that greater leverage is associated with higher bank failure risk.

In contrast, bank size, profitability, and liquidity have negative and statistically significant coefficients. Bank size is negatively associated with failure risk, $B = -0.082$, SE = 0.035, $t = -2.343$, $p = .021$. This relationship may be consistent with larger banks having greater access to diversified funding sources or greater capacity to manage shocks, although it may also capture other characteristics correlated with size.

Profitability is negatively associated with failure risk, $B = -0.247$, SE = 0.101, $t = -2.446$, $p = .016$, which is consistent with the role of internally generated resources and stronger loss-absorption capacity. Liquidity likewise has a negative and statistically significant coefficient, $B = -0.184$, SE = 0.079, $t = -2.329$, $p = .022$. This coefficient can be interpreted as evidence of a risk-reducing association only if higher values of the liquidity measure actually represent stronger liquidity positions.

Model 4 has an R^2 of 0.583 and an adjusted R^2 of 0.551, while the overall F statistic is 17.642, $p < .001$. Among the reported models, Model 4 has the highest coefficient of determination. However, differences in the dependent variable, the number and type of regressors, and model specification can influence R^2. Consequently, the larger coefficient of determination does not, by itself, establish that Model 4 has superior predictive performance or stronger causal validity. A claim of predictive superiority would require out-of-sample evaluation and comparison using appropriate predictive criteria.

Overall, Model 4 supports three central empirical relationships: HTM classification is positively associated with bank failure risk, bank capital is negatively associated with bank failure risk, and the interaction between bank capital and HTM classification is negative. Taken together, these coefficients are consistent with the interpretation that HTM classification may be associated with greater vulnerability particularly among less-capitalized banks. Nevertheless, because of the unresolved operational definition of failure risk, the discrepancy between the 157 observations reported in the descriptive statistics and the 160 observations used in the regressions, and the absence of a precise description of the robust covariance estimator, the results should be reported as conditional empirical evidence rather than as definitive proof of a causal relationship.

4. Discussion and Conclusion

The present study examined the relationship between held-to-maturity (HTM) securities classification, banks' financial condition, regulatory capital, and bank failure risk among banks listed on the Iraq Stock Exchange during 2018–2025. The findings provide several important insights. First, the descriptive evidence showed a marked increase in the use of HTM classification over the study period, from a mean of 0.194 in 2018 to 0.371 in 2025. Over the same period, the mean book-risk index rose from 0.063 to 0.123, while the mean capital-to-assets ratio and capital adequacy ratio declined. Second, changes in interest rates were positively and significantly associated with the use of HTM classification. Third, bank capital and profitability were negatively associated with HTM classification, whereas book risk was positively associated with it. Finally, the bank failure-risk model showed that HTM classification was positively associated with failure risk, bank capital was negatively associated with failure risk, and the interaction between HTM classification and capital was negative and statistically significant. Taken together, these findings indicate that the implications of HTM classification cannot be understood independently of banks' financial capacity, particularly their capital strength.

The positive relationship between changes in interest rates and the use of HTM classification is one of the central findings of the study. The estimated coefficient remained positive and significant across the specifications in which HTM classification was the dependent variable. This result suggests that banks tend to increase their reliance on HTM classification as interest-rate conditions become more adverse or volatile. This finding is economically plausible because increases in interest rates reduce the market value of previously issued fixed-rate securities. Under such circumstances, the accounting classification of securities becomes increasingly important for the way valuation changes are reflected in financial statements. Recent evidence on monetary policy and HTM securities similarly shows that monetary tightening can expose banks to substantial unrealized losses and can interact with funding pressures and deposit behavior [4]. Likewise, research on interest-rate risk and microprudential regulation demonstrates that the consequences of interest-rate shocks differ substantially across banks according to their balance-sheet characteristics and regulatory positions [3]. The present findings are therefore consistent with the broader view that interest-rate changes can influence not only the economic value of bank assets but also balance-sheet management and accounting-classification decisions.

The annual trends reinforce this interpretation. HTM classification increased continuously during the sample period, while the dispersion of this variable also widened. At the same time, interest-rate changes became larger and more variable in the later years. This pattern suggests that banks may not respond uniformly to changes in interest-rate conditions. Institutions with different portfolio structures, funding models, or risk-bearing capacities may make different use of HTM classification. Such heterogeneity is consistent with the cross-sectional effects emphasized in studies of prudential regulation and interest-rate exposure [3]. It also underscores the usefulness of a fixed-effects framework, because bank-specific characteristics are likely to influence how monetary and market conditions translate into classification choices.

Another important result was the negative relationship between bank capital and the use of HTM classification. Banks with higher capital levels tended to rely less on HTM classification after other factors and bank fixed effects were controlled. This finding suggests that stronger capitalization may provide institutions with greater flexibility to absorb changes in the market value of securities without relying as heavily on accounting classifications that reduce the immediate effect of valuation changes on reported financial indicators. This interpretation is compatible with the broader literature on capital buffers. Capital provides a cushion against unexpected losses and enables

banks to respond to adverse shocks without immediately contracting their balance sheets or altering asset-management strategies [6]. The finding is also consistent with evidence showing that regulatory intervention and crisis conditions influence the interaction between bank capital and liquidity risk [2].

The negative relationship between profitability and HTM classification provides additional evidence that a bank's financial condition shapes its classification behavior. More profitable banks were less reliant on HTM classification. One possible explanation is that higher profitability increases the accumulation of internal capital and improves financial flexibility, thereby reducing the pressure to manage reported balance-sheet volatility through securities classification. In contrast, banks with weaker profitability may face stronger constraints because losses or low earnings limit their capacity to replenish capital internally. This interpretation is broadly consistent with research showing that financial indicators, including capital adequacy, profitability, asset quality, and liquidity, contain important information for identifying bank vulnerability and failure risk [11, 14]. Nevertheless, the observed relationship should not be taken as direct evidence of opportunistic reporting, because profitability can also be associated with differences in business models, asset composition, and funding strategies.

The positive relationship between book risk and HTM classification is also notable. Banks with higher book-risk indicators used HTM classification more intensively, even after controlling for other financial variables. This finding suggests that greater reliance on HTM accounting may be concentrated among banks already exhibiting weaker risk profiles. The result is consistent with research on bank failure prediction, which emphasizes that deteriorating financial indicators tend to occur jointly rather than in isolation [11]. It also accords with the broader literature showing that models of bank distress become more informative when multiple dimensions of bank condition are considered simultaneously [12-14]. From this perspective, HTM classification may function less as an isolated source of risk and more as one component of a broader financial configuration associated with vulnerability.

The most important finding concerns the bank failure-risk model. HTM classification was positively and significantly related to failure risk. This implies that greater reliance on HTM classification was associated with higher failure risk after controlling for interest-rate changes, capital, size, leverage, profitability, liquidity, and bank fixed effects. This finding supports the argument that accounting classification does not eliminate the underlying economic risks of securities holdings. A security classified as HTM may not transmit unrealized market losses immediately through the same accounting channels as other classifications, but the bank remains economically exposed to interest-rate risk and potentially to liquidity pressure. If securities must be sold because of deposit withdrawals or funding needs, unrealized losses can become realized. This mechanism is strongly aligned with recent evidence that connects HTM securities, monetary tightening, and uninsured deposit withdrawals [4]. It is also consistent with integrated approaches to bank solvency and liquidity, which show that financial weakness can emerge from the interaction between funding pressure and loss absorption rather than from either dimension alone [1].

The positive association between HTM classification and failure risk should therefore be interpreted as evidence that accounting treatment cannot substitute for economic resilience. The result does not imply that HTM classification itself mechanically causes bank failure. Instead, the classification may become particularly consequential when it is combined with interest-rate shocks, weak capitalization, or insufficient liquidity. This interpretation is compatible with the general bank-failure literature, which emphasizes that distress usually reflects the interaction of multiple risk factors rather than a single accounting or financial variable [12, 14]. It also explains

why the predictive importance of financial indicators has remained central even as more advanced machine-learning and cost-sensitive methods have been introduced into bank-failure forecasting [12, 13].

The negative coefficient for bank capital in the failure-risk model provides strong support for the protective role of capitalization. Higher capital was associated with lower bank failure risk. This result is theoretically expected because capital increases loss-absorption capacity and reduces the likelihood that adverse changes in asset values will push a bank toward insolvency. Previous research similarly emphasizes that capital buffers are a fundamental mechanism through which banks manage adverse shocks [6]. Evidence on leverage regulation also indicates that stronger capital positions can improve bank stability by limiting excessive balance-sheet risk [10]. In addition, research on capital regulation in the MENA region shows that prudential capital requirements are closely related to risk-taking behavior and banking-system stability [8]. The present evidence from Iraqi listed banks is therefore consistent with both theoretical expectations and prior empirical research.

The capital finding also aligns with studies emphasizing the broader role of regulatory capital in preserving stability during periods of stress. Higher capital requirements can, under some conditions, encourage safer bank behavior and support lending by making banks more resilient to shocks [7]. Furthermore, capital and liquidity regulations introduced under Basel III have been shown to affect both lending behavior and financial stability in emerging economies [9]. The negative association between capital and failure risk observed in the present study therefore reinforces the view that regulatory capital serves not merely as a compliance constraint but as an important component of institutional resilience.

The interaction between HTM classification and bank capital is particularly important. The coefficient was negative and statistically significant, indicating that higher levels of capital weaken the positive relationship between HTM classification and failure risk. In other words, the association between HTM reliance and failure risk is stronger among less-capitalized banks and weaker among better-capitalized banks. This finding provides empirical support for a moderating role of capital. It suggests that the economic implications of accounting classification are conditional on a bank's financial capacity to absorb losses.

This moderation effect is consistent with recent research emphasizing that prudential capital requirements alter how banks are affected by financial shocks. The consequences of interest-rate risk can vary substantially with the level and structure of bank capital [3]. Similarly, work on bank capital requirements and default dynamics shows that adequate capitalization can reduce the amplification of financial distress and limit the likelihood that shocks develop into broader default events [15]. The present findings extend this logic to HTM classification: greater reliance on HTM securities appears to be more problematic when capital buffers are weak.

The moderating role of capital can also be understood through the link between solvency and liquidity. A well-capitalized bank has greater capacity to absorb valuation losses and may be less likely to experience a loss of confidence during periods of market stress. By contrast, a weakly capitalized institution may be more vulnerable to liquidity shortages, deposit outflows, or forced asset sales. Evidence that banks adjust their capital positions in response to liquidity shortages supports the idea that capital and liquidity are jointly determined components of resilience [5]. Likewise, integrated macroprudential stress-testing frameworks demonstrate that solvency and liquidity shocks can reinforce one another, making joint assessment essential [1]. The significant interaction found in the present study is therefore consistent with a broader theoretical mechanism in which capital reduces the extent to which unrealized valuation losses and balance-sheet classifications translate into distress.

The positive coefficient for financial leverage in the bank failure-risk model further supports the importance of balance-sheet structure. More highly leveraged banks had higher failure risk. This result is in line with research

showing that leverage regulation can influence risk-taking and bank stability [10]. Because high leverage reduces the equity cushion available to absorb asset-value losses, even relatively small shocks can have a disproportionate effect on solvency. The negative coefficients for profitability and liquidity also align with previous work emphasizing these variables as important indicators of resilience and failure risk [11, 14]. Strong profitability supports internal capital generation, while greater liquidity reduces the probability that a bank will need to liquidate assets under unfavorable market conditions.

The negative association between bank size and failure risk may indicate that larger institutions benefit from more diversified income sources, broader funding access, or stronger risk-management capacity. However, this result should be interpreted cautiously because bank size can also be associated with greater complexity and interconnectedness. The direction observed in the present study is therefore best understood as a sample-specific conditional relationship rather than a universal characteristic of large banks. The broader bank-failure literature similarly cautions that predictive variables can differ in importance across institutional environments and samples [13, 14].

Overall, the results support an integrated interpretation of bank risk. HTM classification, interest-rate conditions, capital, profitability, liquidity, and leverage appear to operate as interrelated components of bank vulnerability. The study therefore complements research that approaches bank stability from multiple perspectives, including capital regulation, liquidity risk, failure prediction, and monetary-policy exposure [2, 4, 8]. The evidence suggests that the relevance of HTM classification becomes clearer when it is assessed together with banks' financial condition rather than in isolation. In particular, the negative interaction between HTM classification and capital indicates that the same accounting classification can carry different risk implications depending on a bank's capacity to withstand losses. This finding has particular relevance for emerging banking systems, where differences in capital quality, liquidity management, and regulatory implementation may generate substantial heterogeneity across institutions.

This study has several limitations that should be considered when interpreting the findings. First, the sample is limited to banks listed on the Iraq Stock Exchange and therefore may not represent unlisted banks or banking systems operating under different regulatory and institutional conditions. Second, the discrepancy between the 157 observations reported in the descriptive statistics and the 160 observations used in the regression models limits complete reproducibility unless the source of the difference is clarified. Third, the operational definition of bank failure risk requires further specification, and the distinction between the book-risk index and the failure-risk measure should be explicitly maintained. Fourth, the exact robust covariance estimator used in the panel regressions was not specified, despite diagnostic evidence of serial correlation, heteroskedasticity, and cross-sectional dependence. Fifth, the panel becomes unbalanced in 2025 because only 17 banks are observed, which may influence annual averages and trend interpretation. Finally, the fixed-effects design controls for time-invariant bank heterogeneity but does not eliminate potential reverse causality, omitted time-varying variables, or other sources of endogeneity.

Future studies should extend the analysis in several directions. Researchers could construct a fully balanced panel and compare the results with those obtained from the complete unbalanced sample to assess sensitivity to sample composition. Future work should also use more precise measures of bank failure probability, regulatory capital, risk-weighted assets, unrealized securities losses, deposit concentration, and asset duration. Incorporating security-level data would make it possible to distinguish accounting classification from the underlying interest-rate sensitivity of individual securities. Dynamic panel estimators, instrumental-variable strategies, lagged explanatory variables, or quasi-experimental designs could also be used to address possible reverse causality and endogeneity.

Additional analyses could estimate marginal effects of HTM classification at different levels of capital and report corresponding confidence intervals. Future research may also examine whether the observed relationships differ across ownership structures, bank size groups, capitalization levels, or periods of monetary tightening and easing, and cross-country studies could determine whether the findings are specific to Iraq or generalizable to other emerging banking systems.

Bank managers and regulators should evaluate HTM classification together with capital strength, liquidity, leverage, and exposure to interest-rate risk rather than viewing accounting classification as an independent indicator of safety. Banks with substantial HTM portfolios should conduct regular stress tests that assess the effect of interest-rate increases, deposit withdrawals, and forced asset sales on both liquidity and capital. Management should also monitor whether reliance on HTM classification is increasing alongside weakening profitability or capitalization, because this combination may signal growing vulnerability. Regulators should require transparent reporting of unrealized losses, capital adequacy, liquidity capacity, and securities maturity structures and should pay particular attention to banks with high HTM exposure and low capital buffers. Maintaining adequate capital and liquidity cushions, strengthening asset–liability management, improving interest-rate-risk measurement, and conducting scenario-based stress testing can help reduce the likelihood that accounting valuation differences develop into broader solvency problems.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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