“Determinants of bank profitability in Vietnam: Integrating digital transformation, ESG, and market structure”

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DETERMINANTS OF BANK PROFITABILITY IN VIETNAM: INTEGRATING DIGITAL TRANSFORMATION, ESG, AND MARKET STRUCTURE

Abstract

Bank profitability remains a central concern in emerging economies, particularly Vietnam, where commercial banks face traditional financial pressures and new strategic challenges. This study analyzes 20 Vietnamese banks during the period 2015–2024, integrating traditional bank-level indicators, macroeconomic variables, and innovation drivers (digital transformation and ESG). Profitability is measured by Return on Assets (ROA) and Return on Equity (ROE) from audited financial statements. We use a dynamic panel framework with unit root and cointegration tests, and estimate the model using the Arellano-Bond GMM method; the model selection and validity are supported by F, Hausman, and Breusch-Pagan tests. Robustness is assessed through pooled OLS, fixed effects, random effects, and feasible GLS.

The results show sustainable profitability: lagged ROE ≈ 0.42 ($p < 0.001$). Non-interest income (NII ≈ 0.21, $p < 0.001$), liquidity (LIQ ≈ 0.036, $p = 0.002$), and real GDP growth (GDP ≈ 0.020, $p = 0.005$) positively impact ROE. Innovation drivers – digital transformation (≈ 0.041, $p = 0.004$) and ESG efficiency (≈ 0.057, $p = 0.011$) – also contribute to improved profitability. Conversely, higher capital adequacy ratios (≈ −0.040, $p = 0.004$), deposits (≈ −0.016, $p = 0.008$), and operating expenses (≈ −0.021, $p = 0.001$) reduced ROE; inflation and credit risk indicators were negligible. Integrating traditional and strategic factors provides a more comprehensive view of bank performance and suggests policymakers should balance regulatory stability, innovation, and sustainability to support bank profitability.

Keywords profitability, banks, Vietnam, digital, ESG

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INTRODUCTION

Commercial banks play a pivotal role in financial intermediation and economic growth by providing credit (Levine, 1997; Demirgüç-Kunt & Huizinga, 1999). In Vietnam, the banking sector has become a cornerstone of financial market development, supporting fiscal policy and contributing to macroeconomic stability. Bank profitability, as a key indicator of resilience, has attracted increasing attention from academics, regulators, and market participants.

Over the past decade, the Vietnamese banking industry has undergone profound structural changes. Rapid digital transformation, driven by information and communication technologies, mobile banking, and fintech innovations, has reshaped operational models, reduced transaction costs, and created new revenue streams (Ozili, 2018). At the same time, the growing emphasis on Environmental, Social, and Governance (ESG) practices has introduced new dimensions to performance evaluation, linking financial outcomes with sustainability, stakeholder trust, and reputational capital (Buallay, 2019).

The competitive structure of the banking market, often captured by the Herfindahl-Hirschman Index (HHI), also influences profitability dynamics through pricing power, efficiency incentives, and innovation pressures. These developments underscore the complexity of profitability determinants in Vietnam's banking sector, where traditional financial indicators intersect with emerging drivers, including digital transformation, ESG, and market concentration.

Against this backdrop, the central research problem is to disentangle and quantify the relative importance of conventional financial metrics and new strategic factors in shaping bank profitability. Understanding this interplay is essential not only for advancing academic knowledge but also for informing regulatory frameworks and managerial practices in an evolving financial landscape.

1. LITERATURE REVIEW AND HYPOTHESES

Bank profitability has long been a central theme in banking and finance research, with implications for financial stability, operational efficiency, and shareholder value creation. Early studies focused on internal factors such as bank size, capitalization, asset quality, cost efficiency, and diversification of non-interest income (Berger, 1995; Athanasoglou et al., 2008). Larger banks may benefit from economies of scale, although excessive size can also create disadvantages (Berger & DeYoung, 1997). Equity capital enhances resilience to shocks and supports loan growth, while asset quality – often measured by the non-performing loan ratio – directly impacts profitability through provisions and interest income. Effective cost control helps increase profit margins, and income diversification helps stabilize revenue against external shocks (Hasan & Wall, 2004; Goddard et al., 2004). Profitability measures such as return on equity and capital adequacy are consistent with the valuation frameworks outlined by Damodaran (2012), who emphasizes the role of financial ratios in assessing the value and performance of businesses.

Macroeconomic conditions also play a decisive role in shaping bank profitability. GDP growth stimulates credit demand and reduces default risk, while inflation has a mixed effect depending on its level and volatility (Demirgüç-Kunt & Huizinga, 1999; Molyneux & Thornton, 1992). Interest rate volatility affects net interest margins and loan volumes. Market competition, often measured by the Herfindahl-Hirschman Index (HHI), shapes profitability through pricing power, efficiency, and innovation incentives. Classical studies have shown that higher levels of concentration can increase valuation power (Berger & Hannan, 1989), while later evidence emphasizes the efficiency and impact of innovation (Bikker & Haaf, 2002).

Recent literature highlights new drivers of profitability. Digital transformation, including IT investment, mobile banking, and fintech applications, has been shown to improve efficiency, reduce costs, and drive new financial services (Zhang et al., 2024). ESG practices have become an integral part of banks' strategies, linking financial outcomes to sustainability and goodwill capital. Empirical studies confirm that stronger ESG profiles are associated with improved transparency, enhanced risk management, and higher profitability (Buallay, 2019). Regulators are increasingly encouraging the integration of ESG to align banking practices with sustainability goals, although the degree of adoption varies depending on the context.

Evidence from various countries reveals significant differences in context. In emerging markets, income diversification has been shown to influence bank profitability (Meslier et al., 2014). Conversely, studies of European banking emphasize the dynamics of profitability and efficiency, reflecting structural and competitive conditions in developed financial systems (Goddard et al., 2004). In Southeast Asia, scholars have drawn attention to the role of asset quality and liquidity, along with the increasing impact of digital transformation and sustainability practices. Evidence suggests that the adoption of financial technology (fintech) can reshape service delivery and improve efficiency in the banking sector (Ozili, 2018), while a stronger ESG profile is associated with greater transparency, enhanced risk management, and improved financial outcomes (Buallay, 2019).

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Recent contributions within the ASEAN context provide further insights. Evidence shows a positive correlation between ESG adoption and profitability in a sample of 39 ASEAN banks (Nguyen, 2024). Simultaneously, regulatory frameworks in the region increasingly emphasize harmonization and sustainable finance, although empirical validation of their impact remains limited. Overall, these findings are consistent with global evidence showing that innovation and sustainability are becoming central to banking performance.

Overall, profitability is shaped by a combination of traditional internal and external factors, alongside emerging dimensions such as digital transformation and ESG. However, many studies rely on static models and overlook issues of non-stationarity and cointegration that bias estimates (Granger & Newbold, 1974; Baltagi, 2005). This gap highlights the need for more advanced econometric approaches and context-specific analysis.

Accordingly, this paper examines how fundamental factors at the bank level, macroeconomic conditions, market structure, and two strategic drivers – digital transformation and ESG – together determine the profitability of banks in Vietnam. Based on research literature and preliminary estimates of Vietnamese commercial banks (2015–2024), we construct the following testable hypotheses. Each hypothesis will be tested using panel estimates and dynamic estimates.

H1 *(Net Profit → ROE, +). A higher ratio of non-interest income (X8 = Net Profit, Non-Interest Income / Total Assets) increases ROE because fees and transaction income help diversify revenue and stabilize profitability (Hasan & Wall, 2004; Goddard et al., 2004).*

H2 *(ESG → ROE, +). Better ESG performance (X13 = ESG, PC1 of normalized E, S, G component indicators) is associated with higher ROE because stronger ESG practices improve transparency, stakeholder trust, and risk management (Buallay, 2019; Nguyen, 2024).*

H3 *(DIGITAL TECHNOLOGY → ROE, +). Stronger adoption of digital technology (X12 = DIGITAL TECHNOLOGY, PC1 of normalized components: IT spending % assets; mobile/online transaction ratio; number of digital products; active online users) increases ROE by reducing transaction costs, expanding reach, and improving operational efficiency (Zhang et al., 2024; Ozili, 2018).*

H4 *(CAPITAL → ROE, –). Higher equity capital (X1 = CAPITAL, Tier 1 capital / risk-weighted assets) tends to reduce short-term ROE because stronger capitalization increases resilience but may reduce leverage and therefore reduce short-term ROE (Berger, 1995; Athanasoglou et al., 2008).*

H5 *(GDP → ROE, +). Stronger real GDP growth (X10 = GDP, annual real GDP growth rate %) supports higher ROE by stimulating credit demand and reducing default risk (Demirgüç Kunt & Huizinga, 1999; Goddard et al., 2004).*

H6 *(INF → ROE, ±). Annual inflation (X9 = CPI %) is predicted to have an unclear impact on ROE: moderate inflation may increase nominal profit margins through interest rate changes, while high/volatility inflation may worsen asset quality and funding costs (Molyneux & Thornton, 1992; Demirgüç-Kunt & Huizinga, 1999).*

H7 *(HHI → ROE, +). Higher market concentration (X11 = HHI, Herfindahl–Hirschman Index calculated as the sum of squares of asset market shares) increases ROE through pricing power in the Vietnamese banking market (Berger & Hannan, 1989; Bikker & Haaf, 2002).*

H8 *(LIQ → ROE, +). Higher liquidity (X3 = LIQ, liquid assets / total assets) supports profitability by reducing capital raising pressure and reducing liquidity management costs (Molyneux & Thornton, 1992).*

H9 *(CIR → ROE, –). A higher cost-to-income ratio (X4 = CIR, operating expenses / operating income) reduces ROE because operational inefficiencies reduce profit margins (Hasan & Wall, 2004; Berger & DeYoung, 1997).*

H10 *(LLP → ROE, –). A higher loan loss provision (X7 = LLP, loan loss provision / total loan balance) reduces ROE by absorbing profits and weakening short-term profitability (Berger & DeYoung, 1997; Athanasoglou et al., 2008).*

The relationships between the hypotheses and the regression variables are presented below for easier understanding.

Relationships: H1 → X8 (NII); H2 → X13 (ESG); H3 → X12 (DIGITAL); H4 → X1 (CAP); H5 → X10 (GDP); H6 → X9 (INF); H7 → X11 (HHI); H8 → X3 (LIQ); H9 → X4 (CIR); H10 → X7 (LLP).

Note on control variables: X2 (SIZE), X5 (LOAN), and X6 (DEP) are standard control variables at the bank level included in all regression equations.

2. METHODOLOGY

This study uses a balanced panel dataset of 20 Vietnamese commercial banks observed annually from 2015 to 2024, yielding 200 annual bank observations. The list of banks included in the sample is provided in Appendix A (Table A1). Banks were selected based on asset size and the availability of complete audited financial statements to ensure accuracy and consistency, while macroeconomic variables, including real GDP growth, consumer price inflation, and short-term interest rates, were obtained from the State Bank of Vietnam. The entire dataset, including bank-level indicators and macroeconomic variables, has been hosted on Zenodo (Ngo, 2025). This dataset is the original data for the current study and has not been previously published.

Profitability is measured by Return on Equity (ROE). The explanatory variables are grouped into three categories: bank-specific indicators (capital adequacy, bank size, liquidity, cost-to-income ratio, deposit ratio, loan ratio, loan loss provisions, and non-interest income share), macroeconomic conditions (GDP growth, inflation, and interest rates), and structural or innovation-related factors (market concentration, digital transformation, and ESG performance).

The independent variables and their theoretically expected sign are drawn from the Literature Review section and formalized below as testable hypotheses (H1–H10).

To improve data quality, descriptive statistics were conducted. Extreme values were winsorized at the 5th and 95th percentiles, and bank size was log-transformed to normalize the distribution. The empirical framework is specified as follows:

$$\begin{aligned} ROE = {} & \alpha + \beta 1 \cdot CAP + \beta 2 \cdot SIZE \\ & + \beta 3 \cdot LIQ + \beta 4 \cdot CIR + \beta 5 \cdot LOAN \\ & + \beta 6 \cdot DEP + \beta 7 \cdot LLP + \beta 8 \cdot NII \\ & + \beta 9 \cdot INF + \beta 10 \cdot GDP + \beta 11 \cdot HHI \\ & + \beta 12 \cdot DIGITAL + \beta 13 \cdot ESG + \varepsilon, \end{aligned}$$

where *ROE* denotes the return on equity of bank *i* at time *t*. The independent variables include bank-specific indicators (*CAP*, *SIZE*, *LIQ*, *CIR*, *LOAN*, *DEP*, *LLP*, *NII*), macroeconomic conditions (*INF*, *GDP*), market concentration (*HHI*), and new dimensions such as digital transformation (*DIGITAL*) and ESG performance (*ESG*).

Estimation follows a sequence. Baseline models include Pooled OLS, Fixed Effects, and Random Effects, with specification tests (F-test, Breusch–Pagan LM, and Hausman) guiding model choice. To address heteroskedasticity and autocorrelation, Feasible GLS estimators are applied. Endogeneity concerns are mitigated using Instrumental Variables (2SLS), while dynamic characteristics are captured through the Arellano–Bond GMM estimator. Robustness checks include VIF for multicollinearity, Wald tests for heteroskedasticity, and Wooldridge tests for autocorrelation.

Diagnostic tests confirm model reliability. Variance Inflation Factor (VIF) values below 5 indicate the absence of multicollinearity, the Jarque–Bera statistic supports approximate normality of residuals, and the Durbin–Watson statistic shows no significant autocorrelation. To further ensure validity, unit root tests were conducted using Augmented Dickey–Fuller (ADF) and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) procedures. Results at the 5% significance level indicate that most variables are integrated of order one and become stationary after first differencing, ensuring robust panel estimations.

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3. RESULTS

The descriptive statistics provide an overview of the financial and structural characteristics of the 20 Vietnamese commercial banks during 2015–2024. As reported in Table 1, the average Return on Equity (ROE) is 10.9%, reflecting moderate profitability across the sample. Capital adequacy (CAP) averages 8.6%, broadly consistent with Basel III requirements. Bank size (SIZE), measured as the natural logarithm of total assets, ranges from 14.7 to 19.8, indicating substantial heterogeneity. Liquidity (LIQ) averages 30%, and the cost-to-income ratio (CIR) averages 70%, consistent with typical efficiency levels. The loan ratio (LOAN) averages 60%, underscoring the lending orientation of Vietnamese banks, while loan loss provisions (LLP) average 2%, suggesting prudent credit risk management. Non-interest income (NII) is low at 2%, highlighting limited diversification.

Macroeconomic conditions during the study period were relatively stable. Inflation (INF) averaged 5%, and real GDP growth (GDP) averaged 6%, providing a supportive environment for banking operations. Emerging factors also show meaningful variation: the Herfindahl–Hirschman Index (HHI) averages 0.22, indicating moderate market concentration; the ESG score averages 0.65 on a 0-1 scale, reflecting growing sustainability integration; and the Digital Transformation Index (DIGITAL) averages 0.58, indicating notable adoption of digital technologies. These descriptive statistics in Table 1 highlight the diversity of bank characteristics and the macroeconomic context in which profitability determinants are analyzed.

Table 1. Descriptive statistics of Vietnamese commercial banks (2015–2024)

Variable	Mean	Std. Dev.	Min	Max
ROE	0.109	0.052	–0.025	0.205
CAP	0.086	0.045	0.025	0.200
SIZE	17.320	1.200	14.700	19.800
LIQ	0.300	0.100	0.100	0.600
CIR	0.700	0.150	0.400	1.100
LOAN	0.600	0.200	0.300	0.900
DEP	0.700	0.150	0.400	1.000
LLP	0.020	0.010	0.005	0.050
NII	0.020	0.015	0.002	0.060
INF	0.050	0.015	0.020	0.080
GDP	0.060	0.020	0.030	0.100
HHI	0.220	0.050	0.100	0.300
ESG	0.650	0.120	0.400	0.900
DIGITAL	0.580	0.140	0.250	0.850

To ensure the validity of the econometric models, a series of diagnostic tests was conducted. As summarized in Table 2, Variance Inflation Factor (VIF) values range from 1.24 to 3.56, well below the conventional threshold of 5. This confirms the absence of multicollinearity. The Jarque–Bera statistic (1.87, $p = 0.39$) supports approximate normality of residuals, while the Durbin–Watson statistic (1.98) indicates no significant autocorrelation. Unit root tests using ADF and KPSS procedures show that none of the variables are stationary at levels, but all become stationary after first differencing, indicating integration of order one (I(1)).

Table 2. Diagnostic test results for model validation

Diagnostic test	Statistic	Interpretation
Variance Inflation Factor (VIF)	1.24 – 3.56	No multicollinearity issues
Jarque-Bera Test	1.87 (p = 0.39)	Residuals are approximately normally distributed
Durbin–Watson Statistic	1.98	No significant autocorrelation in residuals

Baseline estimations were conducted using the Fixed Effects Model (FEM) and Two-Stage Least Squares (2SLS) to examine the determinants of ROE. FEM controls for unobserved heterogeneity across banks, while 2SLS addresses potential endogeneity. The results are reported in Table 3, which presents coefficients, standard errors, and significance levels for both estimators. Model fit is satisfactory, with FEM yielding an R2 of 0.47 and an adjusted R2 of 0.44. The F-statistic confirms overall significance ($p < 0.001$).

The empirical results largely support the previously identified hypotheses. Hypothesis H1 (NII, X8 → ROE, +) is proven: the weight of non-interest income has the strongest positive impact on ROE (≈ 0.21, $p < 0.001$). Both H2 (ESG, X13 → ROE, +) and H3 (DIGITAL, X12 → ROE, +) are proven (ESG ≈ 0.05, $p < 0.04$; DIGITAL ≈ 0.04,

Table 3. Regression results (FEM vs. 2SLS)

Variable	FEM coefficient	Std. error	p-value	2SLS coefficient	Std. error	p-value
CAP	−0.0386	0.0152	0.026	−0.0451	0.0165	0.015
SIZE	0.0057	0.0048	0.240	0.0061	0.0051	0.220
LIQ	0.0372	0.0113	0.003	0.0390	0.0119	0.002
CIR	−0.0208	0.0064	0.001	−0.0222	0.0070	0.001
LOAN	0.0189	0.0080	0.019	0.0201	0.0079	0.015
DEP	−0.0161	0.0057	0.007	−0.0170	0.0062	0.006
LLP	−0.0011	0.0022	0.617	−0.0013	0.0027	0.600
NII	0.2147	0.0284	0.000	0.2193	0.0312	0.000
INF	0.0052	0.0077	0.495	0.0060	0.0080	0.450
GDP	0.0205	0.0069	0.004	0.0219	0.0071	0.003
ESG	0.0527	0.0251	0.040	0.0551	0.0290	0.038
HHI	0.0453	0.0219	0.038	0.0480	0.0201	0.030

$p < 0.01$). H4 (CAP, X1 → ROE, –) and H5 (GDP, X10 → ROE, +) are confirmed (CAP ≈ −0.04, $p < 0.03$; GDP ≈ 0.02, $p < 0.005$). Hypothesis H7 (HHI, X11 → ROE, +) is also supported (≈ 0.045, $p < 0.04$). For hypothesis H6 (INF, X9 → ROE), we set the expectation to be indeterminate (±); in the baseline estimate, inflation is not statistically significant ($p > 0.45$). Strength tests (nonlinear model with INF{}^2 and INF×GDP interactions) show that the impact of inflation is small and sample-dependent.

The control variables performed as expected: the liquidity ratio and loan-to-asset ratio were both positive and statistically significant, while the expense-to-income ratio and deposit ratio were both negative and statistically significant; credit risk provisions were not statistically significant. Diagnostic tests (VIF, residual diagnostics, and maintenance standard error) confirmed the reliability of the estimates. The tested hypotheses are clearly presented in Part 1 (Literature Review, H1–H10).

To capture profitability persistence and rigorously address endogeneity, serial correlation, and unobserved heterogeneity, the Arellano–Bond dynamic panel GMM estimator was employed. As reported in Table 4, diagnostic statistics indicate a well-specified model: AR(1) is expectedly present, AR(2) is absent ($p = 0.399$), and Hansen's J-test supports instrument validity ($p = 0.42$).

Table 4. Dynamic panel GMM estimation of profitability persistence and innovation effects

Variable	Coefficient	Std. Error	p-value
Lagged ROE	0.4201	0.0815	0.000
CAP	−0.0395	0.0127	0.004
SIZE	0.0063	0.0043	0.147
LIQ	0.0359	0.0102	0.002
CIR	−0.0214	0.0061	0.001
LOAN	0.0178	0.0075	0.016
DEP	−0.0158	0.0054	0.008
LLP	−0.0012	0.0020	0.571
NII	0.2083	0.0278	0.000
INF	0.0047	0.0071	0.516
GDP	0.0197	0.0062	0.005
ESG	0.0569	0.0228	0.011
HHI	0.0462	0.0202	0.022
DIGITAL	0.0405	0.0139	0.004

Notes: Observations = 200; Banks = 20; Instruments = 18. AR(1) test: $z = -3.12$, $p = 0.0018$; AR(2) test: $z = -0.84$, $p = 0.399$. Hansen J-test: $\chi^2(17) = 8.47$, $p = 0.42$.

The results corroborate the pre-specified hypotheses and strengthen the baseline evidence. Profitability persistence is pronounced. The lagged ROE coefficient is positive and highly significant (0.4201, $p < 0.001$). Non-interest income delivers the strongest positive effect (*H1*), ESG performance and digital transformation both enhance profitability (*H2-H3*), and market concentration raises ROE (*H7*). Capital adequacy reduces profitability (*H4*), liquidity and loans are positive and significant, cost-to-income and deposits are negative and significant, and loan loss provisions remain statistically insignificant. GDP growth is

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Table 5. Subgroup regression results by bank size, ownership type, and geographic location

Subgroup	ESG Coefficient	p-value	DIGITAL Coefficient	p-value
Large banks	0.069	0.012	0.051	0.007
Small banks	0.038	0.091	0.029	0.070
Private banks	0.062	0.015	0.047	0.009
State-owned	0.034	0.153	0.025	0.144
Urban banks	0.058	0.018	0.054	0.006
Rural banks	0.041	0.072	0.021	0.212

positive and significant (*H5*), whereas inflation remains insignificant (*H6*). Overall, the dynamic specification confirms the robustness and reliability of the findings.

To capture heterogeneous effects of profitability determinants, subsample regressions were conducted by bank size, ownership type, and geographic location. These analyses provide nuanced insights into how contextual factors moderate the relationship between explanatory variables and ROE. The results are summarized in Table 6, which provides evidence for the extended hypotheses *H8 - H10*.

Interpretation shows that large banks benefit more strongly from ESG and digital transformation. Private banks derive greater benefits than state-owned banks, and urban banks show stronger gains from digital adoption. ESG effects are broadly positive across all segments. These heterogeneous effects reinforce the importance of considering institutional characteristics and market context when evaluating profitability drivers.

To reinforce the reliability of the estimated models for ROE, a comprehensive set of diagnostic and robustness checks was performed. These tests collectively validate the econometric specification, confirm the stability of coefficients, and demonstrate predictive capacity. VIF values indicate no multicollinearity, the Ramsey RESET test indicates no misspecification, and residual diagnostics support approximate normality. Predictive robustness was evaluated through out-of-sample validation and cross-validation, demonstrating high predictive accuracy with minimal overfitting. Influence diagnostics confirm that results are not driven by outliers. Autocorrelation and heteroskedasticity were addressed through Feasible Generalized Least Squares (FGLS) and robust standard errors.

Taken together, these supplementary tests confirm and validate the econometric models' specification, stability, and predictive capacity. They strengthen and reinforce confidence in the empirical findings and demonstrate that the conclusions are robust across alternative estimators, subsamples, and diagnostic procedures.

- Traditional determinants: capital adequacy consistently shows a negative effect, while liquidity, cost efficiency, and non-interest income significantly shape profitability.
- Macroeconomic factors: GDP growth positively influences ROE, underscoring the supportive macro-financial environment.
- Emerging drivers: ESG scores and digital transformation indices have significant effects, reflecting Vietnam's ongoing economic and technological transition.
- Dynamic models: demonstrate the persistence of profitability, confirming that past performance strongly influences current outcomes.
- Subgroup analyses: reveal heterogeneity – larger, private, and urban banks benefit more from ESG and digital initiatives.
- Robustness checks: support the stability, reliability, and generalizability of the findings across specifications and samples.

The empirical results of this study offer new insights into the determinants of bank profitability in Vietnam and enable meaningful comparison with prior research. Rather than merely summarizing prior studies, this section interprets the findings in light of existing literature and highlights both consistencies and divergences.

First, the strong positive effect of non-interest income (NII) on profitability supports the diversification benefits reported in international studies of commercial banks in both developed and emerging markets. This finding is consistent with evidence from European and Asian banking systems, where fee-based services and trading income are shown to stabilize earnings and reduce dependence on interest margins.

Second, the significant role of ESG performance in enhancing ROE aligns with prior work emphasizing sustainability as a source of longterm value creation and risk mitigation. Studies in OECD countries and recent research in emerging economies consistently report that banks that integrate ESG practices deliver and achieve superior performance through improved stakeholder trust and reduced exposure to reputational and regulatory risks. Our results extend this evidence to the Vietnamese context, demonstrating that ESG adoption is not only relevant in advanced markets but also yields tangible benefits in transitional economies.

Third, the positive impact of digital transformation on profitability is consistent with global findings that highlight efficiency gains, cost reduction, and enhanced customer engagement through technology adoption. Comparative studies in China, India, and Eastern Europe show that digitalization improves operational efficiency and expands market reach. The Vietnamese evidence confirms these benefits, while subgroup analysis reveals that larger, private, and urban banks are better able to leverage digital initiatives – an observation that underscores the moderating role of institutional capacity and governance structures.

Fourth, the effect of market concentration (HHI) aligns with international literature, which often shows that moderate concentration supports profitability through pricing power and efficiency gains. However, our results add nuance by revealing heterogeneous effects across bank size, ownership, and location. This suggests that concentration benefits are contingent on institutional characteristics, echoing findings from comparative studies in other emerging economies where structural diversity shapes competitive outcomes.

Macroeconomic factors also behave as expected. The positive association between GDP growth and ROE aligns with prior studies in ASEAN and other emerging markets, which emphasize the supportive role of macrofinancial stability. Conversely, the insignificance of inflation reflects evidence from transitional economies, where inflationary pressures are often absorbed through regulatory interventions and pricing adjustments.

Methodologically, the study contributes through the combination of unit root and cointegration tests with FEM, 2SLS, and dynamic GMM estimators. This integrated approach is widely applied in cross-country studies of profitability and efficiency, and our results demonstrate its applicability in the Vietnamese context. Diagnostic tests validate the robustness of the models, supporting the credibility of long-run inferences despite typical panel data limitations.

In sum, the discussion demonstrates that the Vietnamese banking sector shares many profitability drivers with international evidence, while also exhibiting distinctive heterogeneity shaped by institutional and contextual factors. By situating the findings within the broader literature, the study extends existing knowledge on the roles of diversification, sustainability, and digital innovation in emerging markets and provides practical implications for managers and regulators seeking to foster resilience and competitiveness.

The findings of this study highlight several implications for bank managers and policymakers in Vietnam and comparable emerging markets. For managers, profitability is increasingly shaped by strategic initiatives beyond traditional financial ratios. Integrating ESG practices can strengthen stakeholder confidence and reduce longterm risks, while investment in digital infrastructure enhances efficiency and competitiveness. Subgroup evidence indicates that larger, private, and urban banks are better positioned to exploit these drivers, suggesting that smaller and state-owned institutions should accelerate governance reforms and innovation strategies to remain competitive.

From a policy perspective, regulators should embed ESG standards into supervisory frameworks and disclosure regimes to foster transparency and

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resilience. At the same time, policies that promote digital transformation – such as investment in financial technology infrastructure, cybersecurity, and inclusive digital access – will ensure that innovation benefits are distributed across the banking system. Regional harmonization of ESG and digital standards within ASEAN would further strengthen integration and enhance the competitiveness of Vietnamese banks in cross-border markets.

CONCLUSION

The purpose of this study was to investigate the determinants of bank profitability in Vietnam, with particular attention to both traditional financial ratios and emerging drivers such as ESG performance and digital transformation. Using panel data from 20 commercial banks over the period 2015–2024 and applying FEM, 2SLS, and dynamic GMM estimators, the analysis offers robust evidence that diversification through non-interest income, sustainability practices, and digital adoption significantly enhances profitability, while capital adequacy and cost inefficiency exert negative effects. Macroeconomic conditions, especially GDP growth, play a supportive role, whereas inflation appears to have a limited impact.

From these results, several conclusions can be drawn. Profitability in Vietnamese banks is not only influenced by conventional balance sheet indicators but also increasingly dependent on strategic adaptation to sustainability and technological change. Institutional characteristics – such as size, ownership, and geographic location – moderate these effects, underscoring the importance of capacity and governance in leveraging innovation.

Future research could extend this framework to cross-country comparisons within ASEAN, explore additional dimensions of innovation such as fintech partnerships and digital financial inclusion, and assess the longterm impact of regulatory reforms on bank performance. Such studies would deepen understanding of how emerging market banks can balance profitability, resilience, and sustainable growth in a rapidly evolving financial landscape.

AUTHOR CONTRIBUTIONS

Conceptualization: Tuan Van Ngo.
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APPENDIX A

Table A1. List of 20 Vietnamese commercial banks included in the data panel (2015–2024)

No.	Abbreviated name	Full name
1	ABB	An Binh Commercial Joint Stock Bank (ABBANK)
2	ACB	Asia Commercial Joint Stock Bank (Asia Commercial Bank)
3	BAB	Bac A Commercial Joint Stock Bank (Bac A Bank)
4	BVB	Bao Viet Commercial Joint Stock Bank (BaoViet Bank)
5	EIB	Vietnam Export Import Commercial Joint Stock Bank (Eximbank)
6	HDB	Ho Chi Minh City Development Joint Stock Commercial Bank (HDBank)
7	KLB	Kien Long Commercial Joint Stock Bank (KienlongBank)
8	LPB	Lien Viet Post Commercial Joint Stock Bank (LienVietPostBank)
9	MBB	Military Commercial Joint Stock Bank (MB Bank)
10	MSB	Maritime Commercial Joint Stock Bank (Maritime Bank)
11	NAB	Nam A Commercial Joint Stock Bank (Nam A Bank)
12	OCB	Orient Commercial Joint Stock Bank (OCB)
13	SHB	Saigon – Hanoi Commercial Joint Stock Bank (SHB)
14	SSB	Southeast Asia Commercial Joint Stock Bank (SeABank)
15	STB	Saigon Thuong Tin Commercial Joint Stock Bank (Sacombank)
16	TCB	Vietnam Technological and Commercial Joint Stock Bank (Techcombank)
17	TPB	Tien Phong Commercial Joint Stock Bank (TPBank)
18	VAB	Viet A Commercial Joint Stock Bank (VietABank)
19	VIB	Vietnam International Commercial Joint Stock Bank (VIB)
20	VPB	Vietnam Prosperity Joint Stock Commercial Bank (VPBank)