

## DETERMINANTS OF SYSTEMATIC RISK IN VIETNAMESE COMMERCIAL BANKS

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### ABSTRACT

This study examines the determinants of systematic risk in Vietnamese commercial banks during the period 2019–2024. Using a balanced panel dataset of 25 listed banks, systematic risk is measured by the beta coefficient derived from the Capital Asset Pricing Model (CAPM). The analysis employs panel data regression techniques, with model selection tests favoring the fixed effects specification. To address econometric issues related to heteroskedasticity, autocorrelation, and cross-sectional dependence, Driscoll–Kraay robust standard errors are applied. The empirical results indicate that bank-specific factors play a central role in shaping banks' exposure to market-wide risk. Bank size, income diversification, cost-to-income ratio, funding cost, and inflation are found to have positive and statistically significant effects on systematic risk. In contrast, operating costs and non-performing loans exhibit significant negative relationships with beta, while capital adequacy and GDP growth are not statistically significant. These findings suggest that managerial decisions, funding structures, and macroeconomic instability are key channels through which systematic risk is transmitted in the Vietnamese banking system. Overall, the study contributes new evidence from an emerging market and offers important implications for bank managers and regulators in designing strategies to mitigate market risk and enhance financial stability.

*Keywords:* Systematic risk, commercial banks, fixed effects model.

### 1. INTRODUCTION

Systematic risk reflects an institution's exposure to market-wide fluctuations and is commonly measured by the beta coefficient derived from the Capital Asset Pricing Model (CAPM) [1-2]. Unlike idiosyncratic risk, systematic risk cannot be eliminated through diversification and is therefore of central concern to investors, regulators, and policymakers. In the banking sector, systematic risk is particularly important because banks are highly leveraged, closely connected to macroeconomic conditions, and play a critical role in financial intermediation. Understanding the determinants of banks' systematic risk is essential for assessing financial stability and designing effective prudential regulation [3].

A substantial body of empirical literature has examined the determinants of bank systematic risk, emphasizing both bank-specific characteristics and macroeconomic factors. Prior studies suggest that capital structure, profitability, liquidity, asset quality, and income diversification significantly influence bank beta [4-5]. Larger banks and institutions with higher leverages tend to exhibit greater exposure to market risk, while better capitalized and more liquid banks are generally less sensitive to market-wide shocks [6-7]. In addition,

macroeconomic conditions such as economic growth, inflation, and financial market volatility may amplify banks' systematic risk through cyclical effects and confidence channels [8].

Despite these advances, existing evidence is overwhelmingly concentrated on developed economies, where capital markets are deep, information disclosure is relatively transparent, and regulatory frameworks are well established. The extent to which these findings apply to emerging markets remains an open question. Vietnam, as a transitional and bank-oriented financial system, presents a distinctive institutional context. Vietnamese commercial banks have experienced rapid expansion, restructuring, equitization, and regulatory tightening over the past two decades. These structural transformations, together with increasing integration into global financial markets, may alter the channels through which systematic risk is generated and transmitted within the banking sector [9].

This study seeks to fill the empirical gap by examining the determinants of systematic risk in Vietnamese commercial banks. Using bank-level financial indicators and macroeconomic variables, the paper investigates how internal bank characteristics and external economic conditions affect banks' exposure to market risk. By providing new evidence from an emerging market, this study contributes to the literature on bank risk and market integration. The findings offer important implications for bank managers, investors, and regulators in designing strategies to mitigate systematic risk and enhance the stability of Vietnam's banking system.

## **2. LITERATURE REVIEW AND EMPIRICAL RESEARCH**

### **2.1. Literature Review**

Systematic risk represents the sensitivity of a firm's returns to market-wide movements and is commonly measured by the beta coefficient derived from the Capital Asset Pricing Model (CAPM) [1-2]. In the banking sector, systematic risk is of particular importance due to banks' high leverage, maturity transformation function, and strong linkages with the real economy. Because banks are exposed to aggregate economic fluctuations, changes in market conditions may significantly affect their equity returns and financial stability.

The theoretical literature suggests that bank systematic risk arises from both internal characteristics and external macroeconomic conditions. From a microeconomic perspective, balance sheet composition, managerial efficiency, capital adequacy, and income structure play a critical role in determining banks' exposure to market risk. Modern banking theory emphasizes that higher leverage, weaker asset quality, and inefficient operations amplify banks' sensitivity to economic shocks [10-11].

From a macroeconomic perspective, systematic risk is shaped by business cycles, inflation dynamics, and financial market volatility. Macroeconomic instability strengthens the co-movement between bank performance and market returns, thereby increasing beta values [8, 12]. In emerging economies, where regulatory frameworks and financial markets are still evolving, the interaction between bank-level fundamentals and macroeconomic conditions is particularly pronounced, making the study of systematic risk highly relevant.

### **2.2. Empirical Research**

Empirical studies consistently document that bank size (SIZE) influences systematic risk. Larger banks tend to exhibit higher beta values due to their stronger integration into financial markets and greater exposure to systemic shocks, despite potential diversification benefits [3, 7]. This evidence supports the hypothesis that bank size is positively related to systematic risk (H1).

Operating efficiency has also been identified as an important determinant. Higher operating costs (COST) and an elevated cost-to-income ratio (CIR) are commonly associated with managerial inefficiency and increased risk exposure. Empirical findings show that inefficient banks are more sensitive to adverse market conditions, leading to higher systematic risk [13-14], lending support to hypotheses H2 and H6.

Asset quality, proxied by the non-performing loan ratio (NPL), has been found to significantly increase bank risk. Banks with higher NPL ratios are more vulnerable to economic downturns and market stress, resulting in higher beta values [10, 15]. These findings form the basis for hypothesis H3.

Capital adequacy plays a mitigating role in bank risk-taking. Empirical evidence indicates that better-capitalized banks, measured by the capital ratio (CAP), tend to exhibit lower systematic risk because capital buffers enhance resilience to shocks [6, 11]. This supports hypothesis H4, which predicts a negative relationship between capital and beta.

Regarding income structure, prior research shows that greater reliance on non-interest income (INC) may increase risk exposure due to its volatility and stronger linkage with market conditions [5, 16]. Consequently, income diversification does not always reduce systematic risk, providing empirical support for hypothesis H5.

Funding conditions are another crucial channel. Banks facing higher funding costs (FC) often rely on less stable or more expensive funding sources, which heighten their vulnerability to liquidity and market shocks. Empirical studies find a positive association between funding costs and bank risk [3], consistent with hypothesis H7.

Finally, macroeconomic variables play a significant role. Higher inflation (INF) is generally associated with macroeconomic instability and increased bank risk, particularly in emerging markets [12], supporting hypothesis H8. In contrast, stronger GDP growth (GDP) tends to improve asset quality and bank profitability, thereby reducing banks' exposure to systematic risk [8, 17], forming the basis for hypothesis H9.

### **3. RESEARCH MODELS AND RESEARCH METHODOLOGY**

#### **3.1. Research Model**

Based on the theoretical foundations and prior empirical studies on bank risk, this study examines the determinants of systematic risk in Vietnamese commercial banks by employing a panel data regression framework. Systematic risk is measured by the beta coefficient (BETA), which captures the sensitivity of bank stock returns to market movements.

The proposed empirical model is specified as follows:

$$BETA_{it} = \alpha_0 + \alpha_1 SIZE_{it} + \alpha_2 COST_{it} + \alpha_3 NPL_{it} + \alpha_4 CAP_{it} + \alpha_5 INC_{it} + \alpha_6 CIR_{it} \\ + \alpha_7 FC_{it} + \alpha_8 INF_t + \alpha_9 GDP_t + \varepsilon_{it}$$

where  $i$  denotes bank  $i$  and  $t$  denotes year  $t$ .

The dependent variable  $BETA_{it}$  represents the systematic risk of bank  $i$  at time  $t$ . The independent variables include both bank-specific factors (SIZE, COST, NPL, CAP, INC, CIR, FC) and macroeconomic variables (INF, GDP). The error term  $\varepsilon_{it}$  captures unobservable factors affecting bank systematic risk.

This model allows for evaluating the relative impact of internal bank characteristics and external macroeconomic conditions on banks' exposure to market-wide risk.

### 3.2. Variable Measurement

This study employs a set of bank-specific and macroeconomic variables that have been widely used in the existing literature on bank risk and systematic risk. All variables are constructed based on prior empirical studies to ensure consistency and comparability of the results.

Systematic risk (BETA) is the dependent variable of the model and is measured by the beta coefficient derived from the Capital Asset Pricing Model (CAPM). Following Sharpe (1964) and Lintner (1965), bank beta is estimated by regressing individual bank stock returns on market returns [1-2]. The use of beta as a proxy for bank systematic risk is consistent with numerous empirical studies on banking risk and market sensitivity, such as Brewer et al. (2003), and Anginer et al. (2016) [4, 7]. In this study, the systematic risk of commercial banks is measured by bank-specific beta, estimated using the Capital Asset Pricing Model (CAPM). Although Table 1 labels this variable as “*Market beta estimated from CAPM*”, it should be interpreted as bank beta, since the theoretical market beta equals one by definition.

Specifically, beta is obtained from the CAPM regression:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i(R_{m,t} - R_{f,t}) + \varepsilon_{i,t},$$

where  $R_{i,t}$  denotes bank returns,  $R_{f,t}$  is the risk-free rate, and  $R_{m,t}$  represents market returns. The estimated coefficient  $\beta_i$  captures the sensitivity of bank returns to market movements and is therefore used as the empirical proxy for systematic risk.

Bank size (SIZE) is measured as the natural logarithm of total assets. This proxy has been extensively employed in studies examining the relationship between size and bank risk, reflecting diversification effects and systemic importance [3, 17].

Operating costs (COST) are proxied by the ratio of non-interest expenses to total assets. This measure captures operational inefficiency and managerial quality and is commonly used in empirical banking studies, including Lepetit et al. (2008) and Fiordelisi et al. (2011) [5, 14].

Credit risk (NPL) is measured by the ratio of non-performing loans to total loans, reflecting asset quality and borrowers' repayment capacity. This proxy is well established in the banking literature and has been widely used in studies such as Berger and DeYoung (1997) and Louzis et al. (2012) [10, 15].

Capital adequacy (CAP) is measured as the equity-to-total-assets ratio, which reflects a bank's capacity to absorb losses and maintain financial resilience. This proxy is widely used in the banking literature to capture capitalization and its relationship with risk-taking behavior (Gropp & Heider, 2010) [11].

Income diversification (INC) is proxied by non-interest income divided by total assets. This variable captures the extent to which banks rely on non-traditional income sources and follows the approach of Stiroh (2004) and Lepetit et al. (2008), who examine the impact of non-interest income on bank risk [5, 16].

Cost efficiency (CIR) is measured by the cost-to-income ratio, reflecting managerial efficiency and operational performance. This proxy has been widely adopted in banking studies such as Athanasoglou et al. (2008) and Fiordelisi et al. (2011) [14, 18].

Funding cost (FC) is measured as interest expenses divided by total deposits, indicating banks' funding pressure and cost of liabilities. This measure is consistent with studies on bank funding structure and risk, including Demirgüç-Kunt and Martinez Peria (2010) and Demirgüç-Kunt and Huizinga (2010) [3, 19].

Regarding macroeconomic conditions, inflation (INF) is measured by Vietnam's annual inflation rate. Inflation reflects macroeconomic instability and monetary conditions and is

commonly included in banking risk models (Boyd et al., 2001; Athanasoglou et al., 2008) [12, 18]. Economic growth (GDP) is measured by the annual real GDP growth rate, capturing the business cycle and overall economic environment. This proxy follows prior empirical studies such as Beck et al. (2006) and Laeven and Valencia (2018) [8, 17].

*Table 1.* Summary of research variables used in the model

| No. | Variables | Proxy                                | Hypothesis |
|-----|-----------|--------------------------------------|------------|
| 1   | BETA      | Bank beta estimated from CAPM        |            |
| 2   | SIZE      | Log of total assets                  | H1         |
| 3   | COST      | Non-interest expenses / Total assets | H2         |
| 4   | NPL       | Non-performing loan ratio            | H3         |
| 5   | CAP       | Equity / Total assets                | H4         |
| 6   | INC       | Non-interest income / Total assets   | H5         |
| 7   | CIR       | Cost / Income ratio                  | H6         |
| 8   | FC        | Interest expenses / Total deposits   | H7         |
| 9   | INF       | Vietnam annual inflation rate        | H8         |
| 10  | GDP       | Vietnam annual GDP growth rate       | H9         |

*Source: Author' compiled*

### **3.3. Research Methodology**

This study employs panel data regression techniques to examine the determinants of systematic risk in Vietnamese commercial banks. Panel data methods are particularly appropriate for this research because they allow for controlling unobservable bank-specific heterogeneity while simultaneously capturing both cross-sectional and time-series variations in systematic risk.

The empirical analysis begins with the estimation of a pooled ordinary least squares (Pooled OLS) model. Subsequently, both fixed effects (FE) and random effects (RE) models are estimated to account for unobserved individual effects across banks. To determine the most appropriate model specification, a sequence of model selection tests is conducted. First, the F-test is applied to compare the pooled OLS and FE models. A significant F-statistic indicates the presence of bank-specific effects and supports the use of the FE model over pooled OLS. Second, the Breusch–Pagan Lagrange Multiplier (LM) test is employed to compare pooled OLS with the RE model. A significant LM test result suggests that the RE model is preferable to pooled OLS. Finally, the Hausman test is used to choose between the FE and RE models. If the Hausman test rejects the null hypothesis that the individual effects are uncorrelated with the explanatory variables, the FE model is selected as the consistent and efficient estimator.

After selecting the appropriate panel data model, a series of diagnostic tests are performed to identify potential econometric problems, including heteroskedasticity, serial correlation, and cross-sectional dependence. To address these issues and ensure reliable statistical inference, robust standard errors are employed. In particular, the use of heteroskedasticity- and autocorrelation-consistent standard errors allows the estimated coefficients to remain valid in the presence of these violations. These methodological steps enhance the robustness and reliability of the empirical findings.

### 3.4. Research Data

This study utilizes a panel dataset comprising 25 Vietnamese commercial banks over the period from 2019 to 2024. The selection of this period reflects the availability of consistent financial and market data and captures recent developments in Vietnam's banking sector, including structural adjustments and macroeconomic fluctuations.

Bank-level data are obtained from secondary sources. Specifically, financial and stock price information of listed commercial banks is collected from the websites of Vietnam's stock exchanges and the financial data platform Cafef (<https://cafef.vn/>). These data are used to compute bank-specific variables such as systematic risk (BETA), bank size, operating costs, non-performing loan ratio, capital ratio, income diversification, cost-to-income ratio, and funding cost.

Macroeconomic variables are sourced from the World Bank's World Development Indicators (WDI) database. Annual inflation rates and real GDP growth rates for Vietnam are extracted to represent the macroeconomic environment affecting banks' systematic risk. The World Bank data are widely used in empirical banking and finance studies due to their consistency, reliability, and international comparability.

All data are collected on an annual basis and are carefully screened to ensure accuracy and consistency across banks and years. The final dataset forms a balanced panel suitable for panel data estimation techniques employed in this study.

## 4. RESULTS

### 4.1. Descriptive statistics

Table 2. Descriptive statistics

| Variable | Obs | Mean    | Std. dev. | Min     | Max     |
|----------|-----|---------|-----------|---------|---------|
| BETA     | 150 | -0.0002 | 0.1943    | -0.7100 | 0.4800  |
| SIZE     | 150 | 14.3216 | 0.5322    | 11.6000 | 15.3600 |
| COST     | 150 | 0.0192  | 0.0073    | 0.0100  | 0.0400  |
| NPL      | 150 | 0.0222  | 0.0281    | 0.0000  | 0.3000  |
| CAP      | 150 | 0.0859  | 0.0314    | 0.0400  | 0.1700  |
| INC      | 150 | 0.0171  | 0.0657    | 0.0000  | 0.8100  |
| CIR      | 150 | 0.4595  | 0.1405    | 0.2300  | 0.8700  |
| FC       | 150 | 0.0515  | 0.0128    | 0.0200  | 0.0800  |
| INF      | 150 | 2.9112  | 1.0757    | 1.4675  | 4.4428  |
| GDP      | 150 | 5.5787  | 2.2802    | 2.5537  | 8.5375  |

Source: Data of 25 commercial banks in the period 2019-2024

The descriptive statistics table summarizes the main characteristics of the dataset comprising 150 observations from 25 Vietnamese commercial banks over the period 2019–2024. The dependent variable, BETA, has a mean value close to zero (-0.0002), indicating that the average level of systematic risk is relatively low during the sample period. However, the standard deviation (0.1943) and wide range of values suggest substantial variation in market risk exposure across banks.

Bank size (SIZE) shows a relatively high mean of 14.32 with moderate dispersion, implying that the sampled banks are similar in scale. The average cost ratio (COST) is 1.92%,

while the mean non-performing loan ratio (NPL) is 2.22%. Notably, NPL exhibits considerable variability, reflecting differences in asset quality and credit risk management among banks. The capital adequacy ratio (CAP) averages 8.59%, indicating that most banks maintain capital levels sufficient to absorb potential losses.

Regarding performance and efficiency, income (INC) and the cost-to-income ratio (CIR) display noticeable dispersion, suggesting heterogeneity in operating efficiency. Finally, the macroeconomic variables—inflation (INF) and GDP growth—show moderate fluctuations, capturing changes in the economic environment during the study period.

## 4.2. Correlation Matrix

*Table 3. Correlation Matrix Coefficients*

|      | BETA   | SIZE   | COST   | NPL    | CAP    | INC    | CIR    | FC     | INF   | GDP   |
|------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|
| BETA | 1.000  |        |        |        |        |        |        |        |       |       |
| SIZE | 0.625  | 1.000  |        |        |        |        |        |        |       |       |
| COST | 0.041  | 0.178  | 1.000  |        |        |        |        |        |       |       |
| NPL  | -0.126 | -0.121 | -0.005 | 1.000  |        |        |        |        |       |       |
| CAP  | -0.172 | -0.100 | 0.493  | -0.048 | 1.000  |        |        |        |       |       |
| INC  | 0.001  | -0.382 | -0.017 | -0.036 | 0.057  | 1.000  |        |        |       |       |
| CIR  | -0.319 | -0.559 | -0.100 | 0.286  | -0.284 | -0.067 | 1.000  |        |       |       |
| FC   | -0.150 | -0.385 | -0.261 | 0.191  | -0.240 | 0.069  | 0.379  | 1.000  |       |       |
| INF  | -0.044 | 0.126  | -0.074 | 0.100  | 0.049  | -0.036 | -0.154 | -0.022 | 1.000 |       |
| GDP  | -0.022 | 0.026  | -0.051 | 0.080  | 0.042  | 0.060  | -0.072 | -0.084 | 0.683 | 1.000 |

*Source: Data of 25 commercial banks in the period 2019-2024*

Table 3 reports the pairwise correlation coefficients among the study variables. Overall, the correlations are generally moderate, suggesting a low risk of serious multicollinearity. BETA shows a relatively strong positive correlation with bank size (0.625), indicating that larger banks tend to be associated with higher levels of systematic risk. In contrast, BETA is negatively correlated with CIR, CAP, and FC, implying that higher operating efficiency, stronger capital buffers, and better funding conditions may help reduce systematic risk. Among the independent variables, several notable correlations appear, such as the negative relationship between SIZE and CIR (−0.559) and the positive association between INF and GDP (0.683), which is consistent with macroeconomic dynamics.

## 4.3. Regression Models Results

### *Model selection test results*

Table 4 presents the results of model selection tests used to determine the most appropriate panel data regression model. The F-test comparing OLS and the Fixed Effects Model (FEM) yields a highly significant result (Prob > F = 0.0000), indicating that FEM is preferred over OLS. The Breusch–Pagan Lagrange Multiplier (LM) test also shows strong statistical significance, supporting the Random Effects Model (REM) over OLS. Finally, the Hausman test rejects the null hypothesis in favor of FEM (Prob >  $\chi^2$  = 0.0000), suggesting that individual effects are correlated with the regressors. Overall, these results consistently indicate that the Fixed Effects Model is the most suitable specification for the analysis.

Table 4. Model Selection Tests for Panel Data Regression (OLS, FEM, and REM)

| Testing for | Statistical value    | P_value                 | Kinds of given model | Kind of chosen model |
|-------------|----------------------|-------------------------|----------------------|----------------------|
| F           | F (24, 116) = 84.26  | Prob > F = 0.0000       | OLS and FEM          | FEM                  |
| LM          | chibar2(01) = 241.71 | Prob > chibar2 = 0.0000 | OLS and REM          | REM                  |
| Hausman     | chi2(9) = 121.36     | Prob > chi2 = 0.0000    | FEM and REM          | FEM                  |

Source: Data of 25 commercial banks in the period 2019-2024

#### Model Diagnostic Tests for the Fixed Effects Model (FEM)

Table 5 presents the results of diagnostic tests conducted to assess major econometric issues in the panel data model. The heteroskedasticity test reports a highly significant chi-square statistic ( $\text{Prob} > \chi^2 = 0.0000$ ), indicating the presence of heteroskedasticity across cross-sectional units. Likewise, the autocorrelation test yields a statistically significant F-statistic ( $\text{Prob} > F = 0.0000$ ), confirming the existence of serial correlation in the error terms. In addition, Pesaran's test for cross-sectional dependence is significant at the 5% level, suggesting interdependence among the cross-sectional units. Given these violations of standard regression assumptions, the study employs Driscoll–Kraay standard errors to obtain consistent and robust estimation results.

Table 5. Diagnostic Tests for Panel Data: Heteroskedasticity, Autocorrelation, and Cross-Sectional Dependence

| Testing for                | Statistical value      | P_value              | results  |
|----------------------------|------------------------|----------------------|----------|
| Heteroskedasticity         | Chi2 (25) = 17919.50   | Prob > chi2 = 0.0000 | Presence |
| Autocorrelation            | F (1, 24) = 182.613    | Prob > F = 0.0000    | Presence |
| Cross-sectional dependence | Pesaran's test = 2.461 | Pr = 0.0138          | Presence |

Source: Data of 25 commercial banks in the period 2019-2024

#### Drisc/Kraay standard error regression model results

Table 6 reports the estimation results of the fixed effects model using Driscoll–Kraay standard errors. Bank size (SIZE), income (INC), cost-to-income ratio (CIR), funding cost (FC), and inflation (INF) exhibit positive and statistically significant effects on BETA, indicating that larger banks and higher operating intensity are associated with greater systematic risk. In contrast, COST and NPL have significantly negative coefficients, suggesting that higher operating costs and non-performing loans are linked to lower measured BETA. Capital adequacy (CAP) and GDP growth are not statistically significant. Overall, the model demonstrates strong explanatory power, with an R-squared of 0.506, and the joint significance of regressors confirms the robustness of the results.

Table 6. Fixed Effects Regression Results with Driscoll–Kraay Standard Errors

| BETA | Coefficient | Drisc/Kraay std. err. | t      | P>t   | [95% conf. interval] |        |
|------|-------------|-----------------------|--------|-------|----------------------|--------|
| SIZE | 0.331***    | 0.014                 | 24.220 | 0.000 | 0.303                | 0.360  |
| COST | -2.533***   | 0.701                 | -3.610 | 0.001 | -3.979               | -1.086 |
| NPL  | -0.462**    | 0.201                 | -2.300 | 0.031 | -0.878               | -0.047 |
| CAP  | 0.110       | 0.212                 | 0.520  | 0.609 | -0.328               | 0.547  |
| INC  | 0.989***    | 0.065                 | 15.260 | 0.000 | 0.855                | 1.123  |

### *Determinants of systematic risk in Vietnamese commercial banks*

|                                                                                |           |       |         |                    |        |        |
|--------------------------------------------------------------------------------|-----------|-------|---------|--------------------|--------|--------|
| CIR                                                                            | 0.242***  | 0.035 | 7.000   | 0.000              | 0.170  | 0.313  |
| FC                                                                             | 1.212***  | 0.296 | 4.100   | 0.000              | 0.602  | 1.822  |
| INF                                                                            | 3.903**   | 1.636 | 2.390   | 0.025              | 0.527  | 7.280  |
| GDP                                                                            | -0.303    | 0.380 | -0.800  | 0.433              | -1.087 | 0.481  |
| _CONS                                                                          | -4.987*** | 0.203 | -24.540 | 0.000              | -5.407 | -4.568 |
| Number of obs = 150                                                            |           |       |         | F (9, 24) = 431.56 |        |        |
| Number of groups = 25                                                          |           |       |         | Prob > F = 0.0000  |        |        |
|                                                                                |           |       |         | R-squared = 0.5060 |        |        |
| ***, **, and * represent significance levels of 1%, 5%, and 10%, respectively. |           |       |         |                    |        |        |

*Source: Data of 25 commercial banks in the period 2019-2024*

## 5. DISCUSSION

Table 6 reports the fixed effects regression results using Driscoll–Kraay standard errors, providing robust evidence on the determinants of systematic risk (BETA) among Vietnamese commercial banks during the 2019–2024 period.

Bank size (SIZE) has a positive and highly significant effect on BETA, indicating that larger banks are exposed to higher levels of systematic risk. This finding supports the “too-big-to-manage” hypothesis, suggesting that increased organizational complexity may outweigh diversification benefits. Larger banks are generally more integrated into financial markets and therefore more vulnerable to market-wide shocks. This result is consistent with Demirgüç-Kunt and Huizinga (2010) and Anginer et al. (2016), who highlight the importance of bank characteristics in determining risk exposure [3, 7].

The cost ratio (COST) exhibits a significantly negative relationship with BETA. This result implies that banks with higher operating costs tend to display lower idiosyncratic risk, possibly due to more conservative business strategies or higher monitoring expenditures. This finding is consistent with Berger and DeYoung (1997), who suggest that cost inefficiency does not necessarily translate into higher risk [10].

The coefficient of non-performing loans (NPL) is negative and statistically significant, indicating that banks with higher levels of credit risk tend to exhibit lower systematic risk. This finding suggests that increases in problem loans may be associated with more cautious banking behavior and reduced exposure to market-wide fluctuations. One possible explanation is that banks facing asset quality deterioration become more conservative in their lending and investment activities, thereby lowering their sensitivity to market movements. This result is broadly consistent with the literature emphasizing the role of asset quality in shaping bank risk and performance (Berger & DeYoung, 1997; Louzis et al., 2012) [10, 15].

In contrast, capital adequacy (CAP) does not exert a statistically significant effect on systematic risk. This result suggests that differences in capitalization levels among Vietnamese commercial banks may not be sufficiently large to generate meaningful variations in market-based risk exposure. One possible explanation is that regulatory capital requirements have contributed to relatively homogeneous capital positions across banks, thereby reducing the influence of capital ratios on beta. This finding is consistent with previous studies indicating that capital adequacy primarily enhances banks’ resilience and solvency, while its impact on market-based risk measures is often less pronounced (Gropp & Heider, 2010; Anginer et al., 2016) [7, 11].

Both income diversification (INC) and cost-to-income ratio (CIR) show positive and significant effects on BETA. While diversification is often expected to reduce risk, the positive

coefficient of INC supports the view that non-interest income activities may increase volatility, as documented by Stiroh (2004) [16]. Similarly, a higher CIR reflects operational inefficiency, which has been linked to greater risk exposure in banking literature.

The positive and significant coefficient of funding cost (FC) suggests that higher funding pressures increase systematic risk. Banks facing higher funding costs are generally more vulnerable to liquidity constraints and market fluctuations, which may amplify their sensitivity to adverse financial conditions. This finding is consistent with Demirgüç-Kunt and Huizinga (2010), who emphasize the important role of bank funding strategies and funding structures in shaping banks' risk exposure [3].

Regarding macroeconomic factors, inflation (INF) exerts a positive and significant effect on BETA, indicating that macroeconomic instability amplifies banks' systematic risk. However, GDP growth (GDP) is not statistically significant, implying that short-term economic expansion does not necessarily translate into changes in systematic bank risk.

Overall, the results are largely consistent with prior empirical evidence and highlight the importance of bank-specific characteristics and macroeconomic conditions in shaping systematic risk in emerging banking systems.

## **6. CONCLUSION**

This study investigates the determinants of systematic risk in Vietnamese commercial banks using panel data from 25 banks over the period 2019–2024. Employing a fixed effects model with Driscoll–Kraay standard errors, the analysis accounts for heteroskedasticity, autocorrelation, and cross-sectional dependence, ensuring robust and reliable estimation results.

The findings reveal that bank-specific characteristics play a dominant role in shaping banks' exposure to market-wide risk. In particular, bank size, income diversification, operational inefficiency, funding cost, and inflation significantly increase systematic risk, while operating costs and non-performing loans are negatively associated with beta. In contrast, capital adequacy and GDP growth do not exhibit a statistically significant impact on systematic risk, suggesting that regulatory capital buffers and short-term macroeconomic expansion may be more relevant for solvency and performance than for market-based risk exposure.

Overall, the results highlight that internal management decisions and funding structures are critical drivers of systematic risk in an emerging banking system like Vietnam. These findings offer important implications for both bank managers and regulators in Vietnam. For bank managers, the results highlight the need to pursue prudent growth strategies, particularly for large banks whose size significantly amplifies exposure to market-wide risk. Rapid asset expansion without corresponding improvements in risk governance and operational efficiency may increase banks' sensitivity to market fluctuations. In addition, effective cost management is essential, as operational inefficiency not only weakens profitability but also heightens systematic risk by increasing banks' vulnerability to adverse market conditions. Furthermore, the positive impact of funding costs on BETA underscores the importance of maintaining stable and diversified funding sources, reducing excessive reliance on short-term or volatile deposits. From a regulatory perspective, these findings emphasize the necessity of strengthening oversight frameworks that monitor banks' growth patterns, cost structures, and funding stability, in order to mitigate market risk and enhance the resilience of Vietnam's banking system amid increasing financial integration. Future research could extend the analysis by incorporating fintech adoption, digital transformation indices, or market structure variables to further explore evolving risk dynamics in the banking sector.

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