



“Bank loan growth under uncertainty in Vietnam: Does bank diversification matter?”

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BANK LOAN GROWTH UNDER UNCERTAINTY IN VIETNAM: DOES BANK DIVERSIFICATION MATTER?

Abstract

Uncertainty has become a critical concern for economists and policymakers worldwide, especially following the global financial crisis and the COVID-19 pandemic, both of which have underscored its significant economic implications. This study delves into the impact of banking uncertainty on loan growth, with a particular emphasis on the moderating role of bank diversification. Diversification is evaluated across three key dimensions: assets, funding sources, and income streams. The analysis is based on a panel dataset comprising 40 Vietnamese commercial banks over the period from 2010 to 2023. To address potential endogeneity, the study employs a dynamic model estimated using the generalized method of moments (GMM). The findings reveal a negative relationship between banking uncertainty and loan growth, indicating that uncertainty adversely affects banks' lending activities. The results also highlight that banks with higher levels of diversification are better positioned to cushion the negative effects of uncertainty, with this mitigating effect being consistent across all three dimensions of diversification. These insights suggest that diversification strategies can play a vital role in enhancing banks' resilience to economic shocks and uncertainties.

Keywords

bank lending, banking uncertainty, commercial banks,
economic shocks, moderating effects

JEL Classification

G21, G28

INTRODUCTION

In recent years, particularly following the global financial crisis of 2008 and the COVID-19 pandemic, various events have compelled governments to modify financial policy reforms, regulatory oversight, and other supervisory measures (Nguyen & Vo, 2024). These financial reforms and structural adjustments within the economic system have introduced uncertainty regarding future governmental policies, thereby negatively impacting the economic and investment environment. As an integral part of any economic system, banks are influenced by such uncertainty (Ng et al., 2020).

Currently, the relationship between banking uncertainty and bank behavior is underexplored, particularly concerning the effect of banking uncertainty on lending practices in Vietnam. Additionally, bank diversification has become a significant focus of recent research due to inevitable transformations within the banking sector (Nguyen, 2018; Williams, 2016). From an empirical standpoint, while there has been extensive research on how uncertainty affects bank lending, the moderating effect of bank diversification has not been thoroughly examined in the existing literature. This study aims to fill this gap by exploring the conditioning part of diversification in the relationship between bank uncertainty and bank credit. This paper examines 40 Vietnamese banks from 2010 to 2023 to achieve the research objective. Vietnam is chosen as the focus of the study due to its status as a small, open market, where discussions on uncertainty measurement

methods remain limited. The financial data are sourced from FiinPro's aggregated financial statements. The study utilizes a two-step system generalized method of moments (GMM) estimator to regress the dynamic model, effectively addressing endogeneity issues. This analysis clarifies the role of diversification in mitigating the adverse effects of uncertainty, thereby contributing to the existing literature on bank risk management strategies. The theoretical framework on risk management and diversification is enhanced with empirical evidence on how asset, funding, and income diversification can support banks in navigating a volatile banking environment.

1. LITERATURE REVIEW

Uncertainty significantly influences loan growth, which may exhibit positive or negative directions depending on how banks and borrowers adapt to unpredictable economic and financial conditions.

1.1. Adverse impact of uncertainty on loan growth

During periods of heightened uncertainty, banks typically adopt more cautious approaches, leading to the implementation of stricter lending standards. These measures often include higher collateral requirements, increased loan interest rates, and more rigorous credit evaluations, designed to shield banks from potential risks and losses and restrict access to loan finances (Valencia, 2017). Additionally, during times of elevated uncertainty, banks may prioritize maintaining liquidity by reducing the amount of capital allocated for lending, directly impacting loan growth (Bloom, 2009, 2017).

Next, uncertainty elevates the value of waiting for clearer information before committing to irreversible investment decisions (Bernanke, 1983). In uncertain times, businesses are inclined to postpone capital expenditures and expansion plans to avoid potential losses from premature decisions. This behavior diminishes the demand for borrowing as firms defer taking loans until economic conditions become more stable. The real options theory corroborates this perspective, positing that the option to wait gains value amidst uncertainty, resulting in decreased investment and borrowing (Pindyck, 1988).

Economic uncertainty can also undermine borrowers' financial state, heightening the risk of default. As borrowers' financial stability weakens, their creditworthiness deteriorates, prompting banks to become more hesitant to extend loans.

Consequently, loan growth contracts as banks impose tighter lending standards to mitigate higher credit risks (Danisman & Tarazi, 2024; Gulen & Ion, 2016).

Furthermore, the combined effect of reduced investment and consumption contributes to a broader economic slowdown. As businesses and households reduce spending and borrowing, economic growth decelerates, further decreasing the demand for loans. For instance, during the 2008 financial crisis, heightened uncertainty led to a significant decline in economic activity and a corresponding drop in loan demand (Ivashina & Scharfstein, 2010).

1.2. Positive impact of uncertainty on loan growth

Banks may adopt a more selective lending approach, concentrating on borrowers with solid credit histories and stable income streams (Al-Thaqeb & Algharabali, 2019). This strategy, rooted in the principles of financial stability, can lead to lower default rates and reduced credit risk. By prioritizing loans to financially stable borrowers, banks can maintain a "healthy" loan portfolio, supporting steady loan growth even amid uncertainty.

It is argued that banks often experience substantial cash inflows during uncertain times as investors shift their assets from direct investment channels to safer savings options, such as bank deposits (Acharya & Naqvi, 2012). This results in banks accumulating significant cash reserves. With an abundance of deposits, the sensitivity of bank profits to risk decreases, potentially leading to an increase in loan volumes.

Several empirical studies have explored the relationship between economic policy uncertainty and bank lending behavior. Bordo et al. (2016)

are pioneers in investigating the impact of economic uncertainty on bank loan growth in the United States, identifying that fluctuations in economic policy negatively affect the supply of loans. Similarly, Valencia (2017) develops a model using data from U.S. banks, finding that periods of higher economic uncertainty significantly reduce the supply of bank credit and increase the likelihood of bank bankruptcies. Hu and Gong (2019) extend this line of research, confirming that economic uncertainty significantly diminishes the supply of bank loans, with the negative impact being more pronounced in larger and riskier banks. Additionally, Jiang et al. (2019) examine the nonlinear effects of economic uncertainty on loan supply. Using macroeconomic data from China, they explore the nonlinear relationship between economic uncertainty shocks and the scale of credit growth, demonstrating that loan supply responds asymmetrically to changes in economic policy.

Recently, Nguyen et al. (2020) analyzed the impact of policy uncertainty on credit growth across 22 banking systems from 2001 to 2015, discovering that high levels of uncertainty significantly reduce credit growth. Demir and Danisman (2021) utilized the World Uncertainty Index (WUI) and the geopolitical risk index to compare their effects on bank credit growth. They found that while economic uncertainty reduces credit growth, geopolitical risk does not have a significant impact. Additionally, Wu and Suardi (2021) observed that high economic uncertainty, as indicated by the risk premium spread, decreases the supply and demand for credit. They note that it also reduces the scale and maturity of loans and increases the proportion of secured loans, with these effects being particularly pronounced during economic downturns.

1.3. Moderating role of bank diversification

The benefits and costs of bank diversification are diverse and multifaceted. Portfolio theory, economies of scale, agency theory, and core competency theory provide a comprehensive framework for understanding these dynamics (Dang & Huynh, 2022; Denis et al., 1997; Deyoung & Roland, 2001; Laeven & Levine, 2007; Markowitz, 1952; Shim, 2019). The existing theoretical litera-

ture not only demonstrates that diversification can directly influence banking activities but also indirectly suggests several reasons why diversification may affect how lending activities respond to uncertainty.

By diversifying assets, funds, or income sources, banks can leverage economies of scope through cross-selling opportunities (Gallo et al., 1996; Jouida, 2018; Mercieca et al., 2007). Diamond (1984) posits that bank diversification helps overcome information asymmetry by improving borrower screening and monitoring approved loans. This capability enables banks to mitigate the adverse impact on lending when confronted with economic shocks.

However, engaging in nontraditional activities can lead to less stable relationships between banks and their customers because of reduced switching costs. This instability makes the lending activities of highly diversified banks more susceptible to volatility during periods of uncertainty. Furthermore, more diversified banks tend to become more complex and challenging to manage effectively. This complexity can lead to riskier activities, potentially amplifying the “search for yield” motive (DeYoung & Roland, 2001).

Building on the insights provided by previous studies, the potential influence of diversification activities on the relationship between uncertainty and bank loans remains an open question in the literature. While prior research has highlighted the effects of uncertainty on bank lending decisions and the importance of diversification in mitigating financial risks, no empirical studies have directly examined how diversification activities might shape or alter this relationship. The lack of evidence leaves a critical gap in understanding whether diversification serves as a stabilizing factor during periods of heightened uncertainty, potentially mitigating its adverse effects on lending, or whether it amplifies these effects due to the added complexity and risks associated with diversification strategies.

Addressing this gap, this study aims to investigate the moderating role of diversification activities in the nexus between uncertainty and bank loans. Thus, the hypotheses are as follows:

H1: *Diversification amplifies the impact of uncertainty on bank lending.*

H2: *Diversification mitigates the impact of uncertainty on bank lending.*

2. METHODOLOGY AND DATA

This section outlines the methodology and data employed to investigate the moderating role of diversification activities in the relationship between uncertainty and bank loans. First, the measurement of key variables, including indicators for uncertainty and diversification activities, is described. Next, the section presents the empirical model used to test the proposed hypotheses, detailing the econometric approach and addressing potential endogeneity concerns. Finally, an overview of the data is provided, including the sources, sample characteristics, and time frame, ensuring robust and comprehensive analysis.

2.1. Measurement of variables

Asset diversification refers to the extent to which a bank allocates its resources across different types of assets to manage risk and optimize returns. It includes investments in various asset classes such as loans, securities, and other financial instruments. Funding diversification measures the variety of a bank's funding channels, such as deposits (retail and corporate), interbank borrowing, wholesale funding, and equity. A well-diversified funding base minimizes reliance on any single source, reducing liquidity risks and improving stability. Income diversification involves generating revenue from multiple sources, including interest income (from lending activities), non-interest income (from fees, commissions, and trading activities), and other operational streams. The Herfindahl-Hirschman Index (HHI) is a standard measure used to evaluate the level of diversification in a bank's asset, capital, or income portfolio. The general formula for HHI is calculated as follows:

$$HHI_{it} = 1 - \sum_{i=1}^n \left(\frac{S_i}{S_{total}} \right)^2, \quad (1)$$

where S_i represents the share of asset, funding, or income component i in the portfolio, S_{total} is the total value of all components in the portfolio under consideration, and N is the total number of components in the portfolio. According to equation (1), a higher value of HHI indicates higher diversification.

To verify the sensitivity of the findings, an additional set of variables representing bank diversification is incorporated. The study categorizes the bank's asset, fund, and income items into two groups:

- (i) lending and non-lending (assets);
- (ii) deposits and non-deposits (funds); and
- (iii) interest income and non-interest income (income sources).

Initially, banking activities are primarily associated with lending, collecting deposits, and generating interest income from traditional lending activities. However, due to diversification, the proportion of these items tends to decrease over time.

To measure bank uncertainty, this paper adopts a framework positing that increased bank uncertainty makes future outcomes more difficult to predict. From the banks' perspective, this reduced predictability is manifested through a greater dispersion of bank shocks across various banking variables (Buch et al., 2015; Dang & Huynh, 2023). Consequently, the dispersion of these shocks is used to represent uncertainty within banking operations. To achieve this objective, the study estimates the equation to derive the annual shocks for each bank variable:

$$V_{i,t} = \alpha_i + \beta_t + \varepsilon_{i,t}, \quad (2)$$

where $V_{i,t}$ represents the variable of bank i in year t . Following the empirical model of Buch et al. (2015), these variables include total asset growth (UNC1), deposit growth (UNC2), and profitability measured by net income on assets (UNC3). The equation also accounts for bank fixed effects α_i and year fixed effects β_t . The residuals in the regression model represent the measure of shocks; therefore, the paper uses

these residuals to calculate the dispersion across all specific bank shocks in year t . More specifically, the standard deviation of the residuals is used:

$$Uncertainty_t = SD(\varepsilon_{i,t}). \quad (3)$$

This approach helps quantify the uncertainty in the banking sector by examining the variability of these residuals over time. The method proposed by Buch et al. (2015) offers several advantages. For instance, calculating bank uncertainty using this approach does not necessitate extensive market data, unlike market-based uncertainty indices. It also avoids the reliability concerns associated with media-sourced information, such as text-based survey measures (Baker et al., 2016). Since this method is based on bank-level accounting variables, it can be easily applied to any financial market, including Vietnam.

2.2. Empirical model

The study examines whether the impact of uncertainty on banks is moderated by the role of diversification through the following model:

$$\begin{aligned} LGR_{i,t} = & \alpha_0 + \alpha_1 \cdot LGR_{i,t-1} + \alpha_2 \cdot UNC_{t-1} \\ & + \alpha_3 \cdot HHI_{i,t-1} \cdot UNC_{t-1} \\ & + \alpha_4 \cdot Bank_{i,t-1} + \alpha_5 \cdot Economy_{t-1} + \varepsilon_{i,t}. \end{aligned} \quad (4)$$

LGR represents the bank's loan growth variable, while UNC denotes the uncertainty measure. The variables categorized under $Bank$ and $Economy$ include control factors specific to the bank and macroeconomic factors (see Table 1). All explanatory variables are lagged by one year to account for the possibility that banks may not immediately respond to changes in their balance sheets and external economic events. In the econometric analysis model, the lagged dependent variable is included on the right-hand side of the equation to facilitate a dynamic panel model.

The study incorporates an interaction term to explore the moderating role of diversification on the impact of uncertainty. The rationale is that the effect of uncertainty is not uniform across different entities but depends on the moderating factor of diversification. Thus, the regression coefficient of the

interaction term reveals the moderating effects of diversification on the relationship between uncertainty and bank lending. To support Hypothesis 1, the regression coefficient of the diversification variable in models examining loan growth should have the same sign as the regression coefficient of the bank uncertainty variable. Conversely, to support Hypothesis 2, the regression coefficient of the diversification variable in these models should have the opposite sign to the regression coefficient of the bank uncertainty variable.

The study employs regression estimation using the generalized method of moments (GMM). This estimation technique is particularly effective in addressing endogeneity issues, as it incorporates instrumental variables that help mitigate such problems (Blundell & Bond, 1998; Roodman, 2009). This approach is essential for providing a more precise evaluation of the impact of uncertainty on lending activities.

2.3. Data

The study gathers financial data from banks' balance sheets and income statements from 2010 to 2023, sourced from the FiinPro database. Macroeconomic factors are obtained from the reputable source of the World Bank (WB). The sample includes 40 banks that collectively represent a substantial part of the Vietnamese banking industry. To ensure result reliability and eliminate the influence of outliers, which may arise from large fluctuations due to mergers and acquisitions, exceptional control, or data from small-scale branch operations, the study implements data winsorization at the 2.5% and 97.5% percentiles. This procedure ensures that the extreme values do not disproportionately affect the analysis, thereby providing a more precise and more accurate understanding of the typical behavior of the banking sector in response to uncertainty.

Table 1 provides details of the research variables. Statistical analyses of the sample data collected from 2010 to 2023 reveal that the three uncertainty variables exhibit relatively high standard deviations compared to their mean values, indicating substantial volatility in bank uncertainty in Vietnam. The dispersion indices for assets and deposits are notably close, with the average asset

Table 1. Summary statistics of all variables

Variable	Mean	SD	Min	Max	Definition
LGR	0.19	0.17	-0.11	0.78	Annual loan growth to customers
UNC1	0.23	0.11	0.15	0.44	Bank uncertainty measure based on assets
UNC2	0.29	0.11	0.18	0.55	Bank uncertainty measure based on customer deposits
UNC3	0.01	0.02	0.00	0.08	Bank uncertainty measure based on bank profits
HHIasset	0.49	0.10	0.27	0.65	Asset diversification measured by HHI
DIVasset	0.37	0.13	0.15	0.67	Proportion of non-loan assets to total earning assets
HHIfund	0.47	0.13	0.17	0.68	Capital diversification measured by HHI
DIVfund	0.33	0.14	0.09	0.64	Proportion of non-deposit capital to total mobilized capital
HHIincome	0.36	0.12	0.13	0.60	Income diversification measured by HHI
DIVincome	0.23	0.10	0.07	0.50	Proportion of non-interest income to total operating income
Controls					
Size	11.60	1.26	9.08	14.23	Natural logarithm of total assets (in billions VND)
Capital	0.10	0.05	0.04	0.23	Equity to total assets
Liquidity	0.20	0.10	0.06	0.51	Ratio of high liquidity assets (cash and equivalents) to total assets
ROA	0.01	0.01	0.00	0.03	Net profit to total assets
GDP	0.06	0.02	0.03	0.08	Annual GDP growth
RFR	0.07	0.03	0.04	0.15	Refinancing rates of the State Bank of Vietnam

dispersion level at 0.232 and a standard deviation of 0.105, while the average deposit dispersion level stands at 0.289 with a standard deviation of 0.113.

The correlation coefficients between all diversification variables also present notable points for discussion. Generally, the correlation values between different types of diversification are not closely related, with the highest correlation coefficient being 0.46 between HHIasset and HHIfund. Conversely, the correlation values within the same kind of diversification are relatively high (for instance, HHIasset with DIVasset, HHIfund with DIVfund, and HHIincome with DIVincome). This suggests that different types of diversification reflect distinct aspects and that using alternative indices to assess diversification can enhance the robustness of the results. Additionally, the correlation coefficients between independent variables are modest, indicating that severe multicollinearity issues are unlikely to compromise the regression model. For brevity, the correlation matrix table is not presented here.

3. RESULTS

This section presents the regression results of various empirical models, highlighting the moderating role of bank diversification on the impact of uncertainty on lending activities. The GMM estimates consistently validate the instrument set's appropriateness and demonstrate

the absence of second-order autocorrelation. Additionally, the significance of the coefficients for the lagged dependent variables is confirmed across all results, indicating the reliability of the dynamic model estimated using the system GMM technique.

The regression analysis results reveal that diversification in banking activities influences the relationship between uncertainty and loan growth. Specifically, the regression models assess the extent to which asset, fund, and income diversification impact this relationship. Firstly, the regression results, detailed in the accompanying tables, show that the coefficients for the standalone uncertainty variables (UNC1, UNC2, and UNC3) are consistently statistically significant with negative signs, irrespective of model variations. This supports the conclusion that uncertainty adversely affects bank loan growth in Vietnam during the studied period.

The models presented in Table 2 indicate that the regression coefficients for the interaction terms between asset diversification and uncertainty (UNC1 · HHIasset, UNC2 · HHIasset, and UNC3 · HHIasset) are positive and statistically significant at the 1% level. This finding suggests that higher levels of asset diversification mitigate the negative impact of uncertainty on loan growth. This result remains robust when asset diversification is measured using the DIVasset indicator, as evidenced by the results in Table 3.

Next, as illustrated in Table 4, the regression coefficient for the interaction variable of uncertainty with financing diversification is statistically significant and positive in most regressions using dynamic GMM. This finding suggests that banks with greater diversification in their capital sources experience less impact on loan growth from increases in banking sector uncertainty. This result holds when capital diversification is measured through the DIVfund indicator, as shown in Table 5.

Finally, in Table 6, the bank loan growth model indicates that the interactive variable between bank uncertainty and income diversification is positive and significant across most regression models. This implies that banks with higher levels of income diversification are better able to mitigate the negative impact of uncertainty on their loan expansion. The consistency of this result is con-

firmed when income diversification is measured through the DIVincome indicator, as presented in Table 7.

Overall, these findings reinforce the critical role of diversification in enhancing bank resilience against uncertainty. Specifically, all asset, funding, and income diversification help mitigate the adverse effects of uncertainty on loan growth, highlighting the importance of a diversified approach in banking strategy. The robustness of these results across different measures and types of diversification underscores their reliability and the significant benefits of diversified banking activities in promoting stable loan growth amid economic uncertainty. Importantly, the results support Hypothesis 2, indicating that diversification activities mitigate the influences of bank uncertainty on credit activities.

Table 2. Regression results of uncertainty, loan growth, and asset diversification (HHlasset)

Variable	(1) LGR	(2) LGR	(3) LGR
Lagged dependent variable	0.150*** (0.018)	0.129*** (0.019)	0.099*** (0.024)
UNC1	-1.064*** (0.179)	-	-
UNC1 · HHlasset	1.573*** (0.404)	-	-
UNC2	-	-1.337*** (0.154)	-
UNC2 · HHlasset	-	2.784*** (0.300)	-
UNC3	-	-	-11.383*** (1.275)
UNC3 · HHlasset	-	-	22.354*** (2.764)
HHlasset	-0.179 (0.198)	-0.802*** (0.139)	-0.258* (0.144)
Size	-0.007 (0.007)	-0.018** (0.008)	-0.015** (0.007)
Capital	0.268** (0.107)	0.159 (0.114)	0.177 (0.117)
Liquidity	-0.237*** (0.040)	-0.249*** (0.061)	-0.243*** (0.073)
ROA	1.532** (0.633)	1.924*** (0.711)	1.010 (0.891)
GDP	-0.298 (0.196)	0.196 (0.234)	0.172 (0.129)
RFR	0.629** (0.290)	-0.618 (0.415)	-0.078 (0.242)
Observations	462	462	462
Banks	40	40	40
Instruments	33	33	33
AR(1) test	0.000	0.000	0.000
AR(2) test	0.964	0.749	0.830
Hansen test	0.131	0.153	0.248

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 3. Regression results of uncertainty, loan growth, and asset diversification (DIVasset)

Variable	(1) LGR	(2) LGR	(3) LGR
Lagged dependent variable	0.126*** (0.019)	0.163*** (0.026)	0.080*** (0.024)
UNC1	-1.154*** (0.107)	–	–
UNC1 · DIVasset	2.508*** (0.322)	–	–
UNC2	–	-0.969*** (0.129)	–
UNC2 · DIVasset	–	3.064*** (0.334)	–
UNC3	–	–	-11.412*** (0.983)
UNC3 · DIVasset	–	–	29.859*** (3.099)
DIVasset	-0.353* (0.183)	-0.805*** (0.207)	-0.260* (0.133)
Size	-0.009 (0.007)	-0.020*** (0.007)	-0.016** (0.007)
Capital	0.357*** (0.135)	0.286* (0.173)	0.312* (0.161)
Liquidity	-0.413*** (0.068)	-0.488*** (0.068)	-0.381*** (0.089)
ROA	2.108** (0.835)	1.977** (0.845)	1.092 (1.110)
GDP	-0.080 (0.211)	0.642*** (0.222)	0.247** (0.117)
RFR	0.218 (0.291)	-1.276*** (0.430)	-0.260 (0.224)
Observations	462	462	462
Banks	40	40	40
Instruments	33	33	33
AR(1) test	0.000	0.000	0.000
AR(2) test	0.893	0.677	0.588
Hansen test	0.132	0.365	0.304

Note: * p < 0.1; ** p < 0.05; *** p < 0.01.

Table 4. Regression results of uncertainty, loan growth, and fund diversification (HHIfund)

Variable	(1) LGR	(2) LGR	(3) LGR
Lagged dependent variable	0.203*** (0.025)	0.211*** (0.026)	0.171*** (0.017)
UNC1	-0.918*** (0.236)	–	–
UNC1 · HHIfund	1.292*** (0.408)	–	–
UNC2	–	-0.888*** (0.203)	–
UNC · HHIfund	–	1.532*** (0.354)	–
UNC3	–	–	-2.149 (1.566)
UNC3 · HHIfund	–	–	3.574 (3.089)
HHIfund	-0.402*** (0.140)	-0.602*** (0.160)	-0.081 (0.081)

Table 4 (cont.). Regression results of uncertainty, loan growth, and fund diversification (HHIfund)

Variable	(1) LGR	(2) LGR	(3) LGR
Size	-0.012 (0.008)	-0.010 (0.008)	-0.004 (0.006)
Capital	0.381** (0.165)	0.278* (0.157)	0.107 (0.120)
Liquidity	-0.065 (0.060)	-0.072 (0.057)	-0.073 (0.051)
ROA	2.287*** (0.838)	2.651*** (0.937)	1.522*** (0.554)
GDP	-0.287 (0.221)	-0.114 (0.247)	-0.078 (0.157)
RFR	0.136 (0.283)	-0.201 (0.372)	0.209 (0.230)
Observations	462	462	462
Banks	40	40	40
Instruments	33	33	33
AR(1) test	0.000	0.000	0.000
AR(2) test	0.870	0.999	0.804
Hansen test	0.230	0.238	0.142

Note: * p < 0.1; ** p < 0.05; *** p < 0.01.

Table 5. Regression results of uncertainty, loan growth, and fund diversification (DIVfund)

Variable	(1) LGR	(2) LGR	(3) LGR
Lagged dependent variable	0.253*** (0.032)	0.267*** (0.033)	0.174*** (0.018)
UNC1	-0.877*** (0.123)	-	-
UNC1 · DIVfund	1.899*** (0.272)	-	-
UNC2	-	-0.667*** (0.124)	-
UNC2 · DIVfund	-	1.678*** (0.235)	-
UNC3	-	-	-1.116 (0.967)
UNC3 · DIVfund	-	-	2.229 (2.764)
DIVfund	-0.676*** (0.144)	-0.707*** (0.149)	-0.043 (0.089)
Size	-0.023** (0.009)	-0.018** (0.008)	-0.005 (0.006)
Capital	0.450** (0.198)	0.382** (0.181)	0.125 (0.116)
Liquidity	-0.074 (0.055)	-0.096* (0.050)	-0.076 (0.051)
ROA	2.585** (1.096)	2.607** (1.093)	1.384** (0.627)
GDP	-0.191 (0.264)	-0.008 (0.304)	-0.031 (0.156)
RFR	-0.433 (0.384)	-0.557 (0.500)	0.130 (0.233)
Observations	462	462	462
Banks	40	40	40
Instruments	33	33	33
AR(1) test	0.000	0.000	0.000
AR(2) test	0.798	0.827	0.818
Hansen test	0.168	0.217	0.130

Note: * p < 0.1; ** p < 0.05; *** p < 0.01.

Table 6. Regression results of uncertainty, loan growth, and income diversification (HHlincome)

Variable	(1) LGR	(2) LGR	(3) LGR
Lagged dependent variable	0.328*** (0.015)	0.251*** (0.014)	0.230*** (0.012)
UNC1	-0.687*** (0.141)	—	—
UNC1 · HHlincome	0.720*** (0.246)	—	—
UNC2	—	-0.287*** (0.074)	—
UNC2 · HHlincome	—	0.321** (0.136)	—
UNC3	—	—	-1.241** (0.498)
UNC3 · HHlincome	—	—	3.213** (1.311)
HHlincome	-0.318*** (0.110)	-0.169* (0.088)	-0.092* (0.054)
Size	0.024*** (0.005)	0.017*** (0.005)	0.018*** (0.006)
Capital	0.667*** (0.103)	0.615*** (0.098)	0.554*** (0.112)
Liquidity	0.029 (0.030)	-0.040 (0.029)	-0.005 (0.029)
ROA	-0.735 (0.551)	0.029 (0.569)	-0.707 (0.612)
GDP	-0.630*** (0.157)	-0.291** (0.143)	-0.163 (0.138)
RFR	1.393*** (0.368)	0.777** (0.338)	0.099 (0.208)
Observations	349	349	349
Banks	39	39	39
Instruments	33	33	33
AR(1) test	0.006	0.005	0.006
AR(2) test	0.226	0.266	0.187
Hansen test	0.383	0.479	0.148

Note: * p < 0.1; ** p < 0.05; *** p < 0.01.

Table 7. Regression results of uncertainty, loan growth, and income diversification (DIVincome)

Variable	(1) LGR	(2) LGR	(3) LGR
Lagged dependent variable	0.336*** (0.019)	0.261*** (0.013)	0.241*** (0.015)
UNC1	-0.599*** (0.111)	—	—
UNC1 · DIVincome	0.781*** (0.225)	—	—
UNC2	—	-0.237*** (0.057)	—
UNC2 · DIVincome	—	0.298*** (0.105)	—
UNC3	—	—	-1.350*** (0.486)
UNC3 · DIVincome	—	—	5.259*** (2.029)
DIVincome	-0.449*** (0.131)	-0.266*** (0.097)	-0.180** (0.079)

Table 7 (cont.). Regression results of uncertainty, loan growth, and income diversification (DIVincome)

Variable	(1) LGR	(2) LGR	(3) LGR
Size	0.025*** (0.005)	0.021*** (0.006)	0.020*** (0.006)
Capital	0.563*** (0.113)	0.552*** (0.109)	0.494*** (0.137)
Liquidity	0.052 (0.035)	-0.012 (0.032)	0.018 (0.034)
ROA	-0.767 (0.675)	-0.070 (0.677)	-0.326 (0.768)
GDP	-0.724*** (0.183)	-0.356** (0.149)	-0.183 (0.155)
RFR	1.503*** (0.396)	0.865** (0.341)	0.170 (0.212)
Observations	349	349	349
Banks	39	39	39
Instruments	33	33	33
AR(1) test	0.005	0.005	0.005
AR(2) test	0.197	0.238	0.153
Hansen test	0.281	0.318	0.213

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

The finding that bank uncertainty can reduce the growth rate of bank lending aligns with predictions and is consistent with previous studies (Demir & Danisman, 2021; Jiang et al., 2019; Nguyen et al., 2020). Specifically, while bank uncertainty reduces loan growth, increased diversification in various areas can alleviate this impact on loan growth at Vietnamese banks.

In the face of uncertainty, banks may prefer to “wait” as a result of information asymmetry, leading to more cautious behavior and a reduction in loan volume (Bernanke, 1983; Pindyck, 1988). Furthermore, during uncertain periods, the likelihood of banks encountering significant financial shocks increases. Investors, perceiving higher risks, demand greater risk premiums to provide capital to banks. This increased risk premium results in higher funding costs for banks, lim-

iting their ability to extend loans (Gulen & Ion, 2016). However, these challenges may be less pronounced at more diversified banks, where information asymmetry is reduced due to their broader exposure to many economic segments (Diamond, 1984). Additionally, during periods when credit demand decreases due to delayed investments and reduced spending by businesses and households, banks with diversified income or capital sources are better positioned to capitalize on cross-selling opportunities. This ability helps these banks protect their loan growth from the negative impacts of uncertainty. Moreover, fears of potential liquidity shortages caused by capital challenges may prompt banks to scale back on loan issuance. However, banks with diversified operations often have better access to alternative funding sources, making their loan supply less susceptible to the adverse effects of uncertainty.

CONCLUSIONS

This study aims to assess the impact of bank uncertainty on loan growth, focusing on how diversification moderates this relationship. Diversification is examined in terms of assets, capital, and income. Utilizing a sample of 40 Vietnamese commercial banks from 2010 to 2023, an inverse relationship between bank uncertainty and loan growth is indicated. Specifically, as uncertainty increases, the pace at which the banking system injects capital into the economy slows. However, diversification in banking activities mitigates the adverse effects of uncertainty on bank credit. In other words, the negative impact of bank uncertainty on both the quantity and quality of lending is weaker in banks with higher levels of diversification.

The findings of this study have several important implications and offer solutions for regulatory authorities and banks themselves, especially in economies like Vietnam that heavily rely on bank loans for growth: (i) Policy continuity and stability: Regulatory authorities should strive to maintain policy continuity and avoid frequent adjustments to ensure market participants can form clear expectations for the future. Regulatory bodies can create a stable policy environment by thoroughly assessing trends in economic instability and paying closer attention to the linkages between the stock market, real economic sectors, and the banking sector. This stability will help reduce the impact of uncertainty on bank lending. (ii) Encouragement of diversification: Authorities should promote the diversification of banking activities, including loan portfolios, income sources, and funding sources. Diversification helps banks spread risks across various sectors, thereby minimizing the undesirable effects of uncertainty. This strategy enables banks to maintain lending activities and reduces the risk of liquidity shortages in the market. (iii) Enhancing information collection and risk assessment: From the banks' perspective, enhancing information collection and improving the quality of risk assessment are crucial in an economy that relies on bank loans for growth. Clear and accurate information about the economy, policies, and borrowers allows banks to make more informed lending decisions, avoid ambiguity, and reduce the risk of bad debts. This approach not only improves the flow of capital into economic activities but also strengthens the overall stability and resilience of the banking sector.

AUTHOR CONTRIBUTIONS

Conceptualization: Tan Phuc Nguyen.
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 Formal analysis: Tan Phuc Nguyen.
 Methodology: Van Dan Dang.
 Project administration: Tan Phuc Nguyen, Van Dan Dang.
 Resources: Tan Phuc Nguyen.
 Software: Tan Phuc Nguyen.
 Supervision: Tan Phuc Nguyen, Van Dan Dang.
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 Writing – reviewing & editing: Van Dan Dang.

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APPENDIX A

Table A1. List of Vietnamese banks and their types

No.	Names of banks	Type
1	An Binh Commercial Joint Stock Bank	Joint stock commercial bank
2	ANZ Vietnam Ltd.	100% foreign-owned bank
3	Asia Commercial Bank	Joint stock commercial bank
4	Bac A Commercial Joint Stock Bank	Joint stock commercial bank
5	Bao Viet Commercial Joint Stock Bank	Joint stock commercial bank
6	Dong A Commercial Joint Stock Bank	Joint stock commercial bank
7	Global Petroleum Commercial Bank	State-owned commercial bank
8	Ho Chi Minh City Development Joint Stock Commercial Bank	Joint stock commercial bank
9	HSBC Bank (Vietnam) Ltd.	100% foreign-owned bank
10	Indovina Bank Ltd.	Joint venture bank
11	Kien Long Commercial Joint Stock Bank	Joint stock commercial bank
12	Lien Viet Post Joint Stock Commercial Bank	Joint stock commercial bank
13	Maritime Commercial Joint Stock Bank	Joint stock commercial bank
14	Military Commercial Joint Stock Bank	Joint stock commercial bank
15	Nam A Commercial Joint Stock Bank	Joint stock commercial bank
16	National Citizen Commercial Joint Stock Bank	Joint stock commercial bank
17	OceanBank	State-owned commercial bank
18	Orient Commercial Joint Stock Bank	Joint stock commercial bank
19	Petrolimex Group Commercial Joint Stock Bank	Joint stock commercial bank
20	Public Bank Vietnam Joint Stock Commercial Bank	Joint stock commercial bank
21	Public Bank Vietnam Ltd.	100% foreign-owned bank
22	Saigon – Hanoi Joint Stock Commercial Bank	Joint stock commercial bank
23	Saigon Industry and Trade Joint Stock Commercial Bank	Joint stock commercial bank
24	Saigon Joint Stock Commercial Bank	Joint stock commercial bank
25	Saigon Thuong Tin Commercial Joint Stock Bank	Joint stock commercial bank
26	Shinhan Bank Vietnam Ltd.	100% foreign-owned bank
27	South East Asia Commercial Joint Stock Bank	Joint stock commercial bank
28	Tien Phong Commercial Joint Stock Bank	Joint stock commercial bank
29	Viet Capital Commercial Joint Stock Bank	Joint stock commercial bank
30	Vietnam Asia Commercial Joint Stock Bank	Joint stock commercial bank
31	Vietnam Bank for Agriculture and Rural Development	State-owned commercial bank
32	Vietnam Construction Bank	State-owned commercial bank
33	Vietnam Export Import Joint Stock Commercial Bank	Joint stock commercial bank
34	Vietnam Foreign Trade Joint Stock Commercial Bank	Joint stock commercial bank
35	Vietnam International Commercial Joint Stock Bank	Joint stock commercial bank
36	Vietnam Investment and Development Joint Stock Commercial Bank	Joint stock commercial bank
37	Vietnam Joint Stock Commercial Bank for Industry and Trade	Joint stock commercial bank
38	Vietnam Prosperity Joint Stock Commercial Bank	Joint stock commercial bank
39	Vietnam Technological and Commercial Joint Stock Bank	Joint stock commercial bank
40	Vietnam Thuong Tin Joint Stock Commercial Bank	Joint stock commercial bank