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Article

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FINANCIAL ECONOMICS | RESEARCH ARTICLE

Bank diversification and the effectiveness of monetary policy transmission: Evidence from the bank lending channel in Vietnam

Van Dan Dang^{1*} and Van Cuong Dang²

Abstract: The study empirically examines the impact of bank diversification on monetary policy transmission through the bank lending channel. Based on monetary and bank-level data from 2008 to 2018 in Vietnam, a diverse environment of monetary policy tools, results show that bank diversification significantly drives the bank lending channel in different ways. Using the changes in lending rates and policy rates as monetary policy indicators, the study posits strong evidence to indicate that the transmission of the bank lending channel becomes weaker as banks get more involved in non-traditional activities. In contrast, we observe that bank diversification promotes the effectiveness of monetary policy transmission by the intervention of foreign exchange reserves, with no clear-cut link in the case of open market operations. Further analysis indicates the weakening effect is almost confirmed in all bank groups, while the strengthening effect works only for banks with large capital buffers. In brief, the results suggest that monetary authorities should be vigilant when they are strongly encouraging bank diversification. Besides, they also need to choose the appropriate monetary tools to apply and establish specific policies for different groups of banks.

Subjects: Monetary Economics; Banking; Credit & Credit Institutions

Keywords: foreign exchange reserves; lending rates; non-interest income; open market operations; policy rates

Jel classifications: E52; G21

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PUBLIC INTEREST STATEMENT

In this study, we examine the link between monetary policy of the central bank and lending activities of commercial banks, called “the bank lending channel”, and how bank diversification moderates this channel in Vietnam. In addition to lending rates, we employ various monetary policy tools for empirical analysis, which include policy rates, securities trading and foreign exchange reserves of the central bank. Our findings first confirm the existence of the bank lending channel in Vietnam across different policy tools. Further analysis then suggests that bank diversification drives the channel in asymmetric manners, depending on the policy tools employed.

1. Introduction

The mechanism through which the adjustments in monetary policy alter loanable funds and then force banks to adjust their credit supply constitutes the bank lending channel (Bernanke & Blinder, 1988). For example, contractionary monetary policy (in the form of increased interest rates) reduces the volume of loanable funds and then bank lending if banks encounter frictions in issuing uninsured liabilities to substitute reduced loanable funds. The existence and transmission effectiveness of this key channel are determined by conditions related to the financial market and the specific characteristics of the bank (see the review in section 2). Combining the conditions together, many documents argue that banks with strong balance sheets tend to be less affected by monetary shocks due to the greater availability of alternative funding sources.

Bank diversification is an important aspect well studied recently, stemming from the inevitable shifts in the banking industry. Besides the benefits from well-known economies of scope (Claessens & Klingebiel, 2001), academics also argue that the shifts toward non-traditional activities are detrimental to lending behavior because of the agency costs (e.g., Abedifar et al., 2018; Laeven & Levine, 2007; Lepetit et al., 2008). In essence, changes in customer relationship (illustrated by switching costs), operating leverage (fixed assets) and financial leverage (capital requirements) as banks increase exposure to non-lending activities (DeYoung & Roland, 2001), might shape the effectiveness of monetary policy transmission through the bank lending channel. From an empirical perspective, while there has been numerous research on the bank lending channel, the modifying role of bank diversification has been left unaddressed in the existing literature thus far.

This study aims at investigating the impact of bank diversification on monetary policy transmission through the bank lending channel. At a single glance, it seems that banks diversifying from lending into non-lending activities pay less attention to the implementation of monetary policies that target the bank lending channel, thereby diminishing the effectiveness of this transmission channel. However, central banks could use various monetary tools with different operational mechanisms and outcomes (Varlik & Berument, 2017), thereby changing the behavior of banks in heterogeneous ways. In particular, tools such as the central bank's open market operations or foreign exchange reserves appear to be more favored by well-diversified banks as the major traders. Hence, it is necessary for empirical evidence to cast some light on this issue. Our main hypothesis is that bank diversification promotes or weakens the bank lending channel of monetary policy transmission.

Take a step further compared to prior studies, our study approached additional measures constructed by monetary policy tools, including policy rates, open market operations (OMO) and foreign exchange reserves (FER), instead of using a single monetary indicator for regression analysis. Furthermore, motivated by the idea that bank-specific characteristics, including bank size, capital and liquidity, greatly drive banks' responses to alteration in the monetary policy stance, we therefore examine the influence of these factors on the presence of the bank lending channel along with the marginal effects of bank diversification to establish more detailed understanding. We conduct our analysis focusing on Vietnam, a key emerging market where the central bank has created a diverse environment of monetary policy tools. Monetary and banking data are collected from 2008 to 2018 and then enter regressions in dynamic panel models with the system generalized method of moments (GMM) estimator.

Given its inherent internal conditions, Vietnam provides a favorable context to conduct the analysis. The State Bank of Vietnam (SBV) pursues various targets when executing monetary policy, such as inflation control, economic growth, and macroeconomic stability (Dang & Dang, 2020). In this vein, there is no main objective clearly defined. To this end, the SBV coordinates a variety of monetary policy tools to achieve its various targets, in particular frequently focusing on policy rates (refinance rates and rediscount rates), OMO, and FER (Vo & Nguyen, 2017). Meanwhile, other tools including required reserves and base interest rates (to establish the lending and deposit interest rate framework), which are commonly used by central banks in other countries, remain unchanged for long periods in Vietnam (Anwar & Nguyen, 2018). Instead, the SBV performs

administrative command to directly influence banks' interest rate framework, e.g., they could require banks to lower lending rates to support enterprises.

For the past decades, bank lending has been considered as the key element to fuel the economy, in the context that the capital market here is somewhat underdeveloped (Vo, 2016). This observation also suggests a more conspicuous and stronger existence of the bank lending channel of monetary policy transmission (Saxegaard, 2006). Under such orientations and mechanisms, the Vietnamese banking industry in the time span under research also shows remarkable milestones as the annual rate of credit growth grew strongly for the period of 2008–2012, then declined sharply due to heavy boom of bad debts and only started to stabilize from 2017 (Dang, 2019a, 2019b). In response to the threat of recurring bad debts, the SBV has proposed comprehensive reforms of the banking sector, in which they have also emphasized the goal of safety and efficiency through encouraging operational shifts toward non-lending banking activities. Despite the unclear effects or even the proven disadvantages (Batten & Vo, 2016; Vo, 2017), in general, well-diversified banks are highly valued by the SBV and therefore assigned with higher credit growth ceiling. Therefore, an in-depth study is needed to clarify the impact of bank diversification, particularly in relation to the transmission of monetary policy via the bank lending channel to provide insightful perspectives for monetary authorities.

Our study has several contributions to the extant strand of literature. We make the first attempt to shed light on the effects of bank diversification on monetary policy transmission via the bank lending channel, thereby providing new findings enriching the understanding of bank-level factors that control this key channel. The heterogeneous effects across different bank groups are also taken care to yield better diagnosis, which has often been overlooked in most studies following one-single-modifying-factor setup. Additionally, unlike previous studies that have primarily explored developed economies or designed a framework with only one single monetary policy indicator, this study takes a step further by examining a diverse set of monetary tools coordinated simultaneously in an emerging market that offers a suitable environment for empirical investigation.

The findings denote that the bank lending channel of monetary policy transmission exists in Vietnam, across all measures and tools applied to gauge monetary policy stance. Furthermore, our main finding is that bank diversification significantly drives the bank lending channel in different ways, depending on the monetary policy tools examined. Specifically, designing the framework based on lending rates and policy rates (refinance rates and rediscount rates), we have strong evidence to indicate that the transmission of the bank lending channel becomes weaker as banks get more involved in non-traditional activities. In contrast, we find that bank diversification tends to promote the effectiveness of monetary policy transmission to stimulate higher loan growth if the SBV uses FER, but we obtain no significant link in the case of OMO. Further analysis after creating subsamples based on bank size, capital and liquidity provides more insights into these findings: the weakening effect with the interest rate tools is almost observed in all bank groups, while the strengthening effect with the foreign exchange reserves tool works only for well-capitalized banks.

2. Literature review

A growing stream of research on monetary policy transmission through the bank lending channel focuses on the bank-specific characteristics as moderators. Major concerns belong to the balance sheet strength of banks, such as size, capitalization and liquidity. Kishan and Opiela (2006) show that banks' responses to monetary shocks tend to be amplified at smaller banks which have less access to funding sources compared to larger banks. A similar functioning is observed for other weaker banks as well, i.e., banks have low liquidity positions and small capital buffers (Altunbaş et al., 2002; Gambacorta, 2005; Juurikkala et al., 2011; Kishan & Opiela, 2006). The consequence for these banks is that they find it more challenging and costly to approach external finance. However, existing literature also shows inconsistencies in the findings. For instance, exploring the European market, some authors display that bank capital does not affect the bank lending channel during the periods of monetary restrictions (Gambacorta & Marques-Ibanez, 2011; Jimborean,

2009; Sáiz et al., 2018), and bank size is generally not crucial for the way a bank modifies its lending to interest rate variations (Ehrmann et al., 2003).

Recently, in the flows of business innovation, deregulation and even financial crisis, the bank lending channel exhibits some additional aspects that need to be clarified. In this vein, several scholars have approached new moderators, such as securitization activities (Altunbaş et al., 2009; Gambacorta & Marques-Ibanez, 2011), off-balance sheet items (Perera et al., 2014), bank risk-taking and financial crisis (Altunbaş et al., 2010; Chen et al., 2017), thereby drawing a “bigger picture” for the present topic being studied. According to a research strand relatively close to ours, prior scholars have analyzed banks’ responses to monetary policy adjustments in relation to the level of competition in the banking market. Amidu and Wolfe (2013) and Yang and Shao (2016) find that increased market competition erodes the monetary policy transmission through the bank lending channel. Increased competition creates incentives for bank diversification (Căpraru et al., n.d.). Berger and Hannan (1989) and Hidayat et al. (2012) declare that the greater market power, or the less competitive market, undermine the banks’ need to move into non-traditional banking activities, especially in the context that these business lines are associated with high financial risks.

The segment of research on bank diversification has been increasingly growing and well positioned in the existing banking documents. In general, most studies have made attempts to reveal the benefits or costs for banks when shifting into non-traditional banking activities (the careful reviews are conducted by Abedifar et al., 2018; Ahamed, 2017; Meslier et al., 2014; Williams, 2016). Fundamentally, DeYoung and Roland (2001) theorize that lending-based banks desire long-term relationships with their customers, leading to higher switching costs. This mechanism could shape the lending behavior of banks, e.g., in the context that there are changes in interest rate framework, banks having durable relationships with lending customers could take their advantage to actively manage the credit portfolio and thus make it less volatile. Another important detail that DeYoung and Roland (2001) also point out is that regulators do not require banks to hold capital against the non-interest business lines, which gives banks reason to maintain a large financial leverage. As a result, these banks are assessed by the market to be more risky and therefore have difficulty to access funding (Jayaratne & Morgan, 2000). It is more pronounced when central banks tighten monetary policy, commercial banks with large financial leverage are forced to cut lending significantly since such a policy demonstrates the potential to reduce bank profits, and further the balance of risky assets versus equity in the future (Bolton & Freixas, 2006). In addition to interest income, monetary policy possibly affects non-interest income of banks through securities and foreign exchange trading. With the open market and foreign exchange reserves, central banks’ actions on the one hand are to govern monetary policy and on the other hand are considered as signaling of financial asset prices to banks—the major participants involved in purchase and sale transactions with central banks (Christensen & Rudebusch, 2016). It is worth noting that non-interest-based banks tend to dominate such transactions as they are more interested in trading securities or foreign exchange.

Regardless of the potential mechanisms by which bank diversification affects the bank lending channel, empirical evidence for such relationship has not been shown so far. To the best of our knowledge, we are only aware of the related work of Mamatzakis and Bermpei (2016) which considers the modifying role of asset diversification in the nexus between unconventional monetary policy and bank performance. The authors claim that banks with high level of asset diversification tend to be less affected by the transmission of unconventional monetary policy, measured by assets and excess reserves of the central bank, into bank profitability, since these banks mainly concentrate on non-lending assets. Complementing their work, we investigate the bank lending channel instead of “the bank performance channel” in relation to bank diversification captured by income dimension, using various monetary policy tools to construct regression indicators. Based on the above mentioned arguments, how the bank lending channel varies with the level of bank diversification is ambiguous. Thus, in this

study, we ask if bank diversification boosts or diminishes the monetary policy transmission via the bank lending channel.

3. Research methodology

3.1. Data

Bank-level data are obtained from Vietnamese commercial banks for the period of 2008–2018. This period provides a favorable context for research related to (1) significant changes in business operations of banks in terms of both lending and non-lending segments, and (2) regular adjustments in monetary policy by the SBV. We access the annual financial reports published on each bank's website and manually collect the required data. Our filtering requires the elimination of some banks which are acquired or under special control by the SBV due to distinctive operating regimes. The same manner applies to banks that do not publish enough items of interest. Our final sample has 320 observations from 30 banks, forming an unbalanced panel.

3.2. Variables

3.2.1. Bank diversification

To measure the level of bank diversification in this study we access the bank's income portfolio. Such an approach is widely adopted in most existing empirical studies (DeYoung & Roland, 2001; Laeven & Levine, 2007). To this end, we first split the bank's operating income into two groups: interest income and non-interest income. The former mainly contains income from traditional lending activities of banks; while the latter covers net income from service fees/commissions, foreign exchange and securities trading, and other operating income items. We build the first measure for bank diversification accordingly by the ratio of net non-interest income to total operating income, in accordance with many previous studies (e.g., De Jonghe et al., 2015; Demirgüç-Kunt & Huizinga, 2010; DeYoung & Rice, 2004; Hidayat et al., 2012; Köhler, 2014; Stiroh & Rumble, 2006; Williams, 2016 among many others). A higher ratio suggests greater involvement in non-traditional activities and from the perspective of banks, they are diversifying their business lines more.

For the purpose of verifying the findings' sensitivity, we continue with two additional proxies of bank diversification. Following Esho et al. (2005), Elsas et al. (2010), and Doan et al. (2018), we formulate the HHIdiver variable based on the Hirschmann–Herfindhal index, thus

$$\text{HHIdiver} = 1 - \left[(\text{non-interestincomeshare})^2 + (\text{interestincomeshare})^2 \right] \quad (1)$$

Following Laeven and Levine (2007), Guerry and Wallmeier (2017), and Kamani (2019), we define the LLdiver variable by the equation as follows:

$$\text{LLdiver} = 1 - |(\text{interestincomeshare}) - (\text{non-interestincomeshare})| \quad (2)$$

Larger values of HHIdiver and LLdiver indicate higher levels of bank diversification, or more exposures of banks to non-lending activities.

3.2.2. Monetary policy indicators

Previous studies had proposed a number of different indicators to gauge monetary policy stance, most commonly based on short-term interest rates. Accordingly, they compute the change in money market rates (Altunbaş et al., 2009, 2010; Ehrmann et al., 2003; Olivero et al., 2011; Sáiz et al., 2018), treasury bill rates (Khan et al., 2016) or lending rates (Chen et al., 2017; Yang & Shao, 2016), to construct monetary policy indicators, flexibly based on the availability of data in the target markets. Following these frameworks with no consensus on the best indicator, we use short-term lending rates to gauge overall monetary policy stance in Vietnam. The application of this type

of rate is relevant to the context of Vietnam, where in practice, the SBV considers lending rates to be an important criterion to evaluate the implementation of monetary policy. Hence, our first monetary policy indicator is calculated by the change in the short-term lending rates (Δr_{lend}); the negative (or positive) value of this indicator implies an expansionary (or contractionary) monetary policy and thereby we expect it to be negatively correlated with loan growth. We sourced data of lending rates from the International Financial Statistics (IFS) of International Monetary Fund (IMF).

Emerging markets often combine multiple policy tools simultaneously to achieve desired monetary goals (Chen et al., 2017; Olivero et al., 2011). Moreover, the transmission effectiveness could vary among different monetary policy tools (Varlik & Berument, 2017). Elaborating these arguments in the present study, we examine the specific impacts of various monetary policy tools on bank lending in Vietnam, excluding tools that have remained fixed for long, such as required reserves and base interest rate. We focus on other important factors which have been regularly modified by the SBV, including policy interest rates, OMO and FER.

The SBV, as the lender of last resort, could set policy rates, including rediscount rate and refinance rate, in providing loans to the banking system. We accordingly design two monetary policy variables by taking changes in rediscount rate (Δr_{redis}) and refinance rate (Δr_{refi}), which are all regulated and published by the SBV. The negative (positive) values of these variables also illustrate that the SBV pursues an expansionary (contractionary) monetary policy; we thus expect them to negatively impact bank lending. Regarding OMO, the SBV could trade securities with financial institutions to alter money supply in the economy. To capture this tool, we follow Brei et al. (2013) by measuring the first-order difference of central banks' claims to domestic non-financial sectors as a share of gross domestic products (GDP), forming the ΔOM variable. We obtain the required data for the ΔOM variable from Global Financial Development Database of World Bank. Likewise, the SBV might also intervene in the domestic liquidity market through their FER. Following Chen et al. (2017) thus

$$\Delta FX = \Delta \left(\frac{\text{reserves}}{\text{gross domestic products}} \right) \times \frac{\sigma(\text{reserves})}{\sigma(\text{reserves}) + \sigma(\text{effective exchange rates})} \quad (3)$$

where the first part $\Delta(\text{reserves}/\text{gross domestic products})$ illustrates that the SBV enters into purchase or sale transactions of foreign exchange, while the second part including the standard deviations of monthly foreign reserves and effective exchange rates contains information about exchange rate regime over time. All data sources needed for the ΔFX calculations are obtained from the IFS. In contrast to interest rate tools, the larger values of ΔOM and ΔFX might be interpreted as monetary policy loosening (Brei et al., 2013; Chen et al., 2017); we thus expect a positive correlation between these indicators and bank lending.

3.2.3. Other variables

Extensive existing literature has theoretically and empirically analyzed the determinants of bank lending behavior. Gambacorta and Mistrulli (2004) and Kořak et al. (2015) indicate that bank capital equity may boost lending activities as sufficiently large capital buffers help banks cope with financial shocks. Suggesting a competing hypothesis, other authors argue that well-capitalized banks are more cautious with their investment decisions and thereby tend to slow down the speed of credit expansion (Goodhart, 2013; VanHoose, 2007), which is considered potentially risky (Fahlenbrach et al., 2017; Foos et al., 2010). Investigating another core factor (liquidity position), Cornett et al. (2011) note that banks after reasonably hoarding liquidity are more likely to invest in more loans, which are more profitable, following Roulet (2018) as well. In addition, bank size also plays an important role in driving bank lending. According to the scale economies hypothesis, large banks are expected to expand lending more than small banks (Boyd & Runkle, 1993); however, if taking good advantage of comparative advantages such as better soft information, small banks might outperform their larger counterparts (Stein, 2002; Toh, 2019). Taken together, based on the arguments from literature, we control for the relevant bank-specific characteristics that could potentially affect bank lending,

including bank size computed by the natural logarithm of bank assets, capitalization as calculated by the ratio of equity to total bank assets, and liquidity as measured by the ratio of liquid assets (cash and interbank deposits) to total bank assets.

Along with bank-specific characteristics, the macroeconomic conditions also contribute to explain lending and investment behavior of banks. Thus, we continue to allow for macroeconomic factors (the annual growth rate of GDP and the annual rate of inflation) to serve as control variables. A number of studies have analyzed the banks' loan allocation structure in relation to the business cycle of the economy, most leading to the conclusion about the positive correlation between bank lending and economic growth (Bertay et al., 2015; Davydov et al., 2018; Zins & Weill, 2018). Meanwhile, one could believe that an economy with low inflation rate is not more likely to support enterprises in production and business, which creates barriers for banks in expanding credit operations (Louhichi & Boujelbene, 2017).

3.3. Empirical model specification and estimation technique

To address the persistence in bank lending behavior and also be consistent with the prior research on the transmission of monetary policy via the bank lending channel, we utilize the empirical model of Ehrmann et al. (2003), which has widely been used in subsequent studies (e.g., Chen et al., 2017; Gambacorta, 2005; Gambacorta & Marques-Ibanez, 2011; Khan et al., 2016; Yang & Shao, 2016). We specify the dynamic model specification as follows:

$$\begin{aligned} \Delta \text{Loan}_{i,t} = & \alpha_0 + \alpha_1 \times \Delta \text{Loan}_{i,t-1} + \alpha_2 \times \Delta \text{MPI}_t + \alpha_3 \times \text{IncomeDiver}_{i,t} \\ & + \alpha_4 \times \Delta \text{MPI}_t \times \text{IncomeDiver}_{i,t} + \alpha_5 \times \text{Control}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (4)$$

where subscripts i and t denote individual banks and time dimension, respectively. ΔLoan captures bank lending, calculated by the annual growth rate of gross loans. ΔMPI includes separate variables for monetary policy stance based on (1) short-term lending rates (Δr_{lend}), (2) refinance rates (Δr_{refi}), (3) rediscount rates (Δr_{redis}), (4) open market operations (ΔOM), and (5) foreign exchange reserves (ΔFX). IncomeDiver represents alternative bank diversification measures, namely, NIshare , HHIdiver and LLdiver . $\Delta \text{MPI} \times \text{IncomeDiver}$ is to capture the different impacts of bank diversification levels on the monetary policy transmission via the bank lending channel. Given our hypothesis that bank diversification might mitigate/boost the effectiveness of the bank lending channel, we expect the coefficients on the interaction terms to have opposite/same signs compared to those of monetary policy indicators. Control comprises a set of bank-specific and macroeconomic factors as discussed above, while ε is the error term. The lag of dependent variable is inserted into the right-hand side of the equation to adopt the dynamic nature of bank lending behavior.

To estimate our model, we use the system GMM estimator (Arellano & Bover, 1995; Blundell & Bond, 1998). This estimator is suited to deal with endogeneity issues in the dynamic panel model. Many previous related studies have widely employed the application of the GMM estimator in the dynamic panel model (e.g., Chen et al., 2017; Mamatzakis & Bermpei, 2016; de Moraes & de Mendonça, 2019; Yang & Shao, 2016). We follow the two-step estimation procedure to produce more efficient results than the one-step method, and also control the "too many instruments" problem by limiting the lags of instruments (Roodman, 2009). We have to ensure that the instruments do not outnumber individual units in the panel. We then carry out two diagnostic tests to confirm the validity of our designed regression framework: the Hansen test is to check the instruments' validity and the Arellano-Bond test is to examine the absence of the second-order autocorrelation in residuals.

4. Results

4.1. Descriptive statistics

Table 1 presents the variables' descriptive statistics and definitions. We winsorized our constructed variables at the interval of 2.5% and 97.5% to neutralize the effects of extreme outliers. Some key

Table 1. Summary statistics of indicators

Variables	Observations	Mean	Standard deviation	Min	Max
Δ Loan	320	27.27	25.89	-12.20	107.17
Δr_{lend}	320	-0.32	3.08	-5.70	4.60
Δr_{refi}	320	-0.03	3.03	-5.00	6.00
Δr_{redis}	320	0.05	3.67	-6.00	6.50
Δ OM	320	-0.09	0.81	-1.09	1.57
Δ FX	320	-0.25	0.52	-1.25	0.28
NIIshare	320	19.59	11.56	2.73	40.04
HHIdiver	320	0.27	0.13	0.03	0.46
LLdiver	320	0.36	0.21	0.03	0.72
Size	320	18.21	1.08	16.63	19.92
Capital	320	9.64	3.73	5.45	16.91
Liquidity	320	16.03	8.06	6.52	30.51
GDP	320	6.20	0.67	5.24	7.14
Inflation	320	8.13	6.55	0.88	23.12

The table presents the variables' descriptive statistics. Δ Loan denotes bank lending activities, calculated by the growth rate of gross loans. Δr_{lend} , Δr_{refi} , and Δr_{redis} are the annual changes of lending rates, refinance rates and rediscount rates, respectively. Δ OM and Δ FX capture the interventions of the SBV through open market operations and foreign exchange reserves, respectively. NIIshare, HHIdiver, and LLdiver are alternative measures for bank diversification. Size represents bank size, computed by the natural logarithm of bank assets (in millions of dong). Capital denotes the ratio of equity over bank assets. Liquidity is the ratio of liquid assets (cash and interbank deposits) to total assets. GDP is the annual growth rate of GDP. Inflation is the annual rate of inflation. All variables are expressed in percentage, except for HHIdiver, LLdiver, and Size.

indicators offer preliminary background about the market we are investigating. Annual loan growth of the banking industry in the period under study is high, reaching 27.27% on average; at the same time, its variation is large with the standard deviation of 25.89 percentage points. The level of bank diversification is quite low, as the mean of non-interest income share is less than 20%. Regarding monetary policy, the large values of standard deviation and the wide ranges of indicators (from minimum to maximum) imply significant interventions of the SBV in the market.

We also report the correlations for each pair of variables in Table 2. The correlation between variables that capture the same aspects of monetary policy stance or bank diversification are high. This observation is plausible since the measures are alternative and thus do not enter the same model specification together. In addition, we have evidence to believe that SBV has coordinated various policy tools simultaneously to achieve monetary targets in recent years. While most of the other correlations are low, this supports the assumption of non-existent severe multicollinearity, the inflation variable shows relatively high correlations with monetary policy indicators. To be prudent, we therefore exclude the inflation variable from the regression models.

4.2. Baseline estimation results

In this subsection, we present the main estimation results for the modifying role of bank diversification in the transmission of monetary policy through the bank lending channel, using the whole panel. Based on three proposed diversification proxies, we elaborate multiple groups of results that ensure the robustness of our findings, presented in Tables 3–5. The reliability of our designed regression framework is confirmed, shown by the results of the diagnostic tests of Hansen and AR (1)/AR(2). Accordingly, many interesting results have appeared.

Table 3 presents the results obtained by using non-interest income share as a proxy for bank diversification. Results show that all regressions confirm the presence of the bank lending channel

Table 2. Correlation coefficients matrix

Variables	Δ Loan	Δr_{lend}	Δr_{refi}	Δr_{redis}	Δ OM	Δ FX	NII share	HHI diver	LL diver	Size	Capital	Liquidity	GDP	Inflation
Δ Loan	1													
Δr_{lend}	-0.14	1												
Δr_{refi}	-0.11	0.89	1											
Δr_{redis}	-0.13	0.93	0.97	1										
Δ OM	0.40	-0.19	-0.13	-0.17	1									
Δ FX	0.38	0.22	0.20	0.21	0.61	1								
NIIshare	0.03	-0.06	-0.07	-0.06	0.16	0.12	1							
HHIdiver	0.05	-0.06	-0.06	-0.05	0.21	0.12	0.87	1						
LLdiver	0.06	-0.07	-0.06	-0.06	0.20	0.13	0.90	0.98	1					
Size	-0.18	-0.01	-0.04	-0.04	-0.07	-0.31	0.12	0.18	0.14	1				
Capital	0.02	0.02	0.02	0.03	-0.01	0.24	-0.01	-0.04	-0.01	-0.35	1			
Liquidity	0.27	0.22	0.26	0.22	0.14	0.50	-0.04	-0.01	0.01	-0.31	0.18	1		
GDP	-0.12	0.44	0.40	0.38	0.17	-0.22	-0.01	0.04	0.02	0.26	-0.27	-0.18	1	
Inflation	-0.04	0.58	0.60	0.60	-0.34	0.43	-0.04	-0.07	-0.05	-0.26	0.27	0.46	-0.37	1

Table 3. Estimation results for the bank lending function (with *NIIshare* as the bank diversification measure)

Dependent variable: the annual growth rate of bank loans

	(1) Δr_{lend}	(2) Δr_{refi}	(3) Δr_{redis}	(4) ΔOM	(5) ΔFX
Lagged dependent variable	0.540*** (0.045)	0.079** (0.035)	0.098*** (0.034)	0.271*** (0.047)	-0.151** (0.077)
ΔMPI	-6.520*** (0.759)	-2.954*** (0.942)	-2.682*** (0.880)	5.821** (2.763)	9.711*** (3.681)
<i>NIIshare</i>	0.516*** (0.055)	0.336*** (0.055)	0.260*** (0.057)	0.171** (0.070)	0.120** (0.058)
$\Delta MPI \times NIIshare$	0.148*** (0.034)	0.132*** (0.044)	0.134*** (0.041)	0.039 (0.112)	0.305*** (0.111)
Size	-3.362*** (0.984)	-6.674*** (1.701)	-2.876*** (0.846)	-6.383*** (1.072)	-0.454 (1.400)
Capital	0.110 (0.400)	-1.110** (0.509)	0.089 (0.488)	-1.794*** (0.473)	0.156 (0.351)
Liquidity	0.305*** (0.074)	0.074 (0.097)	0.091 (0.074)	-0.323** (0.135)	0.175* (0.093)
GDP	5.946*** (1.592)	0.032 (1.688)	0.560 (1.764)	-9.544*** (1.508)	0.573 (2.098)
Number of observations	289	289	289	289	289
Number of banks	30	30	30	30	30
Number of instruments	24	24	24	24	23
AR(1) (p-value)	0.000	0.004	0.002	0.000	0.035
AR(2) (p-value)	0.708	0.103	0.101	0.615	0.119
Hansen test (p-value)	0.140	0.168	0.172	0.142	0.110

The table reports the estimation results for the dynamic panel model of bank lending, using the two-step system GMM estimator. Each separate monetary policy indicator (ΔMPI) is placed at the top of column. Hansen test is to check the instruments' validity; AR(1) and AR(2) tests are to examine the first- and second-order autocorrelation in residuals, respectively. Standard errors are exhibited in parentheses. ***, ** and * stand for the 1%, 5% and 10% significance level, respectively.

in Vietnam, regardless of monetary policy indicators tested. More precisely, the regression coefficients on stand-alone indicators designed by lending rates, rediscount rates and refinance rates, display significant negative signs at the 1% level, while those on OMO and FER are significant and positive at least 5% level. Both lower interest rates and more money injection amid expansionary monetary policy increase the credit supply of banks.

For the interaction terms of main interest between bank diversification measure and monetary policy indicators, we find the significant modifying role of income pattern. In column 1, the regression coefficient of interaction term is positive and statistically significant, which is in contrast compared to that of stand-alone monetary indicator. This finding suggests that banks with more exposure to non-traditional activities tend to be less affected by monetary policy when expanding their lending. In terms of economic significance, we could infer that an increase of one percentage point in non-interest income share tends to attenuate the impacts of a decrease of one percentage point in lending rates on loan growth by approximately 0.148 percentage points. In columns 2 and

Table 4. Estimation results for the bank lending function (with *HHIdiver* as the bank diversification measure)

Dependent variable: the annual growth rate of bank loans					
	(1) Δr_{lend}	(2) Δr_{refi}	(3) Δr_{redis}	(4) ΔOM	(5) ΔFX
Lagged dependent variable	0.533***	0.051	0.501***	0.254***	0.124***
	(0.050)	(0.041)	(0.063)	(0.046)	(0.047)
ΔMPI	-10.134***	-1.137***	-7.002***	7.865***	7.759*
	(1.288)	(0.395)	(1.786)	(1.809)	(4.579)
<i>HHIdiver</i>	57.807***	38.667***	36.438***	31.700***	31.068***
	(5.331)	(2.412)	(6.637)	(3.991)	(4.744)
$\Delta MPI \times HHIdiver$	23.046***	-0.451	21.652***	-2.884	21.027*
	(4.233)	(1.354)	(6.196)	(5.217)	(12.397)
Size	-3.944***	-7.234***	-3.719**	-7.361***	-14.645***
	(1.112)	(1.245)	(1.849)	(1.663)	(2.272)
Capital	0.145	-0.826*	0.380	-2.378***	-3.810***
	(0.418)	(0.429)	(0.699)	(0.568)	(0.635)
Liquidity	0.247***	0.360***	-0.376	-0.054	-0.698***
	(0.074)	(0.081)	(0.276)	(0.096)	(0.124)
GDP	6.902***	1.865	2.906*	-12.802***	-12.265***
	(1.770)	(1.739)	(1.685)	(1.484)	(1.876)
Number of observations	289	289	289	289	289
Number of banks	30	30	30	30	30
Number of instruments	24	24	23	25	25
AR(1) (p-value)	0.003	0.002	0.001	0.000	0.001
AR(2) (p-value)	0.223	0.537	0.326	0.987	0.449
Hansen test (p-value)	0.238	0.110	0.110	0.117	0.116

The table reports the estimation results for the dynamic panel model of bank lending, using the two-step system GMM estimator. Each separate monetary policy indicator (ΔMPI) is placed at the top of column. See subsection 3.1 and Table 1 for specific details of all regression variables. Hansen test is to check the instruments' validity; AR(1) and AR(2) tests are to examine the first- and second-order autocorrelation in residuals, respectively. Standard errors are exhibited in parentheses. ***, ** and * stand for the 1%, 5% and 10% significance level, respectively.

3, monetary policy tools including rediscount rate and refinance rate in this case provide additional evidence in favor of the weakening effect of bank diversification. Both statistical and economic significance remain reasonable. Thus, these findings lend support to the hypothesis that the effectiveness of monetary policy transmission through the bank lending channel is mitigated at more diversified banks, in accordance with the findings of Mamatzakis and Bermpei (2016).

Next, we see that the indirect effect of bank diversification changes while using two monetary tools that alter money supply, including OMO and FER. The interaction term is statistically insignificant in column 4; whereas in column 5, we find the regression coefficient on interaction term to be positive and statistically significant at the 1% level. These findings reveal that bank diversification boosts the bank lending channel when the SBV uses foreign exchange reserves to cause the impact on the monetary market. Based on the magnitude of regression coefficient, we could suggest that a one percentage point increase in non-interest income share is likely to elevate the impacts of one percentage point increase in ΔFX on loan growth by almost 0.305 percentage points.

Table 5. Estimation results for the bank lending function (with *LLdiver* as the bank diversification measure)

Dependent variable: the annual growth rate of bank loans

	(1) Δr_{lend}	(2) Δr_{refi}	(3) Δr_{redis}	(4) ΔOM	(5) ΔFX
Lagged dependent variable	0.573***	0.050	0.524***	0.218***	-0.096
	(0.053)	(0.041)	(0.073)	(0.032)	(0.078)
ΔMPI	-9.833***	-1.050***	-6.779***	6.916***	12.338***
	(1.219)	(0.370)	(1.491)	(1.415)	(3.952)
<i>LLdiver</i>	33.867***	24.104***	20.620***	23.314***	13.280***
	(2.950)	(1.803)	(3.911)	(2.668)	(2.931)
$\Delta MPI \times LLdiver$	16.421***	-0.467	15.195***	-1.820	13.912**
	(3.009)	(0.942)	(4.080)	(2.685)	(6.506)
Size	-3.123**	-6.847***	-7.085***	-13.266***	-6.418***
	(1.228)	(1.224)	(2.247)	(1.697)	(1.717)
Capital	0.406	-0.804*	-0.690	-3.847***	-0.791
	(0.461)	(0.445)	(0.656)	(0.600)	(0.522)
Liquidity	0.231***	0.355***	-0.401	-0.082	-0.404**
	(0.072)	(0.080)	(0.269)	(0.074)	(0.162)
GDP	7.664***	1.884	2.758**	-13.425***	-1.701
	(1.686)	(1.761)	(1.206)	(1.262)	(2.221)
Number of observations	289	289	289	289	289
Number of banks	30	30	30	30	30
Number of instruments	24	24	23	25	23
AR(1) (p-value)	0.000	0.002	0.001	0.000	0.011
AR(2) (p-value)	0.152	0.614	0.191	0.773	0.262
Hansen test (p-value)	0.333	0.110	0.111	0.173	0.207

The table reports the estimation results for the dynamic panel model of bank lending, using the two-step system GMM estimator. Each separate monetary policy indicator (ΔMPI) is placed at the top of column. See subsection 3.1 and Table 1 for specific details of all regression variables. Hansen test is to check the instruments' validity; AR(1) and AR(2) tests are to examine the first- and second-order autocorrelation in residuals, respectively. Standard errors are exhibited in parentheses. ***, ** and * stand for the 1%, 5% and 10% significance level, respectively.

Tables 4 and Tables 5 demonstrate the results estimated by *HHdiver* and *LLdiver* proxies as bank diversification, respectively. We again have evidence in favor of the indirect impacts of income pattern on the bank lending channel. In column 1 (Tables 4 and Tables 5), we observe strong economic significance since an increase of one standard deviation in income diversification may mitigate the effects of a decrease of one percentage point in lending rates on loan growth by about 3.00 percentage points (23.046×0.13) or 3.45 percentage points (16.421×0.21), depending on the alternative measures of *HHdiver* or *LLdiver* applied, respectively. Another example, through column 5 in Table 5, we could also confirm our earlier conclusion about the strengthening role of bank diversification proxied by *LLdiver* index. However, the findings' statistical significance almost vanishes when employing the other monetary policy indicators (see columns 2 and 5 in Table 4 and columns 2 in Table 5). A possible explanation is that the interaction of monetary policy indicators and diversification indices create new variables that are highly correlated with current variables (not reported). These high correlations lead to a possible decrease in the statistical significance level of estimates.

Table 6. Estimation results for the bank lending function of two subsamples (large and small banks)

	Panel A: Large banks					Panel B: Small banks				
	(1) Δr_{lend}	(2) Δr_{refi}	(3) Δr_{redis}	(4) ΔOM	(5) ΔFX	(6) Δr_{lend}	(7) Δr_{refi}	(8) Δr_{redis}	(9) ΔOM	(10) ΔFX
ΔMPI	-2.288*** (0.472)	-1.863*** (0.465)	-1.405*** (0.256)	1.849 (1.973)	1.476 (4.424)	-5.805*** (0.487)	-3.907*** (0.417)	-4.167*** (0.580)	7.012*** (1.066)	24.786** (10.405)
NIshare	0.139* (0.073)	0.233*** (0.094)	0.302*** (0.097)	0.084 (0.065)	-0.075 (0.065)	0.611*** (0.076)	0.484*** (0.061)	0.495*** (0.065)	0.496*** (0.066)	0.541*** (0.108)
$\Delta MPI \times NII$ share	0.055*** (0.019)	0.056*** (0.016)	0.027*** (0.010)	0.184** (0.081)	0.559*** (0.135)	0.118*** (0.028)	0.035 (0.016)	0.078** (0.034)	0.043 (0.038)	-0.121 (0.246)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	155	155	155	155	155	134	134	134	134	134
AR(1) (p-value)	0.035	0.019	0.039	0.041	0.022	0.019	0.008	0.017	0.024	0.048
AR(2) (p-value)	0.172	0.325	0.216	0.120	0.176	0.407	0.705	0.654	0.730	0.914
Hansen test (p-value)	0.138	0.336	0.181	0.328	0.338	0.497	0.360	0.573	0.473	0.468

The table reports the estimation results for the dynamic panel model of bank lending in two bank groups, large and small banks, using the two-step system GMM estimator. Panel A (columns 1–5) deals with results of large banks (its size is larger than median value), while panel B (columns 6–10) exhibits those of small banks (its size is smaller than or equal to median value). Each separate monetary policy indicator (ΔMPI) is placed at the top of column. The measure of bank diversification is *NIshare*. See subsection 3.1 and Table 1 for specific details of all regression variables. Hansen test is to check the instruments' validity; AR(1) and AR(2) tests are to examine the first- and second-order autocorrelation in residuals, respectively. Standard errors are exhibited in parentheses. ***, ** and * stand for the 1%, 5% and 10% significance level, respectively.

Table 7. Estimation results for the bank lending channel of two subsamples (banks with low and high capitalization level)

Dependent variable: the annual growth rate of bank loans	Panel C: Banks with high capitalization level					Panel D: Banks with low capitalization level				
	(1) Δr_{lend}	(2) Δr_{refi}	(3) Δr_{redis}	(4) ΔOM	(5) ΔFX	(6) Δr_{lend}	(7) Δr_{refi}	(8) Δr_{redis}	(9) ΔOM	(10) ΔFX
ΔMPI	-3.994*** (0.368)	-3.985*** (0.534)	-3.659*** (0.519)	5.466*** (1.297)	12.636*** (1.243)	-2.890*** (0.591)	-1.897*** (0.702)	-4.287*** (1.048)	6.128*** (1.799)	9.659* (5.568)
NIshare	0.479*** (0.055)	0.565*** (0.060)	0.520*** (0.051)	0.482*** (0.072)	0.295*** (0.047)	0.295*** (0.056)	0.355*** (0.093)	0.267*** (0.064)	0.227*** (0.063)	0.042 (0.088)
$\Delta MPI \times NIshare$	0.058* (0.030)	0.070* (0.036)	0.080** (0.037)	0.218*** (0.049)	0.449*** (0.083)	0.058** (0.023)	0.090*** (0.024)	0.164*** (0.047)	-0.025 (0.061)	0.148 (0.160)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	137	137	137	137	137	152	152	152	152	152
AR(1) (p-value)	0.024	0.027	0.029	0.014	0.033	0.034	0.031	0.047	0.023	0.042
AR(2) (p-value)	0.351	0.777	0.312	0.902	0.758	0.977	0.979	0.742	0.950	0.788
Hansen test (p-value)	0.241	0.360	0.207	0.410	0.252	0.180	0.122	0.138	0.148	0.164

The table reports the estimation results for the dynamic panel model of bank lending in two bank groups, banks with low and high capitalization levels, using the two-step system GMM estimator. Panel C (columns 1–5) deals with results of banks with high capitalization level (its equity ratio is larger than median value), while panel D (columns 6–10) exhibits those of banks with low capitalization level (its equity ratio is smaller than or equal to median value). Each separate monetary policy indicator (ΔMPI) is placed at the top of column. The measure of bank diversification is *NIshare*. See subsection 3.1 and Table 1 for specific details of all regression variables. Hansen test is to check the instruments' validity; AR(1) and AR(2) tests are to examine the first- and second-order autocorrelation in residuals, respectively. Standard errors are exhibited in parentheses. ***, ** and * stand for the 1%, 5% and 10% significance level, respectively.

Table 8. Estimation results for the bank lending channel of two subsamples (banks with low and high liquidity position)

Dependent variable: the annual growth rate of bank loans	Panel E: Banks with high liquidity position					Panel F: Banks with low liquidity position				
	(1) Δr_{lend}	(2) Δr_{refi}	(3) Δr_{redis}	(4) ΔOM	(5) ΔFX	(6) Δr_{lend}	(7) Δr_{refi}	(8) Δr_{redis}	(9) ΔOM	(10) ΔFX
ΔMPI	-3.985*** (0.415)	-2.928*** (0.345)	-5.089*** (0.612)	7.376*** (1.041)	14.895*** (1.962)	-2.897*** (0.544)	-2.285*** (0.762)	-1.108*** (0.379)	3.723*** (1.455)	4.810 (10.652)
NIishare	0.650*** (0.071)	0.580*** (0.059)	0.640*** (0.068)	0.475*** (0.083)	0.438*** (0.088)	0.071*** (0.031)	0.043 (0.046)	0.143** (0.062)	-0.016 (0.051)	-0.270* (0.143)
$\Delta MPI \times NI$ ishare	0.053*** (0.020)	0.039*** (0.018)	0.160*** (0.037)	0.075 (0.046)	0.105 (0.084)	0.091*** (0.019)	0.094*** (0.030)	0.065*** (0.019)	-0.008 (0.053)	-0.003 (0.390)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	137	137	137	137	137	152	152	152	152	152
AR(1) (p-value)	0.007	0.036	0.041	0.007	0.022	0.036	0.048	0.017	0.039	0.058
AR(2) (p-value)	0.240	0.229	0.746	0.382	0.410	0.105	0.107	0.139	0.178	0.160
Hansen test (p-value)	0.188	0.173	0.187	0.269	0.252	0.286	0.232	0.591	0.141	0.165

The table reports the estimation results for the dynamic panel model of bank lending in two bank groups, banks with low and high liquidity position, using the two-step system GMM estimator. Panel E (columns 1–5) deals with results of banks with high liquidity position (its liquidity ratio is larger than median value), while panel F (columns 6–10) exhibits those of banks with low liquidity position (its liquidity ratio is smaller than or equal to median value). Each separate monetary policy indicator (ΔMPI) is placed at the top of column. The measure of bank diversification is NI ishare. See subsection 3.1 and Table 1 for specific details of all regression variables. Hansen test is to check the instruments' validity, AR(1) and AR(2) tests are to examine the first- and second-order autocorrelation in residuals, respectively. Standard errors are exhibited in parentheses. ***, ** and * stand for the 1%, 5% and 10% significance level, respectively.

Overall, our all-bank sample indicates that the monetary policy transmission through the bank lending channel varies with the bank diversification characteristic. In particular, more diversified banks seem to be less affected in lending activities when the SBV alters policy interest rates. However, when the SBV implements another monetary policy tool—interventions in domestic liquidity by foreign exchange reserves, perhaps the banks with higher share of non-interest income are more proactively involved in buying/selling foreign exchange with the SBV. As a result, these banks gain more available funds to grow loans. It should be highlighted that foreign exchange transactions produce an important source of revenue for Vietnamese banks in recent years among non-interest channels (Batten & Vo, 2016). This potential mechanism justifies the finding that the transmission effectiveness of monetary policy using foreign exchange reserves is amplified as banks diversify their activities into non-lending segments.

For the control variables, we observe positive and significant coefficients for all bank diversification measures, suggesting that banks with higher level of income diversification tend to have higher loan growth. This finding is relevant to the context of the Vietnamese banking industry, where banks diversifying more into non-interest segments are considered to be less risky and thus allocated with higher quotas on credit expansion from the SBV. Bank size induces a negative association with bank lending, supporting the view that smaller banks have higher loan growth than larger banks. This is consistent with Toh (2019) and Stein (2002), and also contributes to explain why small banks in Vietnam often carry heavy bad debts (Dang, 2019a, 2019b). The regression coefficient on equity ratio is negative and significant, indicating that banks with larger capital buffers tend to slow down the growth of lending. This result is in line with the theories about the prudent behavior of well-capitalized banks (VanHoose, 2007) and the empirical analysis that rejects the “moral hazard” hypothesis (Goodhart, 2013; Roulet, 2018).

4.3. Bank-specific characteristics and the bank lending channel

In this part, we focus on the potency of monetary policy transmission across different banks. To this end, we split our original sample into subsamples based on bank-specific characteristics, including bank size, capitalization, and liquidity. In line with Olivero et al. (2011) and Yang and Shao (2016), we categorize banks in each year in the way that observations of banks with a value (for bank size, capitalization, and liquidity) higher (lower) than the sample median are categorized as large (small) size, high (low) capitalization and high (low) liquidity.¹

The results in Table 6 show that the existence of the bank lending channel and the weakening effects of bank diversification are confirmed for both large and small banks when using interest rates as monetary policy indicators (see columns 1–3 and columns 6–8). Turning to OMO and FER as monetary policy tools, the bank lending channel is only found at small banks (see columns 9–10), while no significant links have been shown for large banks (see columns 4–5). Thus, there exists variation in the effectiveness of the bank lending channel for banks of different sizes. A potential explanation is that small banks in Vietnam cannot compete with large banks in the credit segment, which strongly force them to seek revenue from other operation channels such as securities and foreign exchange trading.

In the case of bank capitalization (Table 7), despite some differences in the magnitude of transmission, the bank lending channel still exists through all monetary tools examined in two bank groups. With respect to the modifying role of bank diversification, the results show that the weakening effect is somewhat more pronounced at poorly capitalized banks when using the interest rate tools (see columns 6–8 compared to columns 1–3). These findings are at odds with those obtained using the other tools, which exhibit that the strengthening effects of bank diversification are only validated in the group of well-capitalized banks (see columns 4–5). Our result differs from the previous stream revealing that well-capitalized banks tend to weaken the bank lending channel or that the effectiveness of monetary policy transmission does not vary with capitalization level. Most of those studies focus on advanced economies rather than an emerging market like ours (Altunbaş et al., 2002; Gambacorta & Marques-Ibanez, 2011; Jimborean, 2009; Sáiz et al., 2018). However, our finding still lends great support to the notion that the indirect impact of bank characteristics, e.g., bank

competition, on the bank lending channel is more pronounced at high-capitalization banks in an emerging economy (Yang & Shao, 2016).

Finally, in the case of liquidity position (Table 8), the results confirm the presence of the bank lending channel and the modifying role of bank diversification in subsamples are similar to those based on the whole sample. However, we also notice the changes in the magnitude of coefficients and the decreased level of significance (e.g., the bank lending channel in column 10).

5. Conclusions

The study analyzes the impact of bank diversification on monetary policy transmission via the bank lending channel. Although there exists numerous empirical research attempts on the bank lending channel, our study provides new findings contributing the extant stand of literature. Results show that bank lending channel of monetary policy transmission exists in Vietnam, and bank diversification significantly drives the bank lending channel in different ways, depending on the monetary policy tools examined. We have strong evidence to indicate that the transmission of the bank lending channel becomes weaker as banks get more involved in non-traditional activities. The study offers some implications for policy. Monetary authorities should pay more attention to the shifts toward non-traditional segments of the banking sector. The SBV should be vigilant in the current context when they are strongly encouraging bank diversification. Besides, given the finding that the marginal effects are found with the differences among monetary policy tools and bank groups, monetary authorities should carefully determine the appropriate tools to apply and specific banks to focus on. This note also points out implications from the perspective of research, suggesting that future studies should closely account for the analysis of multiple monetary tools in emerging markets, along with heterogeneous effects.

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Note

1. Because the characteristics of size, liquidity, and capitalization of Vietnamese banks have changed drastically from year to year, some banks do not belong to the same group during the research period. We use the median values, so the number of observations for each subsample is the same before the regression stage. However, when entering the regression treatment, we use the lags of variables, so some observations are missing. That explains why the number of observations reported in tables is not the same across sub-samples.

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