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MONETARY POLICY AND RISK OF COMMERCIAL BANKS IN VIETNAM

Dang Quang Nguyen
Faculty of Management, Binh Duong Economics and Technology University, Binh Duong Province, Vietnam

Van Dan Dang
Department of Finance, Ho Chi Minh University of Banking, Ho Chi Minh City, Vietnam

ABSTRACT

This study investigates the bank risk-taking channel of monetary policy transmission by comprehensively analyzing multiple bank risk measurements amid monetary policy shocks in Vietnam. Using banking data for 2008–2021, a dynamic panel model is estimated to examine the risk exposure of 30 Vietnamese commercial banks. The paper employs the annual M2 money supply growth as a monetary policy variable, besides two policy interest rates established by the central bank. We find that an expansion of monetary policy benefits the quality of loan portfolios; however, reduced interest rates or an extended money supply increase insolvency risk. We also document that heightened economic growth corresponds to a reduced likelihood of credit and insolvency risks, while a surge in the inflation rate leads to an escalation in insolvency risk, manifested by a decline in the Z-score index. Overall, the findings on different risk dimensions in this paper are expected to draw a comprehensive picture of banks' risk appetite and behavior in response to monetary changes.

Keywords: bank risk-taking channel; credit risk; insolvency risk; monetary policy

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INTRODUCTION

The 2008 global financial crisis cast doubt on the conduct of monetary policy; in particular, it rekindled debates about relaxing monetary policy and bank risks. In this regard, a monetary policy transmission mechanism emerged and is known as the bank risk-taking channel (Borio & Zhu, 2012), with particular emphasis on how the monetary policy stance affects financial intermediaries' riskiness behavior. As suggested by this channel, low interest rates during monetary expansion can increase banks' risk tolerance. The mechanisms by which monetary policy can exert impacts on bank risk-taking are multifaceted, encompassing several aspects that empirical studies need to address.

Although the empirical literature on the risk-taking channel is expanding (Jiang & Yuan, 2022; Matthys et al., 2020), it is currently limited in some manners. Most importantly, previous results on the effects of monetary policy on different risk dimensions separately are not enough to draw a complete picture of the risk appetite and behavior of banks. Furthermore, prior research has provided evidence that changes in monetary policy influence bank risk, but the strength and significance of the impact depend on the specific risk measures used and vary from one market to another. Hence, it is necessary to consider the influence of the monetary policy transmission channel on various risk characteristics simultaneously in the same market. In addition, most studies have used only policy rates or short-term interest rate-based indicators to assess shocks in monetary policy. It should be mentioned that a single indicator of monetary policy may not fully capture the potential impact of monetary policy on banking performance (Varlik & Berument, 2017). This suggests using multiple alternative proxies to capture the monetary policy stance.

This study aims to investigate the bank risk-taking channel of monetary policy by comprehensively analyzing the changes in bank risk behavior amid monetary policy shocks in Vietnam. When conducting the regression, the dynamic system generalized method of moments (GMM) estimator has been applied to tackle the potential endogeneity between the independent variables and the risk measures by defining the lagged variables as the instruments. The study used M2 money supply growth to proxy monetary policy, along with the alternative use of the policy rates framework.

There are motives in this paper to explain our focus on the Vietnamese market. First, a significant contribution to Vietnam's rapid economic growth is the banking sector, in the context that the capital market has been underdeveloped (Huynh, 2023). Thus, the use of monetary policy to regulate economic output will be more strongly transmitted through the banking channel, and any risks driving the banking industry are likely to threaten the entire economy. Second, the State Bank of Vietnam (SBV) pursues a multi-target monetary regime (related to inflation, economic growth, and macroeconomic environments), in which there is no priority for any specific goals (Dang & Huynh, 2022; Huynh & Dang, 2022). This framework may have an undesirable effect on banking stability beyond the expectations of the monetary authorities; however, this has not been rigorously tested in the literature. Third, the SBV has consistently applied an interest rate framework far from the zero bound; thereby, it still has plenty of room to adjust interest rates in its decisions. Furthermore, an asymmetric pattern for policy rates may not cause biased/inconsistent estimation results.

This paper contributes to the empirical literature on the bank risk-taking channel of monetary policy transmission by analyzing bank risk behavior in response to monetary policy changes in an emerging market, given that most existing research is related to developed countries. More significantly, this is the first study to investigate the evidence on this channel from the perspective of comprehensive risk profiles of the banking system, ranging from credit risk (the most typical risk in the banking business to insolvency risk (financial instability of the bank through the Z-score index). Empirical studies thus far have not approached this issue comprehensively for any markets.

LITERATURE REVIEW

The term "the bank risk-taking channel" was first proposed in the study by Borio and Zhu (2012), which pointed to a potential link between low-interest rates and increased bank riskiness. Many theoretical mechanisms establish the existence of this channel.

The first is through the effect of low-interest rates on asset valuations (Borio & Zhu, 2012). A decrease in interest rates could raise asset prices, which in turn leads to a decrease in risk perception and/or an increase in risk tolerance. Besides, after a positive shock to asset prices due to falling interest rates, the value of the bank's equity relative to debt increases, thus causing a decrease in leverage. Subsequently, the reduction in leverage increases the capital adequacy on the balance sheet, giving the bank more opportunity to increase its holdings of risky assets. Another important mechanism by which the bank risk-taking channel in monetary policy transmission can operate is through the behavior of "search for yield" (Rajan, 2006). In a low-interest-rate environment, bank managers are incentivized to engage in riskier projects to make up for lost profits. Additionally, an exciting mechanism may dominate when the economy experiences a prolonged period of few risks and low-interest rates, and economic agents become too complacent and have overly optimistic predictions. This causes them to increase their asset holdings, which is associated with greater credit risk, and they fail to evaluate potential losses in such an environment (Altunbas et al., 2010).

All the above mechanisms are the driving force behind the bank risk-taking channel in monetary policy transmission and can work simultaneously. Theoretically, however, an expansionary monetary policy could also produce competing effects. In the traditional view, monetary policy easing is expected to reduce the financing costs of borrowers. As a result, the financial burden is relieved, which improves the output of the borrowers and reduces the probability of default (Bernanke & Gertler, 1995). As Smith (2002) suggested, banks opt for cash reserves according to the opportunity cost reflected by interest rates. Under this mechanism, the lower the interest rates, the more banks hold cash and the safer they become. De Nicolo et al. (2012) hypothesized that expansionary monetary policies could enhance the franchise value of banks by increasing their profits, thereby alleviating the problem of moral hazard and suggesting less risk-taking.

There are many reasons why we should expect the significant effects of monetary policy on bank risk-taking; however, the key problem is that the influence of monetary policy on the risk-taking behavior of banks is still multidimensional and inconclusive. On the one hand, many empirical works have shown that risk-taking behavior is exacerbated by relaxing monetary policy, especially when the interest rate environment is near zero or negative (Altunbas et al., 2012; Dell'Ariccia et al., 2014; Heider et al., 2019; Jiménez et al., 2014; Maddaloni & Peydró, 2011; Matthys et al., 2020). On the other hand, a limited number of studies have suggested that monetary expansion may benefit banks and not induce riskier behaviors (Buch et al., 2014). Therefore, the central hypothesis that this paper tests should be as follows:

Hypothesis A. Easing monetary policy likely increases bank risk.

Hypothesis B. Easing monetary policy likely decreases bank risk.

METHODOLOGY

Model specification

The objective of this study is to investigate the impact of monetary policy on different bank risk measures through the following empirical model:

$$Risk_{i,t} = \alpha_0 + \alpha_1 \times Risk_{i,t-1} + \alpha_2 \times MPI_{t-1} + \alpha_3 \times Cont \quad \varepsilon_{i,t} \qquad (1)$$

in which I represents individual banks and t captures years. $Risk_{i,t}$ denotes different proxies of bank risk. Various monetary policy indicators are shown in MPI_{t-1} . Meanwhile, the vector $Control_{i,t-1}$ contains control factors and such variables are selected based on relevant research (Altunbas et al., 2012; Chen et al., 2017; Matthys et al., 2020). Accordingly, these control variables include equity ratio, total assets, liquidity ratio, non-interest income, economic growth, and inflation. Notably, the role of macroeconomic variables in the model is crucial, as they also help to show the macro environment's general effects that change over time, affecting the entire banking system.

The dynamic panel model developed in this study suffers from an endogeneity problem caused by the correlation between the lagged dependent variable $Risk_{i,t-1}$ and the error term $\varepsilon_{i,t}$. Therefore, the model is estimated using the two-step system GMM (Arellano & Bover, 1995; Blundell & Bond, 1998). The system GMM is favored for its ability to yield more consistent and efficient results when dealing with unbalanced panel data, in contrast to difference GMM, which tends to exhibit diminished test power and weak instrumentation (Arellano & Bover, 1995; Blundell & Bond, 1998). When confronted with numerous instruments, the two-step GMM estimator proves more efficient than a one-step estimator (Roodman, 2009). The presence of significantly lagged dependent risk variables supports the appropriateness of employing the dynamic GMM estimator. The efficacy of the GMM approach is further affirmed through various tests, including the Hansen test to validate the instruments, the Arellano-Bond test to reject second-order autocorrelation in the residuals, and the Wald statistic to assess the overall significance of the model. To mitigate the risk of the "too many instruments" issue, where the number of instruments may exceed the number of groups, a constraint is applied to limit the lag range used in generating instruments (Roodman, 2009).

Monetary policy indicators

Regarding monetary policy indicators, one point in common with the preceding literature is that most previous studies agreed to use changes in short-term interest rates under central banks' control to capture monetary policy stance (for instance, Amidu & Wolfe, 2013; Khan et al., 2016;

Varlik & Berument, 2017). Given that, no perfect interest-based monetary policy variables have been suggested by prior authors thus far and in line with the implementation of monetary policy in the Vietnamese market, in this study, we approach short-term policy rates as measures of monetary policy. Concretely, the paper employs two policy rate measures, including the first-order difference in refinancing rates and rediscounting rates set up by the SBV. A positive (negative) value on these difference variables reveals tightening (easing) monetary conditions.

Instead of utilizing only interest rate-based indicators to assess changes in monetary policy like previous studies, this paper takes a further effort by applying a non-interest-rate measure. Accordingly, the annual M2 money supply growth is used as an additional monetary policy proxy. Many previous studies on Vietnam have shown consensus in considering this money supply variable to represent monetary policy stance (Anwar & Nguyen, 2018; Bhattacharya, 2014; Pham, 2019). An increase in the growth rate of the money supply provides evidence of more expansionary monetary policy.

Proxies for bank risk

With regard to credit risk, the most typical and essential type of risk for financial intermediaries, the paper considers the ratio of loan loss provisions to total customer loans. This provisioning ratio describes the ability of banks to deal with potential losses when having bad loans. The higher this value, the more credit risk the bank has. The non-performing loan ratio also is employed in the robustness check section to verify the results for credit risk.

Given that the Z-score index is most commonly used to measure a bank's insolvency risk using accounting data, in line with the accessibility of data in this study, this measure is used for analysis:

$$\text{Z-score} = \frac{ROA + CAP}{\sigma(ROA)} \quad (2)$$

where ROA and σ(ROA) are the return-on-asset ratio and its standard deviation, and CAP is the equity-to-asset ratio. Inspired by suggestions from several previous studies (Azmi et al., 2019; Trinugroho et al., 2020), this work applies a three-year moving window to calculate the standard deviation of ROA to better describe the changing pattern in bank profitability. A larger value of the Z-score implies a lower probability of bank insolvency, and thus it effectively serves as an overall risk proxy in the banking system.

As a highlight of this paper, the Z-score index is decomposed into two components to obtain a better understanding of what primarily drives a bank's default risk (Bilgin et al., 2021; Wu et al., 2020). The first component that helps estimate leverage risk (inverse), and the second component assesses asset portfolio risk (inverse):

$$\text{Z-score (leverage risk)} = \frac{CAP}{\sigma(ROA)} \quad (3)$$

$$\text{Z-score (portfolio risk)} = \frac{ROA}{\sigma(ROA)} \quad (4)$$

Data

The research sample includes 30 commercial banks in Vietnam from 2008 to 2021. To gain the required data, we used annual financial statements published on each bank's website and manually collected all necessary information. Due to a lack of data, the sample constitutes an unbalanced panel dataset, making up around 95% of total banking sector assets in Vietnam on average. For the macro data, policy rates were collected from the SBV, the money supply was obtained from the International Monetary Fund, and economic growth and inflation were sourced from the database of the World Bank.

DISCUSSION

Preliminary results

Table 1 presents the summary statistics for all variables. Looking at their statistical distribution, we can see significant differences between banks in terms of risk exposure, illustrated by the sizeable minimum-maximum disparity and the considerable standard deviation. Therefore, the study sample is sufficiently heterogeneous across banks to yield reliable research results. As a note, the distribution of the Z-score index for the Vietnamese market is comparable to previous studies using the same three-year rolling window to calculate the ROA standard deviation. In more detail, Azmi et al. (2019) calculated an average Z-score of 107.543 for 14 banking systems between 2005–2016, while Trinugroho et al. (2020) determined the mean Z-score index to be 254.195 for the banking sector in Indonesia during 2005–2013. In addition, we observe that short-term interest rates fluctuate widely, similar to money supply growth, indicating that monetary policy is frequently adjusted to regulate the economy.

Table 1: Summary statistics

Variable	Mean	SD	Min	Max	Definitions
Dependent variables					
LLP	0.995	0.718	0.000	3.071	Loan loss provisions scaled by total loans (%)
Z-score	118.772	174.400	14.172	903.819	(CAP + ROA)/σ(ROA), where ROA and σ(ROA) are the return-on-asset ratio and its standard deviation, and CAP is the equity-to-asset ratio
Z-score (leverage risk)	109.406	159.767	13.868	793.567	CAP/σ(ROA)
Z-score (portfolio risk)	6.969	8.024	0.048	38.110	ROA/σ(ROA)
Independent variable					
RFC	-0.199	2.731	-5.000	6.000	Annual change in the refinancing interest rates (%)
RDC	-0.097	3.260	-6.000	6.500	Annual change in the rediscounting interest rates (%)
M2	17.923	5.732	9.676	29.715	M2 money supply growth (%)
Control variables					
CAP	9.666	4.571	4.384	23.838	Equity capital scaled by total assets (%)
Asset	32.226	1.269	29.738	34.788	Natural logarithm of total assets
CTD	0.297	0.239	0.062	1.155	Ratio of cash to deposits (%)
NII	21.454	15.049	-7.907	66.345	Ratio of non-interest income to operating income (%)
GDP	5.711	1.319	2.580	7.076	Annual GDP growth rate (%)
INF	6.788	6.244	0.631	23.115	Inflation rate (%)
Source: Authors' finding.					

Monetary policy and credit risk

To demonstrate that the regression results are not sensitive to a particular set of control variables in the model, the study has added explanatory variables in turn through the following stages: (i) monetary policy variables, (ii) bank-level variables, and (iii) macroeconomic control variables. Under this approach, many regressions have been performed to ensure that the results are not dependent on or sensitive to specific regressions. Despite this, highly consistent and robust results have been shown. For the results reported in this section (and subsequently for all GMM estimation results in this paper), we present all estimates with the lagged dependent risk variables that are statistically significant, thereby indicating that the dynamic GMM model used is suitable for the application.

Table 2 presents the results of the model specification employing the loan loss provision ratio as the dependent variable. In columns 1–3, refinancing rates have a positive and significant coefficient at the (least) level of 5% across all estimates. This result indicates that *ceteris paribus*, a reduction in interest rates is associated with decreased risk on loan portfolios. Quantitatively, we find that if interest rates drop by one percentage point, the bank's credit risk, as measured by provisioning costs, may decrease from 0.011 to 0.036 percentage points. As displayed with the estimates of rediscounting rates in columns 4–6, the results are not changed.

Table 2: Monetary policy and credit risk

	Monetary policy indicator: RFC			Monetary policy indicator: RDC			Monetary policy indicator: M2		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged dependent variable	0.567***	0.330***	0.329***	0.560***	0.323***	0.330***	0.526***	0.385***	0.385***
	(0.024)	(0.036)	(0.035)	(0.021)	(0.035)	(0.035)	(0.022)	(0.034)	(0.025)
MPI	0.011***	0.018**	0.036**	0.012***	0.016***	0.029***	-0.011***	-0.004***	-0.005***
	(0.003)	(0.007)	(0.014)	(0.003)	(0.005)	(0.010)	(0.002)	(0.002)	(0.002)
Asset		0.261***	0.134		0.234***	0.150*		0.134***	0.134***
		(0.061)	(0.084)		(0.062)	(0.085)		(0.016)	(0.021)
CAP		0.066***	0.043		0.060***	0.050*		0.021***	0.021***
		(0.012)	(0.032)		(0.012)	(0.028)		(0.003)	(0.002)
CTD		-0.481***	-0.592***		-0.547***	-0.469**		-0.198***	-0.134***
		(0.170)	(0.198)		(0.184)	(0.218)		(0.059)	(0.050)
NII		-0.011***	-0.009***		-0.011***	-0.011***		-0.004***	-0.004***
		(0.002)	(0.002)		(0.002)	(0.002)		(0.001)	(0.001)
GDP			-0.058***			-0.054***			-0.020**
			(0.016)			(0.015)			(0.010)
INF			-0.011			-0.014*			-0.003
			(0.008)			(0.008)			(0.003)
Obs	383	383	383	383	383	383	383	383	383
Wald chi^2	617.68***	197.24***	897.53***	865.49***	342.39***	691.83***	648.70***	2436.85***	1156.29***
Banks	30	30	30	30	30	30	30	30	30
Instruments	26	26	26	26	26	26	26	30	30
AR(1) test	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.000	0.001
AR(2) test	0.396	0.949	0.952	0.376	0.998	0.875	0.516	0.728	0.753
Hansen test	0.295	0.357	0.258	0.317	0.342	0.302	0.277	0.395	0.355

Note: The dependent variable is LLP – loan loss provisions scaled by total loans. Symbols *** p<0.01, **p<0.05, * p<0.1. Source: Authors' finding.

Turning to the regression analysis of money supply growth and credit risk, all coefficients on M2 are negative and significant at the 1% level. This result shows that an increase in the money supply may alleviate bank credit risk measured by risk provisions. It can be inferred through the magnitude of the estimated results that the loan loss provision ratio may decrease by 0.004–0.011 percentage points in response to a one-percentage-point increase in money supply growth.

Taken together, with different monetary policy variables, the results show that easing monetary policy mitigates bank credit risk, supporting Hypothesis B. In other words, credit risk may decrease in periods of decreasing interest rates or increasing money supply, thereby not supporting the proposal of the bank risk-taking channel in monetary policy transmission in Vietnam. Monetary expansion can reduce the risk of borrowers as their financing costs decrease and their output increases. In this vein, the favorable business of customers reduces credit risk for the bank. Our obtained result is in agreement with some findings of the previous empirical literature (Buch et al., 2014).

Monetary policy and insolvency risk

Table 3 shows the estimated results when the Z-score is employed as the dependent variable to assess the impact of monetary policy on default risk. The Z-score index is an inverse measure of the bank's overall risk. Thus, the higher value of the Z-score is linked to the lower risk.

Table 3: Monetary policy and insolvency risk

	Monetary policy indicator: RFC			Monetary policy indicator: RDC			Monetary policy indicator: M2		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged dependent variable	0.415***	0.361***	0.698***	0.413***	0.361***	0.706***	0.410***	0.402***	0.637***
	(0.006)	(0.008)	(0.038)	(0.006)	(0.009)	(0.031)	(0.009)	(0.006)	(0.025)
MPI	9.388***	8.929***	16.117***	8.289***	7.541***	13.221***	-1.670***	-0.971***	-1.712***
	(0.671)	(1.388)	(2.352)	(0.421)	(1.310)	(2.184)	(0.103)	(0.215)	(0.611)
Asset		32.652***	10.814**		39.048***	12.038***		2.856	7.197**
		(9.940)	(4.270)		(9.989)	(4.328)		(2.340)	(3.241)
CTD		-100.563***	118.839***		-66.078***	115.133***		-44.323***	44.503**
		(17.129)	(14.597)		(13.602)	(16.197)		(3.957)	(18.132)
NII		-0.929	-6.247***		-0.976	-6.147***		0.202***	-3.225***
		(0.715)	(0.830)		(0.653)	(0.805)		(0.057)	(0.577)
GDP			20.637***			22.339***			27.852***
			(3.148)			(2.650)			(2.987)
INF			-10.171***			-8.683***			-4.406***
			(1.451)			(1.659)			(1.177)
Obs	349	349	349	349	349	349	349	349	349
Wald chi^2	4393.53***	6815.94***	1057.47***	5188.17***	6772.85***	1211.93***	2758.20***	8256.10***	8481.23***
Banks	30	30	30	30	30	30	30	30	30
Instruments	24	24	24	24	24	24	24	27	24
AR(1) test	0.003	0.003	0.002	0.003	0.003	0.002	0.004	0.003	0.004
AR(2) test	0.742	0.951	0.954	0.691	0.955	0.895	0.787	0.859	0.817
Hansen test	0.196	0.173	0.443	0.175	0.273	0.473	0.244	0.277	0.384

Note: The dependent variable is Z-score – an inverse measure of bank insolvency risk. Symbols *** p<0.01, **p<0.05, * p<0.1. Source: Authors' finding.

We document a positive and significant coefficient at the 1% level for refinancing rates (columns 1–3). This robust result implies that more expansionary monetary conditions may increase the risk of default, which confirms the existence of the bank risk-taking channel. Observing the magnitude of the estimates in Table 3, we see that if refinancing rates fall by one percentage point, the bank's insolvency risk (measured by the inverse of the Z-score) increases from 8.929 to 16.117 units. An identical pattern is repeated with rediscounting rates in columns 4–6. In addition, the study continues to present the regression results in columns 7–9, where we change the monetary policy variable to the M2 money supply growth. The regressions display a significant and negative coefficient at the 1% level for money supply growth in all columns with the Z-score model, indicating that money supply expansion significantly increases insolvency risk. Quantitatively, it can be speculated that an increase of one percentage point in money supply growth is associated with a rise from 0.971 to 1.712 units of the bank's default risk as measured by the Z-score.

Concerning the influence of macroeconomic factors, it is notable that GDP growth consistently exhibits a markedly adverse regression coefficient in nearly all assessments alongside the credit risk variable. Conversely, its correlation with the Z-score is positive, suggesting that heightened economic growth corresponds to a reduced likelihood of credit and insolvency risks. Besides, the regression outcomes involving the inflation variable reveal that a surge in the inflation rate leads to an escalation in insolvency risk, manifested by a decline in the Z-score index.

As a further analysis step, we decomposed the Z-score into its two components, namely leverage risk and asset portfolio risk, to have in-depth insights into the bank's default risk. The results are presented in Table 4. We can observe that with the new dependent variables, relaxing monetary policy is still associated with reduced financial stability. Policy rates have regression coefficients that are positive and significant at the level of 1% across all different estimates, indicating that interest rate cuts are detrimental to financial stability in terms of both capital and return buffers. The estimated coefficients on money supply growth M2 in all regressions hold significantly negative at the 1% level, revealing an adverse effect of money supply growth on disaggregated indices of bank stability.

Table 4: Monetary policy and components of Z-score

	Dependent variable: Z-score (leverage risk)			Dependent variable: Z-score (portfolio risk)		
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged dependent variable	0.404***	0.406***	0.414***	0.395***	0.391***	0.421***
	(0.019)	(0.018)	(0.012)	(0.026)	(0.025)	(0.025)
RFC	8.109***			0.661***		
	(1.676)			(0.081)		
RDC		6.281***			0.581***	
		(1.314)			(0.075)	
M2			-1.248***			-0.118***
			(0.349)			(0.028)
Asset	13.578***	13.225***	9.433***	1.551***	1.667***	1.108***
	(2.182)	(1.898)	(2.368)	(0.173)	(0.177)	(0.168)
CTD	51.230***	37.839***	17.390*	2.168***	2.353***	2.182*
	(12.951)	(14.191)	(9.138)	(0.689)	(0.629)	(1.187)
NII	-0.519	-0.480	0.765***	0.108***	0.108***	0.209***
	(0.414)	(0.302)	(0.161)	(0.014)	(0.016)	(0.026)
GDP	30.500***	31.976***	34.894***	0.481***	0.547***	0.817***
	(2.359)	(2.468)	(2.538)	(0.130)	(0.131)	(0.135)
INF	-6.065***	-5.244***	-3.150***	-0.054	-0.026	-0.041
	(1.103)	(0.867)	(0.445)	(0.039)	(0.035)	(0.048)
Obs	349	349	349	349	349	349
Wald chi^2	14403.95***	10863.02***	3935.08***	1867.55***	1932.75***	1312.78***
Banks	30	30	30	30	30	30
Instruments	26	26	26	26	26	27
AR(1) test	0.004	0.004	0.004	0.001	0.001	0.001
AR(2) test	0.707	0.729	0.762	0.198	0.210	0.236
Hansen test	0.365	0.287	0.357	0.418	0.474	0.424
Note: The dependent variables are Z-score (leverage risk) and Z-score (portfolio risk), which are the components of Z-score. Symbols *** p<0.01, **p<0.05, * p<0.1. Source: Authors' finding.						

In sum, a consistent conclusion is that relaxing monetary policy via lowering interest rates or expanding the money supply significantly increases the insolvency risk of banks, and Hypothesis A is supported. This result also confirms the existence of the bank risk-taking channel in monetary policy transmission, which is not challenging but complements the previous credit risk findings. Our findings thus far allow the prediction of the sequence of events: an increase in interest rates (or a decrease in the money supply – tightened monetary policy) leads to an increase in the level of loss provisions by banks and then also a rise in the capital adequacy ratio. An increase in provisioning is in response to a riskier credit portfolio, and a rise in capital buffers is to deal with future losses in the credit portfolio, which is expected to compensate for the likelihood of decreased capital adequacy. Reversely speaking, a decrease in interest rates or an increase in money injection reduces provisioning, as banks believe credit portfolios are less risky and lower the capital adequacy ratio when expected losses are smaller in the future, and additional capital is not required. Therefore, the evidence suggests that insolvency risk (where capital is a substantial component of insolvency risk from Vietnam's Z-score, see Table 1) responds to shocks from monetary policy. Our findings together reinforce the idea that both aspects of credit risk and insolvency risk are complementary rather than contradictory. This result is consistent with that of Moraes et al. (2016) in the emerging market economy of Brazil.

Robustness checks

The dataset of the study runs from 2008 to 2021, which means that there are two important milestones to be controlled: (i) the financial crisis of 2008–2009 and (ii) the period of 2020–2021 when countries were affected by the severe impact of the COVID-19 pandemic. Thereby, we can expect structural breaks that can affect the relationship under investigation. Thus, to test whether this may happen and also as a technique to check the robustness of our results, we adjusted our sample by excluding the financial crisis of 2008–2009 and the COVID-19 crisis of 2020–2021, then repeated all regression procedures. Robustness checks are presented for credit risk in Table 5 (where we also employed the non-performing loans (NPL) as an additional credit risk proxy) and insolvency risk in Table 6. Overall, all results remain unchanged: while an expansion of monetary policy benefits the quality of loan portfolios, both reduced interest rates and extended money supply growth increase insolvency risk.

Table 5: Robustness checks for credit risk

	Dependent variable: LLP			Dependent variable: NPL		
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged dependent variable	0.336***	0.342***	0.690***	0.540***	0.521***	0.351***
	(0.047)	(0.050)	(0.100)	(0.076)	(0.030)	(0.063)
RFC	0.028**			0.052**		
	(0.014)			(0.023)		
RDC		0.050**			0.070***	
		(0.024)			(0.023)	
M2			-0.021**			-0.074***
			(0.008)			(0.008)
Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	298	298	298	262	262	262
Wald chi^2	158.91***	254.41***	268.53***	476.91***	528.24***	544.33***
Banks	30	30	30	30	30	30
Instruments	22	22	24	24	26	24
AR(1) test	0.000	0.002	0.001	0.005	0.001	0.006
AR(2) test	0.828	0.892	0.314	0.157	0.110	0.137
Hansen test	0.397	0.593	0.337	0.164	0.161	0.126

Note: The dependent variables are LLP (loan loss provisions/total loans) and NPL (non-performing loans/total loans). The time span excludes the financial crisis of 2008–2009 and the COVID-19 crisis of 2020–2021. Symbols *** $p<0.01$, **$p<0.05$. Source: Authors' finding.

Table 6: Robustness checks for insolvency risk

	Dependent variable: Z-score			Dependent variable: Z-score (leverage risk)			Dependent variable: Z-score (portfolio risk)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lagged dependent variable	1.013***	0.934***	0.449***	0.546***	0.490***	0.435***	0.437***	0.398***	0.274***
	(0.032)	(0.029)	(0.035)	(0.034)	(0.032)	(0.034)	(0.046)	(0.050)	(0.058)
RFC	30.975***			16.945***			0.854***		
	(4.558)			(2.497)			(0.119)		
RDC		15.975***			10.310***			0.600***	
		(3.759)			(1.395)			(0.101)	
M2			-6.825***			-2.641***			-0.115***
			(1.723)			(0.738)			(0.042)
Bank-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	292	292	292	292	292	292	292	292	292
Wald chi^2	3841.68***	2389.16***	1145.42***	3156.16***	7680.62***	1283.48***	873.96***	775.38***	1525.03***
Banks	30	30	30	30	30	30	30	30	30
Instruments	20	20	22	22	22	22	22	22	23
AR(1) test	0.007	0.006	0.003	0.007	0.009	0.009	0.003	0.004	0.009
AR(2) test	0.969	0.740	0.192	0.771	0.632	0.511	0.686	0.609	0.306
Hansen test	0.351	0.553	0.635	0.352	0.136	0.408	0.506	0.512	0.579

Note: The dependent variables are Z-score and its components. The time excludes the financial crisis of 2008–2009 and the COVID-19 crisis of 2020–2021. Symbol *** p<0.01. Source: Authors' finding.

In addition to the GMM method, we used fixed-effects regressions and pooled OLS regressions as the estimators. The results are presented in Table 7. Although the statistical significance is slightly reduced, these estimates generally show that our previous main findings are unchanged. Hence, we indicate that we have already gained evidence to confirm the robustness of the findings, regardless of the econometric methodology used.

Table 7: Robustness checks with alternative econometric methods

Pooled OLS estimations						
	Dependent variable: LLP			Dependent variable: Z-score		
	(1)	(2)	(3)	(4)	(5)	(6)
RFC	0.027**			7.829***		
	(0.013)			(2.839)		
RDC		0.021**			6.576**	
		(0.010)			(2.661)	
M2			-0.002			-1.090
			(0.005)			(1.230)
Bank-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs	383	383	383	383	383	383
R-squared	0.496	0.495	0.484	0.345	0.342	0.323

Table 7: Continued

Fixed effect estimations						
	Dependent variable: LLP			Dependent variable: Z-score		
	(1)	(2)	(3)	(4)	(5)	(6)
RFC	0.024*			10.578***		
	(0.014)			(2.931)		
RDC		0.017			8.614***	
		(0.011)			(2.701)	
M2			-0.005			-3.737**
			(0.006)			(1.531)
Bank-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs	383	383	383	383	383	383
R-squared	0.477	0.476	0.468	0.312	0.314	0.252

Note: The dependent variable is LLP – loan loss provisions scaled by total loans, and Z-score – an inverse measure of bank insolvency risk. Symbols *** p<0.01, **p<0.05, * p<0.1. Source: Authors' finding.

CONCLUSION AND RECOMMENDATION

Using banking data for the period 2008–2021, a dynamic panel model was estimated to examine the risk exposure of 30 Vietnamese banks to changes in monetary policy. First, the results show that relaxing monetary policy has the effect of reducing credit risk. In other words, bank credit risk decreases when interest rates decrease, or the money supply increases, thereby not supporting the bank risk-taking channel of monetary policy transmission in the Vietnam proposal. Second, based on the evaluation of the Z-score index and its two components, we claim that easing monetary policy through interest rate reduction or money supply expansion significantly increases the insolvency risk of banks. This result also confirms the existence of the bank risk-taking channel in the monetary policy transmission, which is not contradictory but complements previous credit risk findings.

Monetary authorities should pay close attention to the workings of the bank's risk-taking channel when setting their monetary policy. It is demonstrated that monetary policy can be used to ease the financial difficulties of businesses; however, its undesirable impact on bank default risk must not be ignored. This research has shown that low interest rates or money injections can lead to the accumulation of insolvency risks in the banking system. Accordingly, the paper provides some implications for macro policy. Monetary authorities need to focus on maintaining macroprudential policies through close vigilance during periods when interest rates are low, or the money supply is at a high level. As a specific example, proposals to control excessive risk-taking behavior by banks that affect capital adequacy, typically requirements for additional capital buffers during relaxing monetary policy, need to be considered. If banks can ensure this requirement, default risk will be partly controlled during the period of monetary policy adjustment.

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ABOUT THE AUTHORS

Van Dan Dang, email: dandv@hub.edu.vn (Corresponding Author)

Dang Quang Nguyen is a doctorate student at the Banking University of Ho Chi Minh City, Vietnam. His research interest could be found in banking and finance.

Dr. Van Dan Dang is an Associate Professor at the Banking University of Ho Chi Minh City, Vietnam. His research interest could be found in various subjects of banking, fiscal policy and monetary policy.