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The Impact of Monetary Policy on Insolvency Risk at Vietnamese Commercial Banks

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Abstract: ***The study assesses the impact of monetary policy on Vietnamese commercial banks' insolvency risk during the 2008-2017 period, with balanced panel data for 30 commercial banks in Vietnam. Results from the study show that an increase in the M2 money supply creates an increase in the Z index, which means a reduction in the risk of insolvency. The expansionary monetary policy increases real estate prices, collateral value, and bank capital, resulting in higher asset value for the bank. As a result, both deposit growth and credit growth in the economy have positive signs; therefore, the activity of commercial banks results in efficiency and improved profit, reducing the risk of insolvency. This result is consistent with the Borio and Zhu (2012) reports.***

Keywords: monetary policy; insolvency risk; System GMM method

Classifications: E5, E52, E51

1. Introduction

When the economic situation experiences volatility with frequent crises, the insolvency risk of commercial banks is of interest to researchers. Studies by Laeven, L., Levine, R., 2009, Mohamed Aymen Ben Moussa (2015) show that insolvency risk not only has serious consequences on the existence of a bank but also affects the stability of the national monetary and financial market. Therefore, ensuring solvency is very important to the existence and development of banks. Solvency means the ability to immediately satisfy customers' demand for money withdrawals at any time. Banks' insolvency will create economic gloom. This was proved by how the insolvency of banks such as Lehman Brothers, Merrill Lynch ... and many other large companies in 2008 caused the US economic downturn and global economic crisis.

Empirical studies on the impact of monetary policy on bank insolvency risk present different results such as: The change in reference interest rate decreases when the central bank implements the expansionary monetary policy which affects the behavior of deposit customers, banks face difficulties in mobilizing business capital and risk tolerance gets reduced. Studies by Laeven, L.& Levine, R., (2009) shows that low interest rates make the profit-seeking goals of banks more difficult to implement, which cause investment activities to become more adventurous. According to Rajan (2006) and Borio and Zhu (2012), regulation of monetary policy makes banks adjust their financial leverage, which will affect risk valuation and the real level of bank risks. In addition, according to Agur, I.& Demertzis, M. (2012), Dell'Ariccia & Marquez (2009), Dell'Ariccia (2014), lower interest rates when implementing expansionary monetary policy may reduce adverse options in the financial market and thus undermine banks' efforts to supervise and monitor capital loans. Delis & Kouretas (2011) show that for eurozone countries, expansionary monetary policy significantly increases banks' insolvency risk, especially for banks with lower capitalization and more off-balance sheet items. Jiménez (2014) found that following monetary expansion, banks in Spain increased credit for borrowers who are less credit solvent.

In developing countries, the experience in economic strengthening, financial liberalization, and crisis handling is still passive. Monetary policy is often used for many purposes, such as inflation control, exchange rates stabilization and economic growth promotion, but the underlying balance between price stability and financial stability has been overlooked. On a different note, banks still account for a large part of the financial system in these countries and act as the main financial source in the economy. Therefore, increased insolvency risk may have more adverse effects than risks in countries where banks account for a smaller share in the financial system (Kashyap, AK& Stein, JC, 1995).

In Vietnam, ensuring the solvency of the commercial banking system is one of the important goals of the banking industry. In recent years, the merger, acquisition and restructuring of banks have been extremely active, with priority given to dealing with weak credit institutions; deploying merger, consolidation and acquisition of credit institutions on the voluntary principle; increasing charter capital and handling bad debts of credit institutions, gradually restructuring operations, governance and administration. That helps the Vietnamese commercial banking system to increase solvency. This action, however, is only to resolve the consequences but can't really solve the causes of the risk of insolvency.The management of monetary policy instruments in the face of the commercial banking system's redundancy or shortage of liquidity will help reduce insolvency risk. Therefore, the impact of monetary policy on insolvency risk is important not only for optimal policy adjustment but also for long-term financial stability and economic growth of Vietnam.

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2. Theoretical Basis

2.1 Theoretical Basis

There have been several studies in the world about measuring the insolvency risk in the banking sector through bankruptcy risk assessments such as Laeven & Levine (2009); Houston et al. (2010); Demirgüç-Kunt & Huizinga (2010) ... Minghua Chen et al. (2017) proposing the calculation of Z-index as follows:

$$Z - score = \frac{ROA_{i,t} + EA_{i,t}}{\sigma(ROA_{i,t})}$$

In which:
$ROA_{i,t}$: represents the ratio of return to bank i's average total assets in year t
$EA_{i,t}$: represents the ratio of average equity to bank i's total assets in year t
$\sigma(ROA_{i,t})$: standard deviation of bank i's ROA in year t

Minghua Chen et al. (2017) argued that the above Z-index calculation shows the bank's ability to accept insolvency risk as measured by the standard deviation of ROA, which reflects the income fluctuation. Specifically,$\sigma(ROA_{i,t})$ is calculated by the standard deviation of the return on average total assets over a 3-year period, usually taking t to t-3, this method allows time changes in the denominator, avoiding change in Z-score to be adjusted only by the variation in banks' profitability and capitalization (Paligorova, T.& Santos, J. C., 2012; Borio, C.& Zhu, H., 2012). The bank's capitalization is assessed by the EA coefficient, which is the equity to total assets that measures the level of financial leverage use, explained as the number of standard deviations according to which profit must be reduced to compensate for the replacement in the bank's equity ratio (Lastra, R. M& Schiffman. N, 1999), the Z score can be considered as a reversal of the bank's insolvency probability. A higher Z-score indicates a reduction in insolvency risk, a higher level of bank stability, or in other words, a lower Z-score indicates a higher level of bank's bankruptcy risk. Because the Z score is very high, the study applied logarithmic levels (1+ Z point) to smooth the high Z values (Borio, C., Zhu, H., 2012). The use of ln (1 + Z-score) as a Z-score is simply to avoid Z-score cut at zero level (Minghua Chen et al. 2017), so the author demonstrates ln (1 + Z -score) as the Z score in the research paper.

Z-score also has some limitations when used for measuring the bank's insolvency risk. The most important limitation is that Z-score is based entirely on accounting data. Therefore, if banks intentionally change the data on the report, Z-score may provide an overly positive assessment of the insolvency probability. In addition, Z-score considers stability in banks separately and can ignore the risk that a collapsed bank could cause damage to other banks in the system. The advantage of Z-score is that it allows comparison of the insolvency risk in many groups of banking and financial institutions with different ownerships or operational goals. In this study, the Z-score calculated by Minghua Chen et al (2107) is to measure the insolvency risk of Vietnamese commercial banks in the period of 2008-2017 for the reasons mentioned above.

2.2 Model

In order to assess the impact of monetary policy on the insolvency risk of commercial banks, previous studies mainly presented models with explanatory variables representing some unique characteristics of banks such as scale and capital structure, capitalization capacity, while macroeconomic conditions, institutional quality and policy transparency affecting this impact are still limited. For example, high market transparency in banking operations reduces the risks associated with monetary-banking policies, implying policy for planners to carefully determine the right level of policy instruments in the banking industry. Or, a move towards greater policy transparency is also encouraged as additional monetary policy instruments to reduce the insolvency risk for banks when monetary policy is loosened (Brissimis et al., 2014. Jiménez et al., 2014).

Based on the developed research hypotheses, to determine the impact of monetary policy on the insolvency risk of Vietnamese commercial banks, the author built a research model based on studies by Minghua Chen et al. (2017), as follows:

$$Risk_{i,t} = \beta_0 + \beta_1 Risk\,(i, t-1) + \beta_2 MP_t + \beta_3 INF_t + \beta_4 LERNER_{i,t} + \beta_5 INC_{i,t} + \beta_6 GRO_t + \beta_7 INS_t + f_i + \varepsilon_{i,t} \quad (1)$$

The study considers additional variables in the model (2) below to consider the impact of monetary policy on the insolvency risk of commercial banks as regards changes in institutional quality:

$$Risk_{i,t} = \beta_0 + \beta_1 Risk\,(i, t-1) + \beta_2 MP_t + \beta_3 INF_t + \beta_4 LERNER_{i,t} + \beta_5 INC_{i,t} + \beta_6 GRO_t + \beta_7 INS_t + \beta_8 MP_t * INSt + fi + \varepsilon i,t \quad (2)$$

In which: $Risk_{i,t}$: Insolvency risk of commercial banks;

MP_t: Monetary policy of Vietnam including rediscount interest rate (MP-I1); CR_t: credit growth rate of the economy; FXI_t: Foreign exchange reserve growth rate; SM_t: Growth of money supply M2;
INF_t : Inflation rate; GRO_t : GDP growth rate; $INC_{i,t}$: Bank income diversification; $LERNER_{i,t}$: The competition level of commercial banks; INS_t: Institutional quality

3. Methodology and Database

3.1 Database

The study used panel data for 30 commercial banks in Vietnam. According to statistics of the State Bank of Vietnam as of December 31, 2017, the number of commercial banks was 44 including state-owned commercial banks, joint-stock commercial banks, 100% foreign-owned banks and joint-venture banks. However, some banks do not have enough data during the research period, so to ensure the balanced panel

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data, the author chooses 30 commercial banks with complete data as presented above. In addition, according to the data of the State Bank of Vietnam as of December 31, 2017, the total assets of 44 commercial banks were VND 8,719,726 billion. Meanwhile, the total assets of the 30 commercial banks used by the author as of December 31, 2017 were VND 6,131,649 billion, accounting for 70% of the total assets of commercial banks. Therefore, 30 commercial banks selected by the author ensure representation of commercial banks in Vietnam.

The data used to measure each bank 's risk and characteristics is taken from banks' annual financial statements for the 2008-2017 period via their official websites, cafef.vn site.

3.2 Methodology

In this model, the existence of problems such as error autocorrelation, as well as the model dynamism represented by lagged dependent variables (endogenous variable problem), will deflect the results of the estimation. The panel data model is called the linear hierarchical panel data model, with these current issues. It is possible to estimate the linear dynamic panel data model using GMM tool. Specifically, this study conducted model regression using Arellano & Bond 's System GMM method (1991). This method is commonly used in estimates of data from linear dynamic panels or panel data with endogenous phenomenon, heteroskedasticity and autocorrelation.

4. Empirical Results and Discussion

Panel 4.1. Estimation results of the impact of monetary policy through rediscount interest rates on the insolvency risk of Vietnamese commercial banks

Z Score	(1)	(2)
L1.ZSCORE	0.7332959***	0.7330487***
MP_I1	-77.6337***	
MP_I1*INS		-136.0426***
LERNER	-67.31281***	-67.88617***
INC	-5.837649	-6.101499
GRO	-4.069882	0.0312943
INF	17.60018**	18.33111**
INS	142.714***	150.1159***
AR (1) p-value	0.000	0.000
AR (2) p-value	0.430	0.420
Hansen p-value	0.158	0.179
Number of groups	30	30
Number of instruments	12	12
Second stage F-test p-value	0.000	0.000

****statistically significant at 1%; **statistically significant at 5%; *statistically significant at 10%*
Source: Calculation results by STATA 12.0 software

The results of the estimation show that the rediscount interest rate variable (MP I1) regression coefficient is statistically significant and negative at -77. This shows that Z index will be increased when the rediscount interest rate decreases, which means insolvency risk will decrease. Explaining this result, it can be seen that the rate of rediscount is the interest rate applied when banks are refinanced by the SBV in the form of discounting commercial papers or valuable papers not yet due. If the expansionary monetary policy is implemented by lowering the rediscount interest rate, commercial banks find it easier to access capital than before, the risk of insolvency is then reduced. On the other hand, expansionary monetary policy is often applied during periods of recession or to achieve targets for economic growth by stimulating consumption to increase the economy's capacity to produce. It will create a positive impact in the context of macroeconomic policies stimulating growth, facilitating business easiness for businesses and commercial banks, increasing profits and reducing the risk of insolvency. This result is in line with Alessandri & Nelson studies (2015); Agur & Demertzis (2012); De Nicolò et al (2010).

Panel 4.2. Estimation results of the impact of monetary policy through credit growth on the insolvency risk of Vietnamese commercial banks

Z Score	(1)	(2)
L1.ZSCORE	0.7621012***	0.7635814***
CR	10.70238**	
CR*INS		18.6333**
LERNER	-53.14439***	-54.05944***
INC	-7.891961	-8.096692
GRO	10.46436	13.69072
INF	-4.309509	-3.966301
INS	91.13384***	87.87678***
AR (1) p-value	0.000	0.000
AR (2) p-value	0.284	0.285
Hansen p-value	0.183	0.190
Number of groups	30	30
Number of instruments	21	21
Second stage F-test p-value	0.000	0.000

****statistically significant at 1%; **statistically significant at 5%; *statistically significant at 10%*
Source: Calculation results by STATA 12.0 software

The loan growth variable (CR) regression coefficient is statistically significant and positive at 10. This shows that the Z index will increase when credit grows, meaning a decrease in insolvency risk. Credit growth can raise the risk of banks becoming insolvent. The change in direction of the impact of credit growth on Vietnamese commercial banks' insolvency risk can be explained as policy management is consistent with the economy's level of development when implementing the expansionary monetary policy by expanding credit growth. Therefore, the situation in which the total volume of money supply increases excessively in circulation is less likely to occur, this will stimulate the business sector to develop production, enhance debt repayment capability, promote economic growth and reduce inflation. Credit growth for commercial banks helps to generate income from loans, increase market share and grow other relevant services and utilities, thus reducing the risk of insolvency for commercial banks. This result is consistent with the Minghua Chen et al. (2017) studies.

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Panel 4.3. Estimation results of the impact of monetary policy through the growth of foreign exchange reserves on the insolvency risk of Vietnamese commercial banks:

Z Score	(1)	(2)
L1.ZSCORE	0.7789841***	0.7793681***
FXI	38.17569**	
FXI*INS		67.14772**
LERNER	-71.34752***	-71.11823***
INC	-18.347***	-18.32496***
GRO	134.0334*	132.8164*
INF	21.01131*	21.28813*
INS	139.7416***	209.3562***
AR (1) p-value	0.001	0.001
AR (2) p-value	0.186	0.182
Hansen p-value	0.128	0.128
Number of groups	30	30
Number of instruments	14	14
Second stage F-test p-value	0.000	0.000

***statistically significant at 1%; **statistically significant at 5%; *statistically significant at 10%*

Source: Calculation results by STATA 12.0 software

The regression coefficient of the foreign exchange reserves growth variable (FXI) is 38 statistically significant and positive. This shows that when foreign exchange reserves increase, Z index will be increased, meaning a decrease in insolvency risk. This result can be explained by the fact that the SBV intervened in the foreign exchange market by purchasing foreign currencies in the market; thus the increase in foreign currency reserves will create an increase in domestic money supply in the market, presenting an expansionary monetary policy, banks can access capital more easily, the insolvency risk is decreased. This result is consistent with the studies by Ghosh et al. (2016); Minghua Chen et al. (2017).

Panel 4.4: The estimation results of the impact of monetary policy through M2 money supply growth on the insolvency risk of Vietnamese commercial banks:

Z Score	(1)	(2)
L1.ZSCORE	0.7012158***	0.7013728***
SM	9.456087**	
SM*INS		15.99276**
LERNER	-44.88975***	-44.71353***
INC	103.5786**	103.3254**
GRO	112.0558**	109.486**
INF	-2.606349	-2.290335
INS	130.5677***	126.3688***
AR (1) p-value	0.000	0.000
AR (2) p-value	0.803	0.805
Hansen p-value	0.107	0.102
Number of groups	30	30
Number of instruments	13	13
Second stage F-test p-value	0.000	0.000

***statistically significant at 1%; **statistically significant at 5%; *statistically significant at 10%*
Source: Calculation results by STATA 12.0 software

The regression coefficient of the M2 money supply growth variable (SM) is 9.4 statistically significant at 5% and positive. This indicates that an increase in M2 money supply will result in an increased Z-index, meaning a decrease in insolvency risk. The increase in M2 money supply shows that the monetary policy is expanded, reducing the insolvency risk of commercial banks. The expansionary monetary policy creates an increase in real estate prices, the value of collateral, and bank capital, resulting in increased bank asset values. As a result, deposit growth and credit growth in the economy both have positive signs, commercial banks' activities thus bring about efficiency and achieve better profit, reducing the insolvency risk. This result is consistent with studies by Borio & Zhu (2012).

5. Conclusion

An expansionary monetary policy by reducing rediscount interest rates or refinancing interest rates, expanding credit limits, growing foreign exchange reserves or growing State Bank of Vietnam's M2 money supply would impact asset prices and thus affect Vietnamese commercial banks' insolvency risk. The expansionary monetary policy increases the value of customer assets as well as bank assets and income, thereby improving profits and business performance and strengthening risk endurance capacity. Moreover, when the SBV introduces an expansionary monetary policy that provides Vietnamese commercial banks with easier access to SBV loans through cheap refinancing interest rates and rediscount interest rates, asset prices at commercial banks rise and thus allow them to increase net capital supply. This effect reduces Vietnamese commercial banks' insolvency risk.

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