THE TRANSMISSION OF MONETARY POLICY TROUGH BANK LENDING CHANNEL IN INDONESIA

Ajeng Ayu Saraswati, M. Khoerul Mubin*
Economics Department, Universitas Airlangga

Abstract

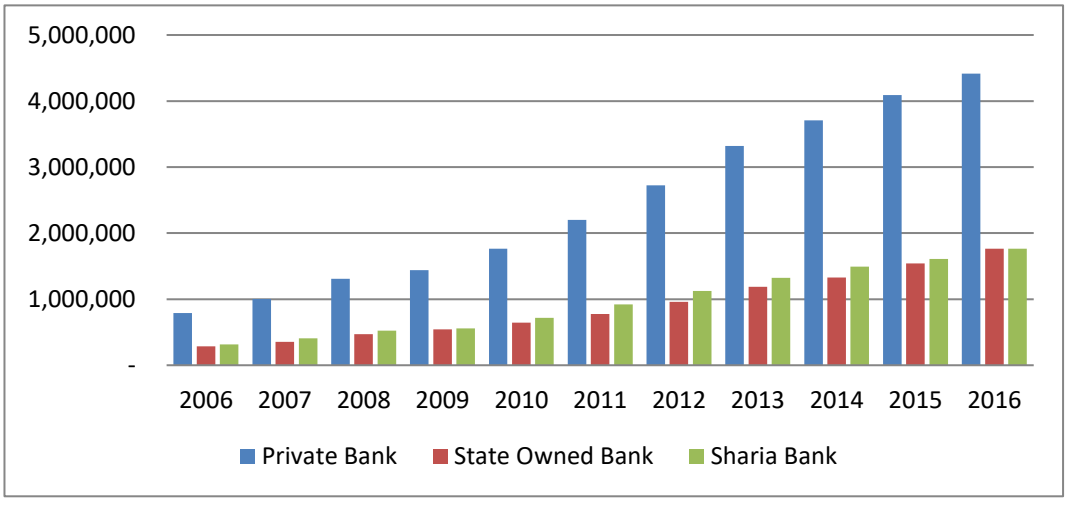
This study aims to determine the effect of policy interest rates (BI rate), GDP, and bank characteristics (size, liquidity, equity, profitability) on the volume of credit through bank lending channels in Indonesia. The study utilize data of 26 state commercial bank in Indonesia. Bank characteristic variables are measured by various approaches related to bank balance sheets. Data collection is retrieved from the websites of Bank Indonesia, the Financial Authority Services, and Indonesian Central Statistics Agency. This study examines the volume of credit distributed by Indonesian commercial bank during 2006 to 2016. Utilizing the GMM method, we found that the policy interest rate (BI rate), GDP, and bank characteristics (size, liquidity, equity, and profitability) significantly affect the volume of credit through bank lending channel in Indonesia.

Keywords: *bank lending channel, size,liquidity, profitability, equity.*

1. INTRODUCTION

According to Mishkin (2004), The central bank can control the amount of money used in an economic activity with various forms of policy instruments. Bank Indonesia (The Central Bank of Indonesia) continues to do this in achieving its main objective of maintaining the value of the rupiah by regulating the amount of money in circulation. There are several measure held by the central bank to achieve the ultimate goal of monetary policy using various instruments. The instruments reach the ultimate goal trough the channel transmission of monetary policy.

The interest rate that was the policy of Bank Indonesia during 2006 to 2016 was the BI Rate so that it is expected to achieve the targeted monetary policy target.



Source: Financial Service Authority (2016)

Figure 1
Indonesian Commercial Bank Credit Volume, including Stated Owned Banks and Sharia Bank from 2006 to 2016 (billion rupiah)

*Coressponding author. Email address: mkmubin@feb.unair.ac.id

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The main instrument of central bank monetary policy is the discount policy or the interest rate policy. During 2006 to 2016, Bank Indonesia set the policy interest rates using the BI Rate as the reference for bank's interest rate in Indonesia. In line with its objectives, Bank Indonesia continuously working to achieve its targets by setting up the policy interest rate in accordance with the current economic conditions. The increase in the amount of credit extended by the bank when the central bank lower the policy rate, indicates the existence of monetary policy transmission through the credit channel, particularly the bank lending channel.

The monetary policy transmission mechanism through the bank lending channel observes the various effect of monetary policy according to banking characteristics, such as the assets and liabilities side. According to Berger (2015), there are several characteristics of banks that affect the transmission of monetary policy, namely size, liquidity, profitability and equity. Banks in certain characteristics can increase their ability to seek funding sources as the response to the monetary policy exercised by the central bank.

Research on the mechanism of monetary policy transmission through bank lending channels has been carried out in many countries by Gunji and Yuan (2009), Gambarcota (2004), Mahathanasetha and Tauer (2018), Matousek and Solomon (2017), Golodniuk (2005), Apergis, et al. (2012), Salachas, et al. (2016), Heryan and Tzeremes (2016). However, study on the bank lending channel with regards the bank characteristics in Indonesia has not been exercised.

This study aims to determine the effect of policy interest rates and GDP on credit volume and to determine the effect of bank characteristics on credit volume through bank lending channels in Indonesia. The difference between this study and previous research lies in two things. First, this study utilize the data of individual bank of 26 commercial bank in Indonesia. Second, this study adds the variable bank profitability in the characteristics of banks to see the behavior of banks in responding monetary policy by the central bank in Indonesia.

The initial part of this research includes an introduction containing the background, research gaps, objectives, research contributions. The literature review contains the theory and results of previous researchers. The research method contains data sources, population and sample, research data period, empirical model, descriptions of variables and empirical techniques. The results and discussion contain statistics description, discussion of finding, and robustness Check. The final section contains conclusions.

2. LITERATURE REVIEW

2.1 Monetary Policy Transmission Mechanism

2.1.2 Credit Channels in the Monetary Policy Transmission Mechanism

According to Mishkin (2004), monetary policy through its mechanisms can affect output and prices (inflation). The mechanism for transmitting monetary policy through the credit channel is divided into five channels, namely:

1. Bank lending channel, which explains the effect of monetary policy on credit according to bank financial conditions. All sides of the assets and liabilities are important components in the credit channel.
2. The firms balance sheet channel is the route used by the central bank in knowing the company's financial condition which can affect companies in obtaining bank credit.
3. The path of unexpected price level changes. In industrialized countries, debt payments are usually contractually in nominal terms, an increase in the price level which is not expected to reduce the value of the company's real liabilities (a decrease in debt burden) but should not decrease the value of the company's real assets.
4. The effect of household liquidity. This path illustrates the outlook for credit based on consumer spending, especially on durable goods and housing. This understanding occurs with

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regard to liquidity in consumer spending. When an income shock occurs, consumers will sell their durable goods to increase their liquidity. As a result, they incure large losses because they do not get the full value of the assets under selling pressure.

2.2 Previous Research

Several studies in different countries have had mixed results. Research conducted in Thailand by Mahathanasetha and Tauer (2018) using the GMM method provides results that there is a monetary policy transmission mechanism through the credit line in Thailand. As a result, banks with small sizes are more sensitive to monetary policy in Thailand than large banks. This occurs due to the tendency of banks to offset the flow of borrowed funds caused by tightening monetary policy by acquiring more deposits.

Another study by Gunji and Yuan (2009) in China. The study examines the impact of monetary policy in China according to bank profitability. By using the GMM method, the results show that banks with liquidity are more likely to be sensitive to monetary policy. The profitability results show a positive relationship to credit volume through bank lending channels in China. The impact of monetary policy that occurs is more sensitive for banks with high profitability. This happens because the tight monetary policy causes a decrease in deposits, profitable or high profitability banks should be able to finance this deficiency more easily than banks with low profitability. The results of other research on bank profitability are similar (Martynove, et al., 2019).

Several other studies have also examined how the impact of the economic crisis on the monetary policy transmission mechanism. The first study looked at the effect of monetary policy on bank lending channels during the financial crisis period before and after 2007 (Salachas, et al, 2016). The results show that the adoption of new monetary policy measures is fast in stimulating credit growth in the post-crisis sub-period in America, UK, Japan, Germany, Italy and France.

Research on the transmission of monetary policy is also being developed on the effects of competition between banks. Research conducted in ASEAN (Khan, et al., 2016) observed bank responses to changes in monetary policy based on bank characteristics (size, liquidity, and capitalization). The results shows that bank concentration undermines the effectiveness of monetary policy transmission through the bank lending channel. The results of the characteristics of banks that respond more to monetary policy are banks with high size and capital and with very liquid liquidity. This result is consistent with the theory of banking characteristics on credit volume through bank lending channels.

Previous research has shown that the variables used in this study have an influence on the transmission of monetary policy through the credit line. However, there is no research that explains the effect of the relationship between profitability on credit volume through bank lending channels in Indonesia by including the profitability variable. Hence, profitability is added in this study as the contribution to the literature. In addition, the data used in this research is individual bank. Whereas in previous studies use aggregate banking data. Then, the variable characteristics of the bank in this study were differentiated based on ten banks with the highest characteristics and ten banks with the lowest characteristics. The results will show which one is faster in influencing lending based on differences in bank characteristics, both in terms of influence and the level of significance of the development of credit volume through bank lending channels in Indonesia.

3. RESEARCH METHODS

3.1 Data

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Table 3.1
Data Sources

Variable	Source
Bank Loan	Financial Authority Services
GDP (Gross Domestic Product)	Central Statistics Agency
Policy Rate (BI interest Rate)	Indonesian Statistics of Economic and Finance (Bank Indonesia
Bank Characteristics (size, liquidity, equity, profitability)	Financial Authority Services

This study has a sample of 26 commercial banks in Indonesia during the period 2006 to 2016. State-owned and public-owned banks is selected as the sample based on the consideration that the circulation of money that occurs in those banks has a wider scope.

3.2 Empirical Model

The GMM method is a method using dynamic panel data. The GMM method is appropriate to use in this study because it solve the issue of endogeneity. In dynamic panel data, there is a lag in the dependent variable so that it correlates between the dependent variable and the residue. As a result, there will be data bias when using simple regression (Baltagi, 2005; Ekananda, 2016). To solve this problem, Arrelano & Bond (1991) suggest using GMM which includes the dependent variable lag as the independent variable. This study uses the GMM (Generalized Methods Moments) method in testing hypotheses with dynamic panel data estimation during 2006 to 2016. The empirical model is as follows:

$$\boldsymbol{lnloan_{it} = \alpha + \beta_1\, lnloan_{i,t-1} + \beta_2 size_{i,t-1} + \beta_3 liq_{i,t-1} + \beta_4 equ_{i,t-1} + \beta_5 prof_{i,t-1} + \beta_6 lnpdb_{i,t-1} + \beta_7 r_{i,t-1} + \varepsilon_{i,t}} \quad (3.1)$$

Description:

$lnloan_{it}$: volume of bank's credit distribution
$lnloan_{i,t-1}$: lag of dependent variable
$size_{i,t-1}$: bank size
$liq_{i,t-1}$: bank liqudity
$equ_{i,t-1}$: bank capitalization
$prof_{i,t-1}$: bank profitabiliy
$lnpdb_{i,t-1}$: gross domestic product
$r_{i,t-1}$: policy interest rate
$\varepsilon_{i,t}$: error term
$\beta_1, \ldots \beta_7$: coefficient of regression to 1, 2,… 7
i=1,2… 7 : cross section of commercial banks
t : time period
α : constant

3.3 Definition of Variables

In this study, there are 7 variables with the definition of each variable is as follows:

a. Total Credits: In the bank lending channel, total credit is defined as the total credit that has been extended by the bank to borrowers.

b. Bank size: According to Matousek and Holomon (2016), bank size is measured by the total assets owned by the bank. The greater the total assets owned by a bank, the bigger the size of the bank.
c. Bank liquidity: The calculation of the liquidity variable is the ratio between liquid assets divided by total assets. The higher the liquidity value, the more liquid assets the bank has.
d. Bank capitalization (equity): The measurement of bank equity uses the ratio of equity divided by total assets. The unit used in the variable equity is the ratio of equity to total assets (decimal).
e. Bank profitability**:** The measurement of bank profitability uses the total asset turnover ratio (Total Asset Turnover Ratio). This ratio measures the ability of banking assets to generate profits or income. The calculation of the total asset turnover ratio is by means of the ratio of total income to total assets. The unit used in the profitability variable is the ratio of total income to total assets.

3.4 Test of GMM Specifications

3.4.1 Arellano Bond Test

The Arellano Bond test aims to determine the consistency of the results obtained. To test autocorrelation on GMM, look at the Arellano Bond AR (2). If the probability value (Pr> z) appears below the significance level of 1%, 5%, and 10%, it means that there is autocorrelation in the model so that the model is invalid. Meanwhile, if the probability value (Pr> z) is above the significance level of 1%, 5%, and 10%, then the null hypothesis (H0) is not rejected. That is, there is no autocorrelation in the model and the model is valid.

3.4.2 Sargan Test or Hansen Test

The Sargan Test or Hansen Test tests the validity of the instrument for over-identifying restrictions. This test is carried out in order to find out whether the regression model is exogeneous, in which the dependent variable is only influenced by the variables in the model without being influenced by other variable.

4. RESULTS AND DISCUSSION

4.1.1 GMM Estimation Results for all sample

The GMM estimation results for all banks during 2006 to 2016 show that the effect of bank size on the volume of credit through the bank lending channel has a significant positive relationship. The results of the bank size variable are the same as the bank profitability. For the bank liquidity, the effect on the volume of credit through bank lending channels is significant negative. Then, the effect of equity on credit volume through bank lending channels is not significant. Meanwhile, the effect of the BI Rate on the volume of credit through bank lending channels is negative significant.

Table 4.1
GMM-SYS Estimation Results for All Banks

Variable	System GMM	
	Coefficient	Prob
Lag loan	0.4179335***	0.000
size	0.5443872***	0.000
liquidity	-0.5252631***	0.000
equidity	0.0120188	0.262

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profitability	0.9933418***	0.000
GDP	0.045711***	0.000
BI RATE (r)	-0.0272432***	0.000
AR(1)		[0.066]
AR(2)		[0.540]
***Hansen test* GMM**		[0.662]
***Difference* GMM**		[0.193]
***Hansen test* iv**		[0.998]
***Difference* iv**		[0.378]
Difference* iv *null		[0.378]

Description : (***) estimate with a significance level of 1%, (**) an estimate with a significance level of 5%, (*) an estimate with a significance level of 10%.

4.1.2 GMM Estimation Results considering Bank's size

Bank size and profitability have a significant positive effect to credit volume through bank lending channel. However, for GDP, liquidity and equity have a non-significant positive relationship. For banks with smaller sizes the results are as follows, bank sizes and GDP have a significant positive effect to the volume of credit through bank lending channels. Meanwhile, bank liquidity and BI Rate shows insignificant effect to credit volume.

Table 4.2
GMM-SYS Estimation Results Considering Bank size

Variable	***Higher Size***		***Lower Size***	
	Coefficient	***Prob***	***Coefficient***	***Prob***
Lag loan	0.6271415***	0.000	0.2695398	0.122
Size	0.320656***	0.000	0.5697876***	0.001
Liqudity	0.538292	0.784	-0.305108	0.241
Equity	0.535142	0.433	0.0622488	0.542
Profitability	4.171014***	0.000	0.7111372*	0.083
GDP	0.441921*	0.086	0.1607498***	0.000
BI Rate	-0.0247046***	0.005	-0.0231991	0.141
AR(1)	[0.015]		[0.005]	
AR(2)	[0.488]		[0.987]	
***Difference* GMM**	[0.602]		[0.903]	
***Sargan test* iv**	[0.813]		[0.607]	
***Difference* iv**	[0.955]		[0.976]	
Difference iv null	[0.348]		[0.370]	

Description : (***) estimate with a significance level of 1%, (**) an estimate with a significance level of 5%, (*) an estimate with a significance level of 10%.

4.1.3 GMM Estimation Results considering Bank's liquidity

Table 4.3
GMM-SYS Estimation Results Considering Liquidity

Variable	***Higher Liquidity***		***Lower Liquidity***	
	Coefficient	***Prob***	***Coefficient***	***Prob***
Lag loan	0.3124811***	0.002	0.8414639***	0.000
size	0.6442862***	0.000	0.1213948	0.193
Liquidity	-0.0814386	0.615	-0.754159**	0.021

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Equity	0.0288882	0.742	0.1752604*	0.064
Profitability	0.5441215**	0.032	0.6810672	0.526
GDP	0.0424454***	0.004	0.0568295***	0.005
BI rate	-0.262987**	0.045	-0.0243415*	0.086
AR(1)	[0.004]		[0.006]	
AR(2)	[0.988]		[0.333]	
***Difference* GMM**	[0.904]		[0.170]	
***Sargan test* iv**	[0.802]		[0.159]	
***Difference* iv**	[0.917]		[0.266]	
Difference iv null	[0.751]		[0.088]	

Description : (***) estimate with a significance level of 1%, (**) an estimate with a significance level of 5%, (*) an estimate with a significance level of 10%.

The result of the bank group with high liquidity is as follows, bank size, profitability and GDP have significant positive effect to credit volume. However, the effect of equity is not significant. As for policy rates (BI Rate), the effect is negative to the credit volume. For banks with lower liquidity the results is as follows. bank size, equity, and profitability are not significant in affecting credit volume. Moreover, the GDP significantly affects the distribution of credit positively. Then liquidity and policy rates (BI Rate) shows negative effect on credit volume through bank lending channels.

4.1.4 GMM Estimation Results considering Bank's equity

The results for banks with higher equity are as follows. sizes and GDP have a significant positive effect to the volume of credit. Equity, liquidity and BI Rate shows insignificant effect to credit volume. Moreover, the results for banks with lower equity is as follows, liquidity, equity and BI Rate have a negative impact to the credit volume through bank lending channels. while size, profitability and GDP have a positive impact to credit volume through bank lending channels. However, the effect of profitability is not significant. The result obtained by model estimation is that the loans volume of banks with lower equity is more quickly affected than banks with higher equity.

Table 4.4
GMM-SYS Estimation Results Considering Equity

Variable	*Higher Equity*		*Lower Equity*	
	Coefficient	***Prob***	***Coefficient***	***Prob***
loan	0.5311585***	0.000	0.466851***	0.000
Size	0.4052502***	0.003	0.512733***	0.000
Liquidity	-0.03468099	0.302	-0.302251**	0.046
Equity	0.1610402	0.305	-0.0290338	0.668
Profitability (*prof*)	0.5322063	0.256	0.4697903	0.536
GDP	0.0670446***	0.001	0.032054**	0.040
BI Rate	-0.0010137	0.959	-0.379771***	0.000
AR(1)	[0.004]		[0.020]	
AR(2)	[0.893]		[0.244]	
***Difference* GMM**	[0.592]		[0.812]	
***Sargan test* iv**	[0.565]		[0.929]	

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***Difference* iv**	[0.607]	[0.943]
Difference iv null	[0.543]	[0.766]

Description : (***) estimate with a significance level of 1%, (**) an estimate with a significance level of 5%, (*) an estimate with a significance level of 10%.

4.1.5 GMM Estimation Results considering Bank's profitability

Results for banks with higher profitability characteristics are as follows, bank size, profitability, and GDP have significant positive effect to credit volume. liquidity and BI Rate has negative effect to the volume of credit. In category of banks with lower profitability, bank sizes and GDP have significant positive impact on the volume of credit. Meanwhile, variables that shows negative influence on credit volume are bank liquidity, equity, policy interest rate (BI Rate).

Table 4.5
GMM-SYS Estimation Results Considering Profitability

Variable	*Higher Profitability*		*Lower Profitability*	
	Coefficient	***Prob***	***Coefficient***	***Prob***
Loan	0.5292631***	0.000	0.4436315***	0.000
Size	0.411548***	0.000	0.5354678***	0.000
Liquidity	-0.6929613**	0.011	-0.4936246***	0.003
Equity	0.0696787	0.586	-0.0277911	0.689
Profitability	1.012882***	0.007	0.546934	0.400
GDP	0.0672697***	0.000	0.0334302**	0.031
BI Rate	-0.0107004	0.526	-0.388417***	0.000
AR(1)	[0.000]		[0.021]	
AR(2)	[0.985]		[0.216]	
***Difference* GMM**	[0.518]		[0.575]	
***Sargan test* iv**	[0.781]		[0.563]	
***Difference* iv**	[0.462]		[0.352]	
Difference iv null	[0.897]		[0.899]	

Description : (***) estimate with a significance level of 1%, (**) an estimate with a significance level of 5%, (*) an estimate with a significance level of 10%.

4.2 Discussion

In this study, the results of GMM estimates showed that the characteristics of banks (size, liquidity, equity, and profitability) significantly influenced the lending in the sample of all banks. This indicates that the bank lending channel has a role in the transmission mechanism of monetary policy in Indonesia during 2006 to 2016. The lag of dependent variables indicates the potential for credit growth that occurs annually. Other results in this study for samples throughout the bank also showed results that fit the theory. The policy rate effect is negative to the volume of credit through the bank lending channel while economic growth has a positive impact to the volume of credit. This finding in line with the theory that changes in interest rates will affect capital costs and eventually affect investment and consumption as a component of aggregate demand (Mishkin, 1995).

According to the results of GMM estimates, banks with larger size is more quickly affected by economic policy. This happens when the central bank loosens monetary policy by lowering interest rates, then banks with higher sizes already have more assets, so it tends to increase lending. Hence, its revenue will also increase. When the central bank implements contractive monetary policies such as raising interest rates, deposit rates also increase. As a

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result, many people put their money in the bank so that the total deposit increased, while the loan disbursed is decreased. This is in accordance with the results of previous research (Matousek, Roman and Helen Solomon, 2017; Golodniuk, Inna, 2005; Gambarcota, Leonardo, 2004).

Banks with higher liquidity more strongly affected by monetary policy. This occurs because when central bank loosens monetary policy (for example lowering interest rates), banks with higher liquidity have large liquid assets so that the volume of credit through bank lending channels for the short term increases. As a result, disbursed credit increases followed by the increase of output. According to Kashyap and Stein (1994, 2000), the bank's liquidity position is important in determining its reserve deposits. For example, when the central bank tightens monetary policy by increasing reserves at the central bank, the large amount of liquid assets in the bank can cover the depletion of reserve deposits by selling some of the bank's securities. As for banks with lower liquidity, they are likely to maintain their liquidity due to the small amount of their liquid assets (John Thornton, John and Tommaso, Caterina di., 2019; Yang, Jun and Shao, Hanhua., 2015; Apergis, et al., 2012).

GMM results for estimation by classifying banks acoording to its equity show that lower equity banks tend to be more affected by the policy rate in term of distributing loans. This is because lower equity banks will reduce the volume of credit more than banks with large equity due to tight monetary policy (Gambarcota, et al., 2011). Mechanisms that occur as follows. When the central bank conducts contractive monetary policy by increasing the bank's capital ratio, then the bank with higher equity still has other capital in channeling credit (resistant to monetary policy). As a result, banks with lower equity tend to reduce loan more than banks with higher equity.

Lastly, the results for estimation by classifying banks acoording to its profitability characteristics indicate that banks with lower profitability are affected stronger by the monetary policy. This happens when the central bank tightens monetary policy, then banks with lower profitability will be more difficult to profit compared to banks with higher profitability. As a result, banks with lower profitability tend to increase loans from other funds so that the profits obtained can cover the loan as a result of underfunding (Martynove, et al., 2019; Gunji, Hiroshi &Yuan, Yuan., 2009)..

5. CONCLUSIONS

The conclusions of this study are:

1. The policy rate (BI Rate) negatively affects the volume of credit through bank lending channels during the period of 2006 to 2016.
2. Economic growth (GDP) positively affect the volume of credit through bank lending channels during the period of 2006 to 2016.
3. Bank karaketristic variables (size, liquidity, equity, profitability) significantly affect the volume of credit through bank lending channels during the period 2006 to 2016. Following the grouping of the samples banks based on the highest rate and the lowest level of its characteristics. The results show that:
   (i) The effect of monetary policy on credit volume through bank lending channels is stronger on banks with higher size.
   (ii) The effect of monetary policy on credit volume through bank lending channels is stronger on Banks with higher liquidity.
   (iii) The effect of monetary policy on credit volume through bank lending channels is stronger on banks with lower equity.
   (iv) The effect of monetary policy on credit volume through bank lending channels is stronger on banks with lower profitability.

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