



How Rural Banks Respond to Monetary Transmission via Bank Lending Channel?

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ABSTRACT

This study investigates the existence of monetary policy transmission via bank lending channel on Indonesian rural banks that located across provinces. The datasets consist of 1860 rural banks that located in 34 provinces in Indonesia. Using the dynamic system generalized method of moments (GMM) estimations, the empirical results indicate that monetary transmission via bank lending channel works on rural bank in Indonesia. When the central bank of Indonesia tightening the monetary policy, the lending channeled by rural banks reduce, and vice-versa. Our findings implies that the transmission of monetary policy via bank lending channel is remain strong policy provided by central bank.

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INTRODUCTION

The monetary policy via bank lending channel suggests that banks play a special role in monetary transmission. When monetary is tight, it forces the bank to reduce their lending supply. As theory suggests, monetary policy has a relationship with the real economy. This monetary policy affects GDP and prices through bank lending (Bernanke and Gertler, 1995). Bank lending channel is a well-established phenomenon in the banking literature. It aims to investigate the existence as well as the effectiveness of monetary policy through the lending channel. However, recently there are some papers re-visit and explore the new insight that related to the literature. A recent paper by (Halvorsen and Jacobsen, 2016) revisits the role of bank lending in monetary policy transmission in a single country, Norway. (Fungáčová et al., 2016) examine how reserve requirement influences the transmission of monetary policy through the bank lending channel in China. Using data from the US bank balance sheet, (Breitenlechner et al., 2016) find that financing cost represents an important element of the bank lending channel.

The existence of bank lending channel literature also has been widely investigated across the globe. For instance, in Europe (Cantero-Saiz et al., 2014; Ciccarelli et al., 2015; Fungáčová et al., 2014; Matousek and Sarantis, 2009), Asia and Latin America (Bhaumik et al., 2011; Hou and Wang, 2013; Olivero et al., 2011a, 2011b). Mishra et al. (2014) specifically make a comparison of bank lending channel in low-income, emerging, and advanced countries. They find that low-income countries exhibit a much weaker transmission of monetary policy shocks to bank lending rates than do advanced and emerging countries.

Some researchers also pay attention to specific lending instead of growth of aggregate lending. By focusing on specific lending, it might have a deeper insight to understand how the channel works. Kandrac (2012) finds that in response to monetary policy tightening, banks decrease the proportion of credit extended to high-agency-cost small borrowers or small firms. Mora (2014) specifies the lending to consumer or household by investigating the weakened transmission of monetary policy to consumer loan rates. Black et al. (2010) look for the special role by examining the business strategies of banks related to mortgage lending. Black et al. (2010) and Musso et al. (2011) provide evidence that the transmission of monetary policy shocks to the housing market. Garretsen and Swank (2003) find that corporate loans are depressed only after a lapse of over a year and household loans decrease almost instantly due to an interest rate rise. Ciccarelli et al. (2015) using U.S and E.U data of bank lending surveys by central banks, find that the credit channel amplifies a monetary policy shock on GDP and price through the balance sheets of households, firms, and banks. They distinguish lending into lending for households and corporates. For corporate lending, amplification is highest through the bank lending and the borrower's balance sheet channel, but for households, demand is the strongest channel.

Monetary policy actions have a single national effect. However, there is some evidence on whether and to what extent monetary policy stances have differential effects on a regional level. Carlino et al. (1998) examine whether monetary policy have similar effects across regions in the United States. Ridhwan et al. (2014) measure the impact of monetary policy shocks on regional output in Indonesia. Guo and Masron (2016) investigate the provincial effects of monetary policy in China and find that provinces respond differently to monetary actions. The studies above confirm that transmission of monetary policy through bank lending channel has both a national and regional effect. Ongena et al. (2021) study the impact of monetary they find that the supply of bank credit in a foreign currency is less sensitive to changes in domestic monetary conditions than the equivalent supply in the domestic currency. Bhaumik et al. (2011) use bank-level data from India, they examine the impact of ownership on the reaction of banks to monetary policy and also test whether the reaction of different types of banks to monetary policy changes is different in easy and tight policy regimes. Their findings suggest that there are considerable differences in the reactions of different types of banks to monetary policy initiatives of the bank central and that the bank lending channel of monetary policy is likely to be much more effective in a tight money period than in an easy money period. It motivates our paper whether different type of bank matters in respond to monetary transmission via bank lending channel.

This work aims to investigate bank type dimension of transmission of monetary policy through bank lending channel. Our detailed data enables us to examine how rural banks respond to the tightening or loosening monetary policy. Using quarterly data from 2010-2016 for 1860 rural banks in 33 provinces in Indonesia, it helps us to understand how the channel works in a different type of financial institution within a country. Indonesia, as the fourth most populous countries and the largest archipelagic state in the world, has a huge disparity among its provinces regarding economic development, financial and business activities, infrastructure, and human development that provides a good laboratory country with which to evaluate the monetary policy transmission via bank lending channel on Indonesian rural banks.

The rest of this paper is structured as follows. Section 2 provides related literature. In Section 3, we present data, variables, and empirical strategy. In Section 4, we report the empirical results. Section 5 concludes with our key findings and provides policy implications.

LITERATURE REVIEW

Several studies about monetary policy through bank lending channel have been extensively conducted with different results. Hereafter, we provide a brief literature review of recent studies that discuss monetary policy via bank lending channel with several related issues. Fungáčová et al. (2014) examine how competition influence the bank lending channel in the euro area countries. Using panel data of banks from 12 euro area countries from the period 2002-2010, they analyze the reaction of loan supply to monetary policy actions depending on the degree of bank competition. They find the effect of monetary policy on bank lending is dependent on bank competition. Further investigation shows that banks with less market power were more sensitive to monetary policy only before the financial crisis.

Olivero et al. (2011a) also examine how competition affects the transmission of monetary policy through the bank lending channel. With two-step estimation using level panel data for commercial banks in 10 Asian and 10 Latin American countries during the period from 1996 to 2006. They find that increasing competition in banking sector weakens the transmission of monetary policy through the bank lending channel. This is also in regard to the banks which have a small size, low liquidity, and low capitalization. In Olivero et al. (2011b) the results remain the same with the effect of banking consolidation on monetary policy. Khan et al. (2016) investigate the role of bank competition for the transmission of monetary policy through the bank lending channel. They also consider the banks' characteristics that might affect the banks' response to monetary policy shocks. Using bank-level data from five ASEAN countries over a period of 1999-2014, they find that the effect of monetary policy on bank lending reduces as the level of competition decreases.

Their evidence regarding the characteristics of banks is supported by the empirical work from Matousek and Sarantis (2009) that investigate the impact of the bank lending channel of monetary transmission in the 8 CEE countries which have joined the EU. They employ panel data over period 1994-2003 with dynamic panel estimation technique. They find that bank size and liquidity play the most significant role to changes in monetary policy. Their findings conclude that the monetary policy via bank lending channel is associated with the degree of competition as well as bank characteristics. They provide evidence from Europe, Latin America, Asia and ASEAN banks.

There are also several studies that have a different view to see the transmission of monetary policy through bank lending channel by ownership changes. Bhaumik et al. (2011) use bank-level data from India, they examine the impact of ownership on the reaction of banks to monetary policy and also test whether the reaction of different types of banks to monetary policy changes is different in easy and tight policy regimes. Their findings suggest that there are considerable differences in the reactions of different types of banks to monetary policy initiatives of the bank central and that the bank lending channel of monetary policy is likely to be much more effective in a tight money period than in an easy money period. They also find differences in the impact of monetary policy changes on less risky short-term and riskier medium-term lending.

To see evidence whether foreign banks react differently relative to domestic bank in terms of monetary policy, Vázquez et al. (2007) exploit a panel dataset comprising 1,565 banks in 20 emerging countries during 1989- 2001 and compare the response of the volume of loans and the rates on loans and deposits to various measures of monetary conditions across domestic and foreign banks. They also look for systematic differences in the behavior of domestic and foreign banks during periods of financial distress and tranquil times. Using differences in bank ownership as a proxy for financial constraints, they find weak evidence that foreign banks have a lower sensitivity of credit to monetary conditions relative to their domestic competitors, with the differences driven by banks with lower asset liquidity and/or capitalization. The lending and deposit rates of foreign banks tend to be smoother during periods of financial distress. However, the differences across domestic and foreign banks do not appear to be strong. These results provide weak support to the existence of supply-side effects in credit markets and suggest that foreign bank entry in emerging countries may have contributed somewhat to stability in credit markets.

Hou and Wang (2013) try to see different perspective by investigating not only ownership differences but also the government intervention as they argue that mostly banks in China are controlled by the government. They examine how banking marketization affects the transmission of monetary policy through the bank lending channel, and test whether the relationship between banking marketization and the transmission of monetary policy changes across heterogeneous banks. Using data from China, as the degree of banking marketization increase, the results show that China's monetary policy transmission through the bank lending channel weakens; it works particularly for large, high profitability, and high capitalization banks.

Inside the bank lending channel literature, several studies have the advantage of detailed data to conduct a deeper investigation. Using a detailed data, they provide deeper investigation and new insight of transmission of monetary policy through bank lending channel. Aysun and Hepp (2013) compare the strength of the lending and balance sheet channel of monetary transmission. They use loan-level data to determine how borrower balance sheets and bank liquidity are related to bank lending decisions and how monetary policy can affect these relationships. Their data enables them to measure the independent effects of the two channels and directly account for borrower balance sheets and lender liquidity. Their findings show that the balance sheet channel is the main mechanism through which monetary policy shocks are transmitted to the economy and that the lending channel does not play a significant role.

Using U.S and E.U data of bank lending surveys by central banks, Ciccarelli et al. (2015) find that the credit channel amplifies a monetary policy shock on GDP and price through the balance-sheets of households, firms, and banks. They distinguish lending into lending for households and corporates. For corporate lending, amplification is highest through the bank lending and the borrower's balance sheet channel but for households, demand is the strongest channel. Black et al. (2010) examine the special role of the bank by examining the business strategies of banks as it relates to mortgage funding and mortgage lending. The bank lending channel suggests that banks play a special role in the transmission of monetary policy because monetary policy affects banks' cost of fund in addition to changes in the risk-free rate. They find evidence that bank lending channel significantly reduces their mortgage lending in response to a monetary contraction.

Ivashina et al. (2021) Using credit-registry data for Spain and Peru, they document that four main types of commercial credit—asset-based loans, cash flow loans, trade finance and leasing—are easily identifiable and represent the bulk of corporate credit. They show that credit growth dynamics and bank lending channels vary across these loan types. The effects of monetary policy propagating through banks' balance sheets are primarily driven by cash flow loans, whereas asset-based credit is mostly insensitive to these types of effects, consistent with theories on the pledgeability of hard assets.

DATA AND METHODOLOGY

We investigate whether monetary transmission via bank lending channel works on rural bank in Indonesia. Our data consist of 1860 rural banks that located in across 34 provinces in Indonesia. We combine the rural bank level data with provinces level data that are retrieved from the Indonesia Statistics Office (BPS) and the

dataset on Indonesian rural banking provided by the Indonesia Deposit Insurance Corporation (LPS) and the Indonesia Financial Services Authority (OJK). Table 1 provides the descriptive statistics of variables and Table 2 provides correlation matrix.

Table 1 Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
BIrate	48,021	6.683	0.761	5	7.75
ldr	40,375	80.069	12.069	57.18	95.97
roa	40,408	3.506	3.098	-1	9
npl	40,366	5.624	4.835	0.51	15.64
car	40,362	28.337	16.500	11	62.54
Bank_Density	48,020	30.047	11.125	14.441	48.058
GDRP	47,663	5.767	0.598	5.05	6.69
lnTA	40,374	16.638	0.987	15.138	18.291
eqta	40,300	0.232	0.187	0.017	0.624
Incredit	40,218	16.332	1.019	14.753	18.014

Table 2 Correlation matrix

	BIrate	ldr	roa	npl	car	Bank_Density	GDRP	lnTA	eqta	Incredit
BIrate	1									
ldr	-0.0018	1								
roa	-0.0374	0.1345	1							
npl	-0.0143	-0.0317	-0.1964	1						
car	-0.0251	-0.0798	0.1327	0.0622	1					
Bank_Density	-0.0082	-0.0319	0.0251	0.0143	0.049	1				
GDRP	0.2687	0.0058	-0.034	0	0.0021	-0.1347	1			
lnTA	0.0533	0.0605	0.0654	-0.2319	-0.3987	-0.1055	0.0356	1		
eqta	-0.0058	-0.0094	0.2062	0.0992	0.582	0.0652	-0.0054	-0.521	1	
Incredit	0.0593	0.1171	0.1327	-0.168	-0.2654	-0.1068	0.0377	0.6681	-0.0324	1

To investigate regional effect of the bank lending channel, we propose the following model based on the approach of Kashyap and Stein (1995) with Gmm system:

$$\Delta Loans_{i,j,t} = \beta_0 + \beta_1 \Delta Loans_{i,j,t-1} + \beta_2 \Delta Interest_t + \beta_3 \Delta GDP_{j,t} + \beta_4 Size_{i,j,t-1} + \beta_5 Liquidity_{i,j,t-1} + \beta_6 Capital_{i,j,t-1} + \beta_7 Findev_{j,t} + \beta_8 Inflation_{j,t} + \beta_9 Competition_{j,t} + \varepsilon_{i,j,t} \quad (1)$$

Where our dependent variable is the growth of rural bank credit. Our main variable of interest is monetary policy (interest) of central bank measure bank Bank Indonesia rate (average of BI Repo rate). We expect that the higher BIrate indicates tightening monetary policy and lower BIrate is loosening monetary policy.

Our control variables are loan to deposit ration as a proxy of intermediation capacity, return on asset to measure the performance of rural bank, non-performing loan to gauge the riskiness of rural bank, CAR to capture the capitalization of rural bank, bank density to show the competition of financial services in a province. We also use logarithm natural of total asset and equity to total asset to measure size of each rural bank and we include inflation rate to control provinces. We also included provinces fixed in effect in regression.

EMPIRICAL RESULTS

We investigate the existence of monetary policy transmission via bank lending channel on Indonesian rural bank that located across provinces. Following previous literature, we use central bank rate to measure the monetary transmission via bank lending channel. Table 3 provide empirical results using two-step GMM estimation following literature in bank lending channel. Our results shows that monetary transmission via bank lending channel works for rural bank in Indonesia. After controlling rural bank characteristics and

province-specific, we find *birate* has negative and significant relationship associated with credit by rural bank. It means that tightening monetary policy set by central bank reduces the quantity of bank lending channeled by rural bank.

Turning to our bank-specific, we find that capacity of intermediation, capital, total asset and leverage could increase the credit by rural bank. However, we find that our macroeconomics variables do not show significant results. Our result is robust with two-step-robust GMM and passes several GMM model testing such as AR test and Hansen test.

Table 3 Baseline regression with two step GMM estimator (with collapsed instruments)

	(1)	(2)
	Two step	Two step robust
lag_lncredit	0.3452 ^{***} (0.0273)	0.3452 ^{***} (0.0555)
birate_g	-0.0322 ^{**} (0.0156)	-0.0322 [*] (0.0194)
ldr	0.0032 ^{***} (0.0004)	0.0032 ^{***} (0.0005)
roa	-0.0027 (0.0017)	-0.0027 (0.0021)
npl	-0.0004 (0.0011)	-0.0004 (0.0013)
car	-0.0076 ^{***} (0.0006)	-0.0076 ^{***} (0.0009)
lnTA	0.5867 ^{***} (0.0268)	0.5867 ^{***} (0.0527)
eqta	1.8254 ^{***} (0.0976)	1.8254 ^{***} (0.1627)
Bank_Density	-0.0008 (0.0007)	-0.0008 (0.0009)
GDRP	0.0088 (0.0074)	0.0088 (0.0094)
_cons	0.4392 ^{***} (0.1397)	0.4392 ^{**} (0.1707)
No. of obs.	34018	34018
No. of groups	1830	1830
No. of instruments	35	35
AR1 stat	-9.0546	-7.9260
AR1 p-stat	0.0000	0.0000
AR2 stat	-2.7396	-2.7064
AR2 p-stat	0.0062	0.0068
Hansen stat	355.4861	355.4861
Hansen p-stat	0.0000	0.0000

Note: Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

We then split our sample based on asset of rural bank to evaluate whether the monetary transmission via bank lending channel exist for both large and small rural banks. We differentiate rural bank into two groups which are Large as large rural bank which have total asset higher than mean value of our sample and Small as small rural bank that have asset below the mean value. Our results reported in Table 4 indicate that monetary policy transmission via bank lending channel only more pronounced for small bank rather than large bank. We find that negative and significant relationship between the change of *birate* with loan growth. This finding relates to study of Naiborhu (2020) that find in conventional commercial bank, bank lending channel exists for both large and small bank. As highlighted in the paper, rural bank is subject to different regulation and business model.

Table 4 sub-sample based on asset

	(Large) lncredit	(Large) lncredit	(Small) lncredit	(Small) lncredit
lag_lncredit	0.2097*** (0.0387)	0.2097*** (0.0723)	0.4653*** (0.0321)	0.4653*** (0.0673)
birate_g	0.0348 (0.0282)	0.0348 (0.0343)	-0.0412** (0.0173)	-0.0412* (0.0230)
ldr	0.0041*** (0.0007)	0.0041*** (0.0009)	0.0027*** (0.0004)	0.0027*** (0.0006)
roa	-0.0086** (0.0036)	-0.0086* (0.0047)	-0.0030** (0.0015)	-0.0030 (0.0020)
npl	-0.0006 (0.0029)	-0.0006 (0.0034)	-0.0013 (0.0010)	-0.0013 (0.0013)
car	-0.0086*** (0.0015)	-0.0086*** (0.0018)	-0.0060*** (0.0006)	-0.0060*** (0.0010)
lnTA	0.6996*** (0.0506)	0.6996*** (0.0858)	0.4934*** (0.0325)	0.4934*** (0.0653)
eqta	3.2024*** (0.2624)	3.2024*** (0.3403)	1.3407*** (0.1005)	1.3407*** (0.1817)
Bank_Density	-0.0025* (0.0014)	-0.0025 (0.0018)	-0.0007 (0.0007)	-0.0007 (0.0010)
GDRP	0.0194 (0.0153)	0.0194 (0.0178)	0.0077 (0.0076)	0.0077 (0.0102)
_cons	0.5152 (0.5148)	0.5152 (0.6381)	0.1794 (0.1817)	0.1794 (0.2291)
N	10958	10958	23060	23060

Note: Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

CONCLUSION

Although bank lending channel is a well-documented, those recent studies provide evidence that bank lending channel remains interesting topic to investigate. Especially, the 2007-2009 global financial crisis that brings back the question whether monetary policy via bank lending channel remains effective. This study contributes to the literature in two ways. First, it provides evidence on the debate whether bank lending channel has a different effect on different type of banks. Second, whether the monetary policy via lending channel works for both large and small rural banks. We find that monetary transmission via bank lending channel works on rural bank in Indonesia and the empirical results are more pronounced for small rural banks. When the central bank of Indonesia tightening the monetary policy by increasing the rate, the lending channelled by rural bank reduces. Our findings implies that the transmission of monetary policy via bank lending channel is remain strong policy provided by central bank.

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