Transmission of Monetary Policy through the Bank Lending Channel in the Philippines

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Abstract—This paper empirically tests the presence of a bank lending channel of monetary policy in the Philippines. It aims to demonstrate that bank lending channel is present in the Philippines by showing that loan growth is affected by monetary policy shocks. This study uses quarterly data from 2008-2011 of the country's 35 commercial and universal banks. The banks are segregated according to the size of their assets: >P300B(large),P200B<size<P300B(large1),P100B<size<P200B(large2),P50B<size<P100B(medium1),P25B<size<P50B(medium 2) and P<25B(small). Panel ordinary least squares method is used to check the relationship between loan growth and monetary policy. Results show that loan growth of small banks is sensitive to movements in monetary policy, thus providing evidence for a bank lending channel in the Philippines. Increase in policy rates result in a decrease in loan supply of small banks. This paper also presents that bank characteristics, particularly size, can have influence in the existence of the bank lending channel.

Index Terms—Bank lending channel, loan supply, monetary policy

I. INTRODUCTION

A number of empirical studies have been made on the effects of monetary policy movements on the economy and the mechanisms by which these effects are subsequently transmitted into the real economy (e.g. [1]-[3]). The research proposition on the role that financial intermediaries (i.e. banks and insurance companies) take in the transmission mechanism of monetary policy is that monetary policy stance has a direct effect on the balance sheets of these intermediaries [4]. The banks' role in the transmission mechanism of the monetary policy stance through credit channels has also been a subject of numerous studies.

Two subchannels within the credit channel are suggestive of the role of banks in the transmission of monetary policies. These subchannels are the balance sheet channel or the borrower's net worth channel and the bank lending channel [5]-[7]. The balance sheet channel is the channel where policy can weaken the balance sheet of borrowers that can, in turn, affect their borrowing capacity. The bank lending channel, on the other hand, is evident when tight monetary policy and/or an increase in the issuances of commercial papers by firms are shown to be related to a decrease in loan supply rather than a decline in loan demand [6]. The bank lending channel can only be possible under two conditions: if there are borrowers who are dependent on banks for their loan requirements and if the loan supply of these banks are

affected by movements in monetary policy [8]. This paper presents evidence to support the existence of the bank lending channel in the Philippines as characterized by the banks' size. The presence of bank lending channel will be ascertained as a constraint in monetary policy is shown to affect the loan supply level of undercapitalized banks, consequently restraining their loan portfolio growth. Following the papers of [2] and [6], this study categorized banks by the size of their assets (bank size). Reference [6] argued that the "too big to fail" policy justifies the use of the asset size as a proxy for information costs. They suggest that banks with sufficient capitalization can absorb the negative effects of a monetary policy constraint on the growth of their loan portfolio. The hypothesis of this study is that movements in policy rates have an effect on the loan growth of smaller banks, thereby providing evidence for a bank lending channel as a mechanism for the transmission of monetary policy into the economy.

This paper is organized as follows: This section is an overview of the transmission of monetary policy and its relevant channels. The next section reviews the literature that shows empirical evidence of bank credit channels from several studies. Section III presents the theoretical framework that lays the basis for the study. Section IV describes the data and estimation with the results and analysis of the findings. Section V presents the conclusion and possible extensions to the study.

II. LITERATURE REVIEW

At least two aspects are to be considered in evaluating the transmission of monetary policy into the real economy; namely, the transmission of the policy from instruments directly controlled by the central bank to the private sector and the relationship between financial conditions and consumption decisions of the consumers [9]. In the case of central bank policy, the transmission mechanism applies as it affects both bank assets and deposits [7]. The instruments controlled by central bank in relation to the monetary policy transmission are reserve requirements and the interest rate; for the non-financial sector, the variables relevant to the transmission of monetary policy include interest rates on loans, deposits and the exchange rates [9].

Studies by [1], [2], [7] have shown the existence of credit channels by which monetary policy affects the economy. These are the borrower's net worth channel or the balance sheet channel and the credit channel called the bank lending channel [10], [11]. According to [8], the balance sheet channel becomes evident from the asymmetric information between lenders and borrowers on the net worth of the borrowers as presented in their balance sheets. Weakened

balance sheets resulting from policy movements, increases the risk premium on borrowers; this subsequently make it more difficult for these borrowers to gain access to financing from banks [4]. Constraints on monetary policy can result in an increase in the cost of capital as its tightening consequently affects the financial system's liquidity[8].

For the bank lending channel to be operational (i.e. for monetary policy to have an effect on the economy) there are two conditions that must be met; namely, that there should be borrowers who dependent on the credit facilities provided by banks and that the lending activities of banks are constrained by monetary policy stance [12]. According to [13], "the costs of obtaining information about a firm's (financial) condition are greater for smaller firms, thus small firms find it difficult and more costly to obtain credit. Banks have a comparative advantage over other intermediaries in information processing that enable them to lend to smaller firms at a lower cost." As in most parts of the world, banks are still major sources for financing for the private sector, specifically, for smaller firms. The banks' role then in the transmission of monetary policy becomes evident through the bank lending channel [14].

In the bank lending channel, asymmetric information problems between banks and the provider of funds (depositors) create constraints for these banks to have access to sources of loanable funds other than demand deposits [15]. It will be more difficult and costly for smaller and undercapitalized banks than banks with sufficient capital and with higher liquidity level, to replace loan supply with other sources of funds [8]. If these banks are not able to provide viable alternative sources of loanable funds with the tightening of the monetary policy, they will be pressured to limit their lending activities, thus, transmitting the effect of the policy stance into the economy [16], [17]. References [6] and [15] have provided evidence that bigger banks with sufficient capital and liquidity are more likely to have the sources to cushion the effects of monetary policy tightening. Sources of loanable funds other than demand deposits (e.g. from interbank and financial markets) are available to these larger banks, thus providing them with alternative forms of loan fund supply [16]. With their access to other forms of sources for their loan supply, bigger banks are less likely to restrain on their lending activities as compared to smaller banks [17]. The level of the banks' capital and liquidity remain to be determinants of the banks' ability to transmit policy stance into the real economy [6], [18]. References [14] and [19], have established that capital adequacy of banks is a significant factor in the banks' ability to sustain their lending activities after monetary policy movements. As stated in [19], "lending by banks with low capital has a delayed and then amplified reaction to interest rate shocks, relative to well-capitalized banks". Excess liquidity can likewise be a source of loan supply for banks as it can be an alternative to equity or debt [18]. Reference [15] have presented that banks with higher level of liquidity have exhibited an increase in the growth of their loan portfolio despite of monetary policy tightening.

Several studies on the presence of the lending channel show that the response of loan supply on contractions of monetary policy may depend on certain bank characteristics. Reference [17], in testing for presence of lending channel in Austria, classified the banks by how similar they react to changes in interest rate. Reference [11] as stated in their paper, categorized banks "on the presence or absence of a formal regulatory action, supplemented with information on regulators' CAMELS rating for banks". However, a number of papers have shown that classifying banks according to asset size have confirmed that indeed, the size of the bank's assets has an effect on the bank's loan portfolio growth.

Reference [20] use liquidity as a variable to prove the presence of lending channel for Germany, Belgium and the Netherlands; [8] for Venezuela, [21] for Spain and [2] for the US, use bank size, liquidity and capitalization as their basis for investigating the presence of lending channels. Reference [22] for Australia, use bank size and loans to show the relationship between the banks' credit stability and policy-induced movements in their deposits. The results of their studies are consistent with the hypothesis that the bank size, liquidity and capitalization have a significant effect on the banks' loan growth as monetary policy tightens.

An earlier work by [1] has likewise shown the effect of monetary policy shifts on the banks' loan supply. Their results show a decrease in loans with a lag after an increase in policy rates. However, it cannot be determined whether the decrease is from a decline in loan supply or a decline in loan demand. Reference [15] then pointed out that since market imperfections influence the banks' ability to induce marginal sources of financing, the effect therefore on loan supply may be more evident in smaller banks. Their empirical tests, using bank level data, yield results consistent with their hypothesis. The size of the bank is directly linked to the banks' ability to provide loans but is totally indifferent to loan demand [6].

To represent monetary policy shifts, the variable used by several empirical studies (e.g. [1] and [11]) is the change in federal funds rate. Reference [6] use the change in federal funds rate and the change in an indicator computed by [23] as a proxy for monetary policy shift. According to them, the Bernanke-Milhov indicator is derived "using non-borrowed reserves, total reserves, and other variables such as real GDP, GDP deflator and commodity prices." Numerous studies on the presence of lending channels in several countries (e.g. [3], [8] and [24]) utilize other proxy variables to represent the factors significant to finding evidence of lending channels. The study of [14] on the lending channel in the Philippines points out the significance of bank credit channels in the transmission mechanism of monetary policy. Results of her study show that during inflation targeting years 1999-2002, the interest and exchange rate channels have become more distinct and that, as she states, "bank credit channel matters in transmitting impulses into the real economy". According to [9], liberalization in the financial markets in the Philippines in the 1990's has opened up alternatives to bank lending, resulting in a decrease in the ability of credit to be a channel for monetary policy transmission. However,the author adds, that despite of the decline in corporate borrowings, a steady demand for consumer loans is sufficient to keep the credit channel significant.

In the Philippine setting, the lending channel remains to be the mechanism by which monetary policy stance is transmitted into the economy [9]. The policy interest rates relevant to the transmission are the Bangko Sentral ng Pilipinas (BSP) overnight reverse repurchase rate (ORRP) or the borrowing rate and the overnight repurchase rate (ORP) or the lending rate. Studies by BSP have shown that policy

rates impact on market interest rates. As BSP policy rates affect the level of liquidity in the system, it then affects the short term market rates which include the 91-days treasury bills and the banks' lending and deposit rates [9]. Policy interest rates impact the real economy as a low policy rate can stimulate consumption and investiment demand [3].

III. THEORETICAL FRAMEWORK

The role of banks in the transmission of monetary policy into the real economy has been investigated in numerous papers notably [1], [2] and [7]. The theoretical framework presented in this paper is adapted from the papers of [2], [6] and [18].

The transmission of monetary policy into the economy is dependent on at least two determinants of the bank's loan supply namely, liquidity and capital. The bank's liquidity plays an important role as a determinant of its credit supply. Excess liquidity can be a source of funds to expand the bank's loan portfolio instead of sourcing the funds from debt or equity. A high level of liquidity will result in a decrease in marginal cost of additional credit. Therefore, it is expected that banks with sufficient capitalization or banks that are overcapitalized can very well benefit from its lending operations as it has more funds to lend out. The bank's level of capital, which is a measure of its financial strength, is also a determinant of its credit supply. The size of the bank's loan portfolio is dependent on the level of its capital as well as liquidity as these are the bank's main sources of funds for lending. A monetary policy shock in the form of interest rate increase will decrease bank reserves should the bank opt not to augment its credit supply from additional equity and debt. An increase in interest rates caused by monetary stance may cause depositors to shift their funds from demand deposits (low cost funds) to time deposits (high cost funds) to be able to take advantage of high interest rates. The bank's priority source of loan funds is their reserve deposits, which are basically the demand deposits. These deposits (savings and checking account deposits) are considered low cost funds since these pay very low interest to savings account depositors and pay no interest to checking account depositors. Sourcing credit supply from time deposits will be costly for the banks as this type of deposit pay higher interest to depositors thus giving the banks lower spreads on their lending. Consequently, loan growth of undercapitalized banks and/or banks with low level of liquidity will be more affected by monetary policy shocks. These banks will be constrained to decrease the level of their credit portfolio. The basic concept of the bank lending channel is that specific characteristics of banks affect its ability to cushion the effects of monetary policy shocks on the credit supply of these banks [18]. Restrictive monetary policy may decrease bank reserves thereby driving banks to cut back on their lending activities [17]. Therefore, a tightening of monetary policy in the form of an increase in interest rates may translate to a decrease in loan supply of undercapitalized banks. Hence, banks with sufficient capital and/or excess liquidity will be able to sustain its lending activities despite of monetary policy tightening.

IV. DATA, RESULTS AND ANALYSIS

This study uses the balance sheets of the 35 universal and commercial banks in the Philippines. The balance sheets are from the Bangko Sentral ng Pilipinas website. Items in the balance sheets relevant to the study are the total assets and total loans. Total assets of the banks serve as a basis for categorizing the banks according to size. The total loans per bank are used to calculate loan growth. Aside from these items, proxy for shifts in the monetary policy is the sum of changes in the overnight reverse repurchase rate (R) while the proxy to reflect the economic condition is real GDP (Q) and the inflation rate (P), defined as the percentage change in the GDP deflator. The study attempts to determine if contractions in policy rates have an effect on the loan growth of banks depending on the bank's characteristics, in this case, the bank's size.

To be able to examine the cross-sectional differences in the loan growth, banks are segregated into six categories according to total asset size (see Table I) : >P 300B (large category), P200B < size < P300B (large 1category), P100B < size < P200B (large 2 category), P50B < size < P100B (medium1 category), P25B < size < P50B (medium 2 category) and < P25B (small category).

TABLE I: LIST OF PHILIPPINE UNIVERSAL AND COMMERCIAL BANKS USED IN THESTUDY CATEGORIZED BY ASSET SIZE

Large: Size: > Php300B
Banco de Oro Unibank Inc.
Metropolitan Bank and Trust Co.
Bank of the Philippine Islands
Land Bank of the Philippines
Large 1: Size: < P300B, > P200B
Rizal Commercial Banking Corp.
Philippine National Bank
Development Bank of the Philippines
China Banking Corp.
Union Bank of the Philippines
Citibank N.A.
Large 2: Size: < P200B, > P100B
HongKong Shanghai Banking Corp. Ltd.
United Coconut Planters Bank
Allied Banking Corp.
Security Banking Corp.
Medium 1: Size < P100B, > P50B
Philippine Trust Co.
East West Banking Corp.
Philippine Bank of Commerce
Philippine Veterans Bank
Standard Chartered Bank
Medium 2: Size, < P50B, > P25B
Asia United Bank
ING Bank
Australia and New Zealand Banking Group Ltd.
JP Morgan Chase Bank
Philippine Bank of Commerce
Mizuho Corporate Bank Ltd.
Bank of Tokyo
BDO Private Bank
Maybank Philippines Inc.
Small: Size: < P25B
China Trust Philippines Commercial Banking Corp.
Bank of America NT and SA
Bank of China Ltd.
Mega International Commercial Bank
Korea Exchange Bank
Bangkok Bank Public Co. Ltd.

Note: The study includes only banks that have complete data. Banks that ceased operations during the study are excluded.

Quarterly data from 2008 to 2011 are used. Panel ordinary least squares (OLS) method is utilized to check the relationship between the dependent variable, loan growth and

the independent variable R, which represents the monetary policy indicator. ORRP is chosen as data on ORP is incomplete. R is the sum of the first differences of ORRP, ORRP lag (1), ORRP lag (2) and ORRP lag (3).

The loan growth, which is the dependent variable, is computed as follows:

$$\text{Loan growth} = \log (L_t / L_{t-1}) \qquad (1)$$

where L_t is the total loans of each bank

The independent variable, R is computed as follows:

$$R = \Delta ORRP_t + \Delta ORRP_{t-1} + \Delta ORRP_{t-2} + \Delta ORRP_{t-3} \qquad (2)$$

The estimation model is as follows:

$$\text{dlog(Loans)} = \text{Constant} + a_1 R + a_2 \text{dlog(Q)} + a_3 \text{dlog(P)} \qquad (3)$$

where Q is GDP, P is the GDP deflator, R is defined above and dlog takes the first difference of logarithms of the variables and the a's are the regression coefficients.

In the initial estimates, the growth in deposits and securities were included as independent variables as in [6]. This was done to check if an increase in the banks' deposits can cushion the loan supply from the effects of shifts in monetary policy. However, the securities data of most banks is incomplete; therefore, this variable was excluded in the estimation. Including total deposit growth yielded unsatisfactory results and are not presented in this paper anymore.

Table II(a) presents the estimates of the effects of monetary policy, represented by R, on loan growth. Following [6] and as stated previously, R is measured as the sum of the first difference of the overnight reverse repurchase rate (ORRP) up to the third lag: $R = \Delta ORRP_t + \Delta ORRP_{t-1} + \Delta ORRP_{t-2} + \Delta ORRP_{t-3}$.

It is interesting to note that the estimated coefficient of R is negative in all the categories but is statistically significant only for the smallest bank group (size < P25B, t-stat = (3.0002)) – a result that more or less conforms with the findings of [6]. As they point out, unlike their results, studies using aggregate data show positive and insignificant effect of monetary policy on loan growth (see [1], [25], [26]).

The results imply that loan supplies of larger banks are insensitive to monetary policy while the loan supply of banks belonging to the smallest category are responsive to changes in monetary policy stance.

The results also show that for small banks, a one percent change in R results in a decrease of 0.2492 in the growth rate of loans. This is the biggest decrease in loan growth rate compared to the decrease in growth rate of other groups. The effect of shifts in monetary policy on the other size categories is insignificant. Of all the categories, the bank group with the largest asset base (>P300B) shows GDP growth as being significant to loan growth (t-stat = 2.9511). Table II(b) shows the descriptive statistics of the bank groups in the study.

The findings of this research offer evidence to support the hypothesis of this paper that movements in monetary policy rates are inversely related to loan growth. It shows evidence that a bank lending channel is present in the Philippines and the evidence becomes visible when data is disaggregated according to bank asset size. As shown above, the distributional consequence of monetary policy for the US found in [6] is also shown for the Philippines.

V. CONCLUSION

The presence of the lending channel is significant to the transmission of the monetary policy into the economy. Empirical studies categorize banks according to certain characteristics when testing for the existence of these channels. The results of this paper are consistent with the hypothesis that the bank lending channel is evident in banks with smaller assets. As [14] points out, that though the author has shown that the lending channel in the Philippines has its significance in the monetary policy transmission, empirical studies about this has not been actively undertaken.

This paper segregated the banks according to the size of their assets, and then tested the relation of the movements of the ORRP with the loan supply of these banks.

The study finds that small banks are more sensitive to contractions in monetary policy rates than banks with bigger assets. Though the results are as expected, further studies can be made and more variables can be added to strengthen the evidence of the presence of these lending channels. Further studies can pursue the inclusion of finer types of deposits and securities as variables than can influence the supply of loans as some studies such as [6] included those variables. As policy rates shift upward, increase in time deposits and securities may be able to cushion the decline in loan supply for smaller banks.

Another area for research is the examination of the presence of the lending channel relative to the banks' capitalization with the use of the banks' capital leverage ratio which was not implemented in this paper because of data limitations. This is another bank characteristic that may influence the movements of loan supply in relation to policy rates. The use of capitalization to determine the degree of policy transmission through banks can illustrate the distributional effects of monetary policy. A bank's capitalization can be a gauge of its ability to increase needed deposits in case of shifts in policy rates.

The study covers only evidence on bank lending channel. Empirical studies can be done on providing evidence for the evidence of the borrowers' net worth channel in the Philippines. As an extension, this study can be supplemented to cover previous years to be able to accurately demonstrate the presence of the bank lending channel in the Philippines.

Finally, this paper shows that asset size can play an important factor in the formulation of monetary policy by its influence on the loan growth. Therefore, bank characteristic, particularly asset size, must be recognized and considered when examining and evaluating the distributional effects of monetary policy on loan supply and ultimately, its effects on the real economy.

TABLE II (A): THE EFFECT OF MONETARY POLICY ON THE GROWTH RATE OF TOTAL LOANS

Size	>P300B	<P300B >P200B	<P200B >P100B	<P100B >P50B	<P50B >P25B	<P25B
B=billion	Large	Large1	Large2	Medium1	Medium2	Small
Constant	-0.0668	-0.1122	-0.0693	0.0139	-0.1027	-0.6857
t-stat	(2.1895)	(2.8040)	(1.7297)	(0.1851)	(0.6340)	(2.7872)
R	-0.0061	-0.0144	-0.0144	0.0125	-0.0222	-0.2492
t-stat	(0.5259)	(1.0466)	(1.0001)	(0.4942)	(0.4031)	(3.0002)
GDP growth	0.5334	0.2567	0.2614	0.0155	0.0732	-0.3414
t-stat	(2.9511)	(2.3914)	(1.8722)	(0.1025)	(0.1744)	-0.5456
Inflation	2.1079	1.9619	2.4282	-0.2404	7.8550	-4.2592
t-stat	(2.0066)	(1.6794)	(1.8457)	(0.1197)	(1.6802)	(0.6325)
Time trend	0.0072	0.0113	0.0065	-0.0003	0.0022	0.0634
t-stat	(2.5079)	(3.1773)	(1.7891)	(0.0523)	(0.1526)	(2.8997)
AR(1)	-0.5732	-0.2355	-0.3487	-0.1012	-0.2223	-0.2416
t-stat	(4.6630)	(1.8423)	(2.4618)	(0.7104)	(2.4138)	(1.9244)
Adj R^2	0.6372	0.2861	0.2340	-0.0646	0.0375	0.1011
Durbin-Watson	1.8723	1.6450	1.9031	1.9278	2.0127	1.9135
No. of banks	4	6	4	5	10	6

Notes: Inflation is the percent change of the GDP deflator
AR(1) is the coefficient from the serial correlation correction procedure computed using E-views 7

TABLE II (B): THE EFFECT OF MONETARY POLICY ON THE GROWTH RATE OF TOTAL LOANS

	Large Total Assets	Deposits	Securities	Loans	Large 1 Total Assets	Deposits	Securities	Loans
Mean	651,115	513,939	66,295	281,692	244,643	163,683	27,237	86,155
Median	631,472	492,480	63,522	256,363	240,962	169,362	28,681	86,382
Maximum	1,067,815	837,008	104,632	635,123	339,992	246,808	41,731	142,714
Minimum	369,858	285,397	25,960	110,894	160,274	69,903	6,969	43,601
Std. dev.	154,509	124,252	16,696	114,415	40,206	38,627	9,901	19,618
Skewness	0.64	0.52	0.02	1.21	0.28	-0.05	-0.90	0.16
Kurtosis	3.33	3.07	2.86	4.17	2.35	2.43	2.92	2.75
Observations	64	64	64	64	96	96	96	96
	Large 2				Medium 1			
Mean	147,737	107,512	12,132	49,665	72,547	55,929	7,371	24,282
Median	147,021	105,698	13,121	48,019	71,180	55,446	6,357	21,474
Maximum	215,061	160,960	30,393	85,612	112,632	92,293	19,442	47,581
Minimum	97,670	69,071	610	23,742	38,906	27,408	263	11,496
Std. dev.	26,728	24,134	6,844	15,762	20,854	20,131	4,440	8,401
Skewness	0.21	0.15	0.39	0.39	0.18	0.23	0.41	0.85
Kurtosis	2.80	1.89	2.94	2.04	1.80	1.69	2.37	2.71
Observations	64	64	64	64	80	80	80	80
	Medium 2				Small			
Mean	34,190	20,980	3,004	9,103	10,781	6,395	1,330	4,819
Median	33,887	21,328	2,285	8,430	9,562	4,987	597	2,873
Maximum	54,513	38,250	9,095	23,022	27,037	19,901	5,987	16,518
Minimum	15,884	659	586	173	2,614	940	0	45
Std. dev.	9,264	9,098	2,158	5,754	6,932	5,498	1,844	4,807
Skewness	0.10	-0.30	1.06	0.22	1.01	1.00	1.78	1.31
Kurtosis	2.01	2.58	3.39	2.21	3.07	2.78	4.26	3.50
Observations	160	160	160	160	95	95	95	95

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