

論 說

Monetary Policy and Financial Development: An Empirical Examination

Md. Rafiqul Islam* and Kang-Kook Lee**

Abstract

Monetary policy can influence economic activities by altering the credit condition of the market. Financial development can promote economic growth, which is the ultimate objective of monetary policy. In this study, we concentrate our analysis on the effect of monetary policy on financial development. Using fixed effects model regressions and data from 1960 to 2013, we find that conventional monetary to manage base money is effective to a change in private credit over GDP. This finding points to the existence of a credit channel. Since private credit indicates the level of financial development and base money affects the credit level significantly, we conclude that monetary policy can enhance financial development. However, it depends on the level of economic development. Our findings are robust to controlling for other macroeconomic variables, and they are much stronger in developing countries. This suggests that central banks especially in developing countries can implement their conventional monetary policy more effectively.

JEL Classification: G2, G10, E51, E52

1. Introduction:

Effective monetary policy is crucial for the economic activity of any country. Theoretically, central banks directly or indirectly change banks' and borrowers' balance sheets by adopting different policies. Since the ultimate goal of monetary policy is stable economic growth, and financial development leads to economic growth (King *et al.*, 1993, Demirgüç-Kunt and Levine, 1996), it is crucial to find the impact of monetary policy on financial de-

*Joint Director, Statistics Department, Bangladesh Bank

Email: rafiqul.islam178@bb.org.bd

Phone: 8801723201964

**Professor, Graduate School of Economics, Ritsumeikan University, Japan.

Email: leekk@ec.ritsumei.ac.jp

Phone: 81775615041

velopment, even though the impact of monetary policy on real economic activities is still inside the black box (Bernanke and Gertler, 1995). After the financial crisis of 2007-09, there was a big question about the capability of central banks to manage the economy successfully. It is, however, believed that a more aggressive monetary policy reduced the adverse feedback loops of the financial crisis (Mishkin, 2009). In the case of advanced countries, before the financial crisis, monetary policy was successful not only in maintaining low inflation, but it also helped to promote stable economic growth (Kim, 1999). After the financial crisis, the short-term interest rates in advanced countries came down to zero, or to near zero and the effectiveness of conventional monetary policy became limited. This is the main reason why most of the advanced countries are now using unconventional monetary policy to stimulate their economy. However, many low-income and emerging market countries still have the scope for utilizing conventional monetary policy because these countries are still now fighting against inflation to maintain a stable price level and to promote economic growth.

The ultimate goal of monetary policy is stable economic growth with a desirable price level and a low unemployment rate. Since monetary policy cannot achieve these goals directly, all central banks have some intermediate targets to reach the final goal. The intermediate target could be money supply or exchange rate or inflation. But central banks cannot achieve these targets directly as well. Central banks have some operating targets to attain the intermediate targets. The operating target could be base money or short-term interest rates over which a central bank has direct control. The impact of monetary policy is at first on the monetary sector, and then on the real sector. There are many channels through which the policy impact works in the economy. The credit channel is the most appropriate channel to calibrate the effectiveness of monetary policy in developing countries as well as in developed countries. Through this channel, if the shock in the policy variable has an impact on the credit level in the economy, it is evidence of the monetary policy effectiveness of the monetary policy. While there are several indicators to gauge the development of the private sector, private sector domestic credit as a percentage of GDP is a prominent indicator of financial development. Thus, it could demonstrate the effects of monetary policy on financial development.

The main objectives of the study are to assess the effectiveness of monetary policy, the impact of conventional monetary policy on financial development, comparing it between developed and developing countries. We attempt to find the answers to the following questions: (1) What is the relationship between monetary policy and private sector credit? (2) How does monetary policy affect private sector credit differently between developed and developing countries? (3) How do other factors affect the relationship between monetary policy and private sector credit in promoting financial development in advanced and developing countries?

Studying these questions is important to a better understanding of the working of conventional monetary policy. Answers are sought about when central banks increase base money, whether it increases private credit in similar fashion in advanced and developing countries. This study uses unbalanced panel data from 1960 to 2013 for 172 countries of which advanced and developing countries are 45 and 127 respectively. It conducts an extensive empirical analysis of the effects of base money on private sector credit. To capture country heterogeneity and aggregate time trend, the fixed effects model of panel regressions are used.

From the empirical analysis, this study finds that conventional monetary policy to manage base money is significantly effective in promoting credit to the private sector, which ultimately represents the level of financial development. The impact of base money is highly significant for all country samples, while there is a difference between developing and developed countries. In developed countries, the effect of monetary policy on financial development is not significant whereas in developing countries this relationship is significant. Furthermore, when we divide the countries into advanced, middle-income and low-income country groups, we find that conventional monetary policy is insignificant in advanced and low-income country groups but significant in the middle-income country group. This result demonstrates the non-linear effect of monetary policy on financial development depending on the income level of the economy. Among macroeconomic factors, GDP per capita and stock market capitalization have a negative impact on the effectiveness of the monetary policy on financial development in the full sample. However, in developing countries, stock market capitalization has no impact on the effect of monetary policy on financial development.

The rest of the paper is organized as follows: Section 2 presents a review of literature related to this study and the background of the study. In Section 3, methodology and data of empirical analysis are presented along with variables that are used and sources of the data. Section 4 discusses empirical results. Finally, the conclusion is presented and policy implications are discussed in Section 5.

2. Literature Review

Monetary policy is the process of maintaining the circulation of money to achieve desirable economic goals. The main objectives of monetary policy of any central bank are to achieve stable economic growth with a desired price level and reducing the level of unemployment. Since central banks cannot achieve the final goals directly, every central bank has some intermediate targets. The intermediate target may be money supply, interest rate, exchange rate, etc. To achieve these intermediate targets, every central bank also has

operating targets. The operating target may be base money or short-term interest rate. Central banks use some monetary policy instruments such as an open market operation to meet the operating target. If any change in monetary policy has a direct impact on the operating target and has successfully meet the intermediate target as well as other economic activities then it indicates that monetary policy is effective. There are many studies about the effectiveness of monetary policy as we present below.

2.1 Effectiveness and channels of monetary policy

The literature on the effectiveness of monetary policy in advanced countries is large because most theories and studies of macroeconomic policies come from the context of advanced countries. The effectiveness of monetary policy depends on the structure and development level of an economy. Along with the development of the financial sector and economic structure, monetary policy loses its effectiveness in terms of private credit as recent empirical studies report. Monetary policy has a stronger effect on the economy when the level of financial development is comparatively much lower (Carranza *et al.*, 2010). Investigating the monetary policy effectiveness of pre and post 1980 periods in the USA, Boivin and Giannoni (2006) find that monetary policy loses its influence in later periods. Investigating the credit channel effectiveness with a large monetary base in the USA, Orłowski (2015) shows that increase of base money is associated with excess reserve but not with private sector credit growth. It is because of implementing unconventional monetary policy by central banks in most developed countries after the financial crisis of 2008. Fawley and Neely (2013) also show that an increase in a monetary base does not increase bank lending in expected magnitude in advanced countries. Since the effectiveness of monetary policy also depends on specific characteristics of the banking sector; imperfect substitutability of loans and securities investment as banks' assets, loans and commercial paper as corporate liabilities, in the case of contractionary policy, monetary policy loses its effectiveness along with the increase of financial development (Kashyap *et al.*, 1993).

In the case of developing countries, there has been little research on this topic. Over the recent decade, some research has been conducted about the effectiveness of monetary policy in developing countries. However, research about how monetary policy can influence financial development, specifically in developing countries, and how its impact differs from that in advanced countries is still scarce.

There are some country-specific studies in the literature. Most of them try to measure the monetary policy effectiveness empirically, but there is heterogeneity in choosing the monetary policy instrument, the nominal anchor, and the operating target. Some studies attempt to find out which instrument is more appropriate for conducting monetary policy in developing countries (Montiel, 1991). In Nigeria, quantity-based nominal anchors such as M2 have more significance on the real economy than price-based nominal anchors (Chuku,

2009). In another study about Malawi, the bank rate has been demonstrated to be more appropriate to measure the impacts of monetary policy on the real economy than bank reserve money (Ngalawa and Vieg, 2011). In a study of the effectiveness of monetary policy in Brazil, Ramos-Tallada (2015) finds that monetary policy significantly influences the loan growth, using the short-term interest rate as a policy variable. To measure the effectiveness of monetary policy in Bangladesh, some studies (Ahmed and Islam, 2004, and Alam, 2015) use the reserve money as monetary policy variable and credit growth as a dependent variable but obtain different results. Ramlogan (2014) finds significant results in the examination of the transmission mechanism of monetary policy in Caribbean countries by using reserves as a policy variable and bank loans as a dependent variable. A test of the monetary policy effectiveness in low-income countries by Mishra *et al.* (2012) finds insignificant results. Using the money market rate as a proxy of policy variable and lending rate as a dependent variable, they find that traditional monetary transmission through the market interest rate is weak or non-existent. Mishra *et al.* (2014) also test the heterogeneity of monetary policy effects using base money as a policy variable and lending rates as a dependent variable. They conclude that monetary policy shocks have larger impacts on lending rates in developed countries compared with developing countries. Sometimes, it is difficult to measure interest rates, and there are debates over the use of interest rate (Friedman, 1968; Bernanke and Mihov, 1998). However, the level of base money is well defined and available for most of the countries, and central banks have direct control over this money supply measure. Bernanke and Mihov (1998) give more emphasis on bank reserve which is a part of the base money.

A transmission mechanism of monetary policy is also a matter of debate to calibrate monetary policy effectiveness. The effects of monetary policy on the real economy work through different channels.²⁾ The appropriate channel for the monetary transmission mechanism for specific countries and for specific times is also a matter of discussion. The monetary transmission mechanism depends on different characteristics of the economy. The institutional environment, financial structures, and competition in banking systems have a great influence on the effectiveness of monetary policy through different channels. It is difficult to estimate the actual effects of monetary policy shocks on the economy only by the traditional interest rate channel. To explain the timing, magnitude, and composition of the economy's response to shocks of monetary policy, it is necessary to use the credit channel of monetary transmission mechanism (Bernanke and Gertler, 1995). Among all channels, a credit view of the transmission mechanism is the most effective channel (Mishra *et al.*, 2012). Jayaraman *et al.* (2008) conduct research on the money transmission mechanism in Fiji and find that the money supply channel is more important in measuring the effects of monetary policy shocks in Fiji.³⁾

In Bangladesh, there are several studies about different channels and monetary policy ef-

fectiveness, but the findings are mixed. Younus (2004) finds that the money supply channel or the credit channel of the transmission mechanism is absent in Bangladesh due to huge excess reserves in the banking sector. Ahmed and Islam (2004) conclude that there is a weak existence of the bank lending and exchange rate channel in Bangladesh. Recently, Rafiq (2015) finds that the impact of monetary policy through the bank lending channel on real economic activity is modest in Bangladesh.

Ramlogan (2004) finds that the credit and exchange rate channel are more effective to transfer of monetary shocks to the real economy as a transmission mechanism of monetary policy in the Caribbean countries. In Sub-Saharan African countries, contractionary monetary policy has a great influence on economic growth through the bank lending channel and the cost of capital channel (Ndikumana, 2014). Egert and MacDonald (2009) find that there is a significant link between monetary policy innovations and the lending rate, but the link between the lending rate and aggregate demand is very weak, or even non-existent in Central and Eastern Europe. Isakova (2008) shows that the exchange rate channel is stronger than the interest rate channel in Central Asian Countries. However, Mishra *et al.* (2012) have shown that among all kinds of transmission mechanisms, only the bank lending channel is appropriate for low-income countries. While they use the price of credit, in developing countries, the level of credit is more important because the borrowers in LICs are willing to pay higher interest rates to get loans from the financial institutions. Thus, in our study, we use base money over GDP as an independent variable for the proxy of the policy variable and domestic credit to the private sector over GDP as a dependent variable. Since the credit channel exists in developing countries and it also exists in developed countries, it will be appropriate to assess the monetary policy effectiveness and its impact on financial development through credit channels in all countries and make a comparison between developed and developing country groups. It is also important to examine whether this relationship is conditional on other variables that have an impact on monetary policy effectiveness and financial development.

2.2 Financial development and its determinants

Studies of effectiveness and channels of monetary policy make it crucial to investigate financial development because the credit channel is significant in the working of monetary policy. The factors which determine financial development can be classified into three main categories, including as institutional factors, macroeconomic factors, and geographical factors (Huang Y, 2010). In this study, we concentrate on macroeconomic factors. There is no single index to measure financial development; however, the most important measures of financial development are liquid liabilities of the financial sector over GDP and the private sector credit over GDP by the financial institution (Carranza *et al.*, 2010).

Economic growth and financial development are related to each other (Gergori *et al.*,

1995, Levine *et al.*, 2000). Well-developed financial systems can foster economic growth (Demirguc-Kunt and Levine, 1996), but it is also argued that financial systems are just responses to the level of economic development. Although the exogenous effect of financial development on economic growth is debated, some studies argue that financial development can significantly predict future economic development (King *et al.*, 1993; Levine, 1997). Inflation is one of the important factors of private sector investment as well as credit. There are some studies suggesting the negative relationship between credit expansion and inflation (Bittencourt *et al.*, 2014, Gillman and Kejank, 2007, Bittencourt, 2008, Kim and Lin, 2010). Although most of the developing countries are struggling to curb inflation, inflation has non-linear effects, specifically in developed countries. There is disagreement about the threshold level (Vinayagathan, 2013, Thanh, 2015, Khan and Senhadji, 2001), but it is true that inflation is one of the major determinants of private sector credit as well as economic growth.

A well-developed financial system including the capital and credit market has a strong influence on financial development (Demirguc-Kunt and Levine, 1996). There is a positive significant relationship between indices of the stock market and financial development. Besides, the net interest rate margin is one of the determinants of financial development (Huang Y, 2010). It reflects the level of competition in the banking sector. Bank concentration also has a significant effect on monetary policy effectiveness (Mishra *et al.*, 2012, Olivero *et al.*, 2011). However, Law S.H (2006) shows that overall bank concentration has no significant effect on financial development in advanced countries, while it has a positive impact in lower-middle and low-income countries.

Most of the aforementioned studies include different macroeconomic factors as determinants of financial development, although the importance of monetary policy is not studied extensively. However, monetary policy and financial development are closely associated as we discussed previously in the section about channels of monetary policy. Empirical studies on how monetary policy can influence financial development are scarce though there are a few related studies. Carranza *et al.* (2010) show that monetary policy has stronger cumulative effects on the economy when the financial system is less developed. Using panel regressions, they conclude the inverse relationship between monetary policy effectiveness and financial development. In a similar fashion, Ma and Lin (2016) conduct an empirical study to determine the effect of financial development on monetary policy in terms of economic growth and inflation. Using panel regressions, they also conclude that financial development reduces the impact of monetary policy on economic growth. However, these are not direct tests of the effectiveness of monetary policy on financial development. Our objectives are to directly test the effect of monetary policy on financial development measured by private credit and to make a comparison between developed and developing countries. Using long period data and a large number of countries, we attempt to make an empirical assessment

of monetary policy effectiveness associated with financial development.

3. Methodology and Data

3.1 Methodology

Monetary authorities conduct monetary policy with several monetary policy tools or instruments⁴⁾ to exert an influence on some target variables.⁵⁾ Monetary policy effectiveness can be measured by the impact of policy variables on those economic variables. We use a methodology which is similar to that used by Mishra *et. al* (2014). In their study, they use the monetary base as an independent variable and the bank lending rate as a dependent variable to assess the effect of monetary policy. Since monetary authorities have direct control over base money and credit is an important channel of monetary policy, we measure the impact of base money on domestic credit to the private sector⁶⁾ by all financial institutions (FIs) in our study. Domestic credit to the private sector or private sector credit over GDP is one of the leading indicators of financial development of any country. So, the impact of the level of base money on this indicator will reflect the influence of monetary policy on financial development. To control for heterogeneity among different countries and remove the bias from unobservable variables, we use a fixed effects model of panel regressions. The Hausman test confirms that the fixed effects model is more appropriate than a random effects model, considering the heterogeneity of the data. We control for macroeconomic variables that are relevant to private credit or financial development. We also include time dummy to control for time trends. Later, we test conditional effects of other macroeconomic variables on the impact of base money on financial development.

The functional form of this model is as follows:

$$PC_{it} = \beta_0 + \beta_1 BM_{it} + \beta_2 X_{it} + \beta_3 T_{it} + \beta_4 \varepsilon_{it}$$

Where, PC = Domestic Credit to private sector by FIs over GDP (%), BM = Base money over GDP (%), X_{it} = Other macroeconomic variables, ε_{it} = Private credit shocks which include the country fixed effects, and T_{it} = Time dummy.

Based on the review of literature, this study includes other macroeconomic variables such as inflation (INF), GDP per capita (GDPPC), stock market capitalization as a percentage of GDP (STOCKM), institutional quality (GADP), net interest rate margin (NETINT) and Bank Concentration Ratio (BANKCON).⁷⁾ Other studies control for these variables in finding out the determinants of financial development and assessing the monetary policy effectiveness.⁸⁾ Thus, the baseline model becomes

$$PC_{it} = \beta_0 + \beta_1 BM_{it} + \beta_2 INF_{it} + \beta_3 GDPPC_{it} + \beta_4 GADP_{it} + \beta_5 STOCKM_{it} + \beta_6 NETINT_{it} + \beta_7 BANKCON_{it} + \beta_8 T_{it} + \varepsilon_{it}$$

To examine the effects of other macroeconomic variables on the influence of monetary policy on private sector credit or financial development, the interaction terms of base money with GDP per capita, stock market and net interest margin are included respectively in the baseline model. The level of income, stock market development, and efficiency of the banking system may well be associated with financial development per se and the effectiveness of monetary policy as well. Thus, the conditional effect of base money on private credit could be affected by these variables. That is why the interaction terms with these three variables are included as follows:

$$PC_{it} = \beta_0 + \beta_1 BM_{it} + \beta_2 INF_{it} + \beta_3 GDPPC_{it} + \beta_4 GADP_{it} + \beta_5 STOCKM_{it} + \beta_6 NETINT_{it} + \beta_7 BM_{it} * GDPPC_{it} + \beta_8 T_{it} + \varepsilon_{it}$$

$$PC_{it} = \beta_0 + \beta_1 BM_{it} + \beta_2 INF_{it} + \beta_3 GDPPC_{it} + \beta_4 GADP_{it} + \beta_5 STOCKM_{it} + \beta_6 NETINT_{it} + \beta_7 BM_{it} * STOCKM_{it} + \beta_8 T_{it} + \varepsilon_{it}$$

$$PC_{it} = \beta_0 + \beta_1 BM_{it} + \beta_2 INF_{it} + \beta_3 GDPPC_{it} + \beta_4 GADP_{it} + \beta_5 STOCKM_{it} + \beta_6 NETINT_{it} + \beta_7 BM_{it} * NETINT_{it} + \beta_8 T_{it} + \varepsilon_{it}$$

Where, INF=inflation measured by GDP deflator, GDPPC=GDP per capita in local currency, STOCKM=Stock market capitalization over GDP, NETINT=Net interest margin, BANKCON=Bank concentration ratio.

The subscript *i* and *j* represent countries and time periods respectively. β_{0i} includes the country-specific effects which are time-invariant. The sample is divided into two subsamples as advanced countries and developing countries according to the World Bank classification. By comparing the coefficient of the parameter from the two groups, we examine different monetary policy effectiveness across country groups.

3.2 Data and its sources

Financial development is important to the economy and domestic credit to the private sector over GDP is one of the major indicators of the level of financial development. Domestic credit created by banks does not have any effects on inflation, but it has a significant effect on economic growth (Korkmaz, 2015). In our study, domestic credit to the private sector over GDP (PC) is the dependent variable. Private credit includes all kinds of claims by the banking sector on firms or individuals. The main independent variable is base money (BM) over GDP (%). Base money includes the sum of currency in circulation by the monetary authorities and deposits of the depository corporations to the central bank. We include some other control variables. This study uses general inflation (INF)

which is basically GDP deflator, GDP per capita (GDPPC), GADP (government anti-diversion policy index) as a proxy for institutional quality (Hall and Jones, 1999), and stock market capitalization (STOCKM) over GDP. We also include variables to measure the efficiency of the financial system. Net interest margin (NETINT) is the difference between interest received and interest payment, and bank concentration (BANKCON) is the ratio of assets of the five largest banks to the share of the assets of all commercial banks in the country.

We use the above control variables because all of them have specific effects on financial development as mentioned in section 2.3. All the data have been collected from the World Development Indicator (WDI) and the Global Financial Development Database (GFDD) of the World Bank except base money. Base money is collected from the International Financial Statistics of IMF. In calculating the base money over GDP, nominal GDP data from the WDI are used. The index for institutional quality is newly calculated, covering the long period after the mid-1980s, from ICRG (International Country Risk Guide) dataset, following Hall and Jones (1999). Calculating a new GADP, four indices are used; bureaucracy quality, investment profile, corruption, and law and order, all with equal weight. To classify the economy into advanced and developing groups, the World Bank classification in 2015 is used. In this study, we use unbalanced panel data because data from 1960 to 2013, and use five-year average data for each variable to reduce the effect of the business cycle. Except for inflation, this study uses a natural log of all variables which minimizes the effect of outliers in the data, following other studies. Appendix Table A1 presents summary statistics of all variables.

4. Empirical Results and Discussion

4.1 Results for all countries and comparison between developed and developing countries

In the empirical results, at first, we discuss the effectiveness of monetary policy in terms of private credit for all countries. In our baseline model where BM, INF, and GDPPC are included as explanatory variables (Table 1, column 1), it is found that the level of base money has a positive significant impact on private sector credit. Over the entire sample, a one percent increase in the level of base money increases private sector credit over GDP by 0.14 percent, *ceteris paribus*. If the central banks introduce some policy shock by increasing or decreasing base money, it has two-way effects. Firstly, when the base money is increased (decreased), the loanable fund for the banking system increases (decreases) and ultimately it affects the private sector credit level because banks can lend more. Secondly, when the central bank increases (decreases) base money it will also decrease (increase)

Table 1. The base line model results for whole sample (All countries)

Dependent Variable: Private sector credit over GDP

VARIABLES	(1) All Countries	(2) All Countries	(3) All Countries	(4) All Countries	(5) All Countries
BM	0.140*** (0.0413)	0.223*** (0.0514)	0.168*** (0.0513)	0.148** (0.0605)	0.101 (0.0624)
INF	-0.165*** (0.0226)	-0.143*** (0.0277)	-0.117*** (0.0290)	-0.0620* (0.0370)	-0.0692* (0.0361)
GDPPC	-0.0123* (0.00690)	0.0162 (0.0103)	0.0203 (0.0265)	0.224*** (0.0535)	0.158*** (0.0564)
GADP		0.122*** (0.0229)	0.136*** (0.0309)	0.162*** (0.0363)	0.106*** (0.0391)
STOCKM			0.0812*** (0.0289)	0.119*** (0.0389)	0.0778* (0.0405)
NETINT				0.00507 (0.0571)	0.0137 (0.0596)
BANKCON					-0.347*** (0.124)
Constant	2.393*** (0.129)	2.371*** (0.195)	2.353*** (0.310)	-0.0897 (0.602)	2.606*** (0.929)
Observations	1,237	732	430	325	294
R-squared	0.340	0.331	0.459	0.492	0.459
Number of countries	172	126	92	91	86

Notes:

1) Standard errors in parentheses (*** p < 0.01, ** p < 0.05, * p < 0.1)

2) BM = base money, INF = general inflation, GDPPC = GDP per capita, GADP = institutional quality, STOCKM = stock market capitalization, NETINT = net interest margin and BANKCON = Bank concentration ration. Except inflation, all variables are expressed as ratios with respect to GDP and finally taken logarithm. These are the whole sample (from 1960 to 2013) results

the interest rates, which has a direct effect on the borrowers' balance sheet and they can borrow more credit cheaply. This significant positive relationship between the monetary policy variable and private sector credit establishes the effectiveness of monetary policy.

Inflation is always found to be significantly and negatively associated with private sector credit, while GDPPC is positively significant in a few models. This is generally consistent with theory and a priori expectations. The level of private sector credit in the economy also depends on a host of other factors. At first, GADP is included as a proxy for the institutional quality in different countries. Better institutional quality always has a significant positive impact on private sector credit, and this study finds the same results, consistent with previous studies (Law and Sha, 2009). The inclusion of GADP appears to make GDPPC weaker or even insignificant because they are interrelated in reality. After including STOCKM in this model it is found that (Table 1, column 3), all variables in the model except GDPPC significantly explain the variability of private sector credit in the economy with their expected signs.

The net interest margin is included in the next model, but the result is not significant results for the all country sample (Table 1, column 4). One of the reasons is that there is a wide gap in the net interest margin between advanced and developing country groups.

The variable BANKCON is next included in the model and it has a negatively significant impact on private sector credit (Table 1, column 5). This is because it represents competition among financial institutions and the larger the bank concentration ratio, the lower is the competition which ultimately decreases private credit. The result is consistent with both theory and other studies (Mishra *et al.*, 2012, Olivero *et al.*, 2011). The coefficient of BM becomes insignificant in the model after including BANKCON, perhaps because of a reduction in the number of observations.

After controlling for five variables (Table 1, column 4), it is found that a one percent increase in base money level increases private sector credit by 0.19 percent. The level of private sector credit is one of the most important indicators of financial development for any country. The ratio of private sector credit to GDP in advanced countries (64.41%) is about three times greater than that of developing countries (23.41%) (Appendix Table A1) and most of the advanced countries have reached a certain level of financial development. We find that base money still exerts a significant positive impact on private sector credit after controlling for other variables, we conclude that monetary policy is effective in the promotion of financial development and hence economic growth.

Now it is a matter of discussion as to how this model fits in advanced and developing countries. In our study, we find that there is a conspicuous distinction between developed and developing countries regarding conventional monetary policy effectiveness and its impact on financial development. The result of the benchmark model, which includes the first three explanatory variables, shows that the level of base money does not exert a significant effect on private sector credit in advanced countries (Table 2, column 1), consistent with the findings of some earlier studies (Jean Boivin and Marc P. Giannoni 2006, Lucjan T. Orłowski, 2015, Fawley and Neely, 2013¹⁰⁾). This result is also in line with the finding of Ma and Lin (2016) to report a smaller effect of monetary policy in countries with more financial development.¹¹⁾ Because the level of financial development in advanced countries is much higher, and the banking sector, stock market, and bond market are already developed, monetary authorities have little scope to influence the credit level by increasing or decreasing the base money. On the other hand, in the case of developing countries, there is a positive significant impact of base money on private sector credit (Table 2, column 2). A one percent increase in base money level increases the level of private credit by 0.24 percent in developing countries. From our earlier discussion, it is comprehensible that conventional monetary policy is certainly effective in developing countries, and it also has great a impact on financial development. This is because in developing countries, the banking sector, stock market, and secondary bond market are underdeveloped and thus the role of base money is more important to private credit.

These findings also exhibit the effective credit channel of the monetary transmission mechanism in developing countries which is similar to the findings of Mishra *et al.* (2012).

Table 2. The base line model results for whole sample (Two groups)

VARIABLES	(1) Advanced Countries	(2) Developing Countries	(3) Advanced Countries	(4) Developing Countries	(5) Advanced Countries	(6) Developing Countries	(7) Advanced Countries	(8) Developing Countries	(9) Advanced Countries	(10) Developing Countries
BM	0.0312 (0.0575)	0.243*** (0.0535)	0.0372 (0.0648)	0.349*** (0.0654)	0.0333 (0.0621)	0.306*** (0.0780)	-0.0326 (0.0751)	0.296*** (0.0903)	-0.0290 (0.0765)	0.236** (0.0947)
INF	-0.0619* (0.0330)	-0.152*** (0.0296)	-0.101*** (0.0360)	-0.0911** (0.0361)	-0.108*** (0.0364)	-0.105** (0.0435)	-0.0858** (0.0427)	-0.00614 (0.0554)	-0.0927** (0.0430)	-0.0218 (0.0528)
GDPPC	-0.0294 (0.0206)	-0.000311 (0.00794)	-0.0177 (0.0775)	0.0398*** (0.0116)	0.0213 (0.115)	0.0552* (0.0321)	0.129 (0.169)	0.289*** (0.0674)	0.0171 (0.169)	0.237*** (0.0702)
GADP			0.0117 (0.0276)	0.186*** (0.0301)	0.0310 (0.0498)	0.195*** (0.0416)	0.0629 (0.0509)	0.197*** (0.0517)	0.0376 (0.0626)	0.116** (0.0520)
STOCKM					-0.120* (0.0647)	0.0940*** (0.0341)	0.00838 (0.0748)	0.152*** (0.0462)	-0.0741 (0.0866)	0.130*** (0.0460)
NETINT							0.131* (0.0709)	-0.147* (0.0796)	0.144* (0.0728)	-0.134 (0.0829)
BANKCON									-0.534** (0.267)	-0.259* (0.137)
Constant	3.263*** (0.230)	1.904*** (0.162)	3.834*** (0.810)	1.500*** (0.243)	3.990*** (1.092)	1.426*** (0.394)	2.347 (1.784)	-1.260* (0.745)	6.282*** (2.195)	0.937 (1.108)
Observations	337	900	217	515	173	257	129	196	117	177
R-squared	0.629	0.285	0.576	0.366	0.534	0.513	0.537	0.579	0.577	0.544
Number of countries	45	127	38	88	36	56	36	55	35	51

Notes:

1) Standard errors in parentheses (***) p < 0.01, ** p < 0.05, * p < 0.1)

2) ibid.

We find the expected significant results for the developing countries after including GADP because financial development is always a proactive phenomenon of a well-developed institutional framework (Table 2, column 4). However, in the case of advanced countries, there is no significant effect of GADP on private credit (Table 2, column 3). It is maybe because the quality of institutions in the advanced countries has already crossed some threshold point beyond which any improvement in institutional quality has little or no impact on financial development. The result of GDPPC could be understood similar way and the variation in GDPPC is much smaller in developed countries. STOCKM also has a significant positive impact on PC in developing countries, but the impact is weak in advanced countries (Table 2, columns 5 and 6). One of the reasons is that stock markets are more developed in advanced countries (accounting for 68% of GDP), but in developing countries, it is only 31% of GDP (Appendix Table A1). Thus, it is a strong determinant of private sector credit in developing countries, and also the level of base money still significantly stimulates credit to the private sector even after controlling for STOCKM.

NETINT is insignificant for the entire sample, but it is positively significant for advanced countries (Table 2, column 7), and negatively significant for developing countries (Table 2, column 8). The higher NETINT represents a higher spread and the lower level of competition in the banking system. In developing countries, specifically, the spread is much higher and banking systems are less competitive.¹²⁾ The higher net interest margin implies a higher cost of borrowing which ultimately reduces the credit level in the market and the entrepreneurs get less credit. Another reason is that with the enhancement of financial development in developing countries, the efficiency increases, and the net interest margin decreases (Saksonova, S, 2014). This finding complies with the finding of earlier studies (Augusto de la *et al.*, 2014, Huang, Y, 2011). However, in the case of advanced countries, it is positively significant. NETINT may have a nonlinear effect on financial development when advanced countries cross a threshold level of financial development. BANKCON is another important indicator of the efficiency of the banking sector. The coefficients are significant for both groups (Table 2, column 9 and 10), with the negative sign, consistent with the findings of an earlier study (Mishra *et al.*, 2012). It should be noted here that even after including five control variables, we find that base money still significantly affects private sector credit in developing countries (Table 2, column 8) but not in developed countries (Table 2, column 7). So, conventional monetary policy has a more significant impact on financial development in developing countries.

4.2 Comparison across periods and country groups

If we split the sample period into the first period from 1960 to 1984 and the second period from 1985 to 2013, we find some interesting results. The year 1985 is chosen as a threshold because, in most developed countries, the banking system reform and financial

Table 3. Comparison of different time periods

Dependent Variable: Private sector credit over GDP

Sample period	1960-1984			1985-2013		
	(1) All Countries	(2) Advanced Countries	(3) Developing Countries	(4) All Countries	(5) Advanced Countries	(6) Developing Countries
BM	-0.00501 (0.0800)	0.368*** (0.125)	-0.146 (0.104)	0.261*** (0.0491)	0.0361 (0.0657)	0.369*** (0.0624)
INF	-0.111** (0.0440)	0.0685 (0.0798)	-0.157*** (0.0529)	-0.0894*** (0.0274)	-0.0997*** (0.0341)	-0.0769** (0.0357)
GDPPC	-0.0360 (0.0289)	-0.231*** (0.0815)	-0.0336 (0.0324)	0.0454*** (0.0132)	-0.273*** (0.0602)	0.0618*** (0.0149)
Constant	2.933*** (0.236)	3.818*** (0.584)	3.018*** (0.278)	2.128*** (0.203)	6.631*** (0.652)	1.436*** (0.250)
Observations	367	110	257	870	227	643
R-squared	0.304	0.479	0.305	0.314	0.428	0.332
Number of countries	100	28	72	172	45	127

Note:

1) Standard errors in parentheses (**p < 0.01, **p < 0.05, *p < 0.1)

2) *ibid.*

development started in the mid-1980s. The regression results demonstrate that the coefficient of base money is not significant for all countries but highly significant only for advanced countries in the first period. However, in the second period, it becomes significant for all countries and developing countries, while it is not significant in developed countries. In the first period, financial development even in advanced countries was not high compared with that in the more recent period and the impact of monetary policy instruments was highly significant in developed countries (Table 3, column 2). In the second period, with the development of the financial sector, monetary policy is no longer significant to private credit in developed countries (Table 3, column 4). This result may reflect the former finding that monetary policy is significant to private credit when the economy and financial sector are underdeveloped. Conventional monetary policy in most of the developed countries appears to have lost its effectiveness to promote private credit in the recent period, which might be reflected in the experience that they have introduced unconventional monetary policy after the global financial crisis of 2007-08.

For the developing countries in the first period, there is no significant result for base money, but in the second period, we get significant results. When the financial system and economic activity in developing countries are too underdeveloped and the banking sector is more concentrated, it could be difficult for the banking sector to create credit even with the increase of base money. In this state of development in developing countries, the role of base money is not effective to create more credit because too underdeveloped economies may not have sufficient capacity to absorb the positive effect of monetary policy. However,

Table 4. Results with three country groups

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Advanced Countries	Middle-income Countries	Low-income Countries	Advanced Countries	Middle-income Countries	Low-income Countries	Advanced Countries	Middle-income Countries	Low-income Countries	Advanced Countries	Middle-income Countries	Low-income Countries
BM	0.0312 (0.0575)	0.223*** (0.0573)	0.427*** (0.152)	0.0372 (0.0648)	0.356*** (0.0690)	0.313* (0.179)	0.0333 (0.0621)	0.317*** (0.0804)	0.683* (0.282)	-0.0326 (0.0751)	0.313*** (0.0943)	0.575 (0.454)
INF	-0.0619* (0.0330)	-0.197*** (0.0327)	0.0246 (0.0719)	-0.101*** (0.0360)	-0.133*** (0.0401)	0.0651 (0.0784)	-0.108*** (0.0364)	-0.115** (0.0460)	0.0643 (0.159)	-0.0858** (0.0427)	-0.00386 (0.0572)	-0.0294 (0.179)
GDPPC	-0.0294 (0.0206)	-0.00334 (0.00848)	0.0288 (0.0234)	-0.0177 (0.0775)	0.0302** (0.0141)	0.0426* (0.0222)	0.0213 (0.115)	0.0606* (0.0325)	1.063** (0.373)	0.129 (0.169)	0.281*** (0.0679)	1.072 (0.625)
GADP				0.0117 (0.0276)	0.228*** (0.0339)	0.199** (0.0813)	0.0310 (0.0498)	0.206*** (0.0432)	0.00807 (0.273)	0.0629 (0.0509)	0.206*** (0.0525)	-0.280 (0.493)
STOCKM							-0.120* (0.0647)	0.0822** (0.0356)	0.0138 (0.0974)	0.00838 (0.0748)	0.141*** (0.0504)	-0.0255 (0.106)
NETINT										0.131* (0.0709)	-0.168* (0.0867)	0.0752 (0.416)
Constant	3.263*** (0.230)	2.259*** (0.171)	0.0653 (0.501)	3.834*** (0.810)	1.622*** (0.264)	0.942 (0.596)	3.990*** (1.092)	1.422*** (0.407)	-9.246* (3.902)	2.347 (1.784)	-1.116 (0.758)	-9.474 (5.890)
Observations	337	702	198	217	401	114	173	236	21	129	178	18
R-squared	0.629	0.296	0.322	0.576	0.409	0.376	0.534	0.508	0.945	0.537	0.573	0.956
Number of countries	45	97	30	38	68	20	36	51	5	36	50	5

Note:

- 1) Standard errors in parentheses (*** p < 0.01, ** p < 0.05, * p < 0.1)
- 2) *ibid.*

in the second half of the sample period, we get significant results. The main reason could be that a certain level of economic and financial development is necessary for the economy to absorb the effect of monetary policy. This suggests that monetary policy to increase base money works better in the middle level of economic and financial development, neither too high nor too low. The results for all countries for both periods are similar to those for developing countries because they were driven by developing countries with more observations.

To examine the effects of base money on financial development more extensively, we divide all countries into 3 groups including advanced country, middle-income country, and low-income country following the World Bank. Using this classification, we find that base money is consistently significant in the middle-income country group across all models (Table 4). It is highly significant in the low-income country group when we use the benchmark model (Table 4, column 3), but the result becomes weaker when we add more control variables. If economic development is very low then the economy cannot respond well to the monetary policy, resulting in a little increase in private credit with an increase in base money. Other factors could be important to private credit, making the effect of base money weaker in those countries. Meanwhile, if a country is highly developed with a sophisticated financial system, then private credit is not significantly affected by base money because the working of the private banking system is much more important than base money. Thus, we find that conventional monetary policy is the most effective to private credit when the level of development of countries is in the middle, but not too low or too high. The change in base money exerts a significant effect on credit creation to the private sector by the financial sector in those countries.

4.3 The relationship between monetary policy and financial development conditional on macroeconomic factors

To find out the impact of other macroeconomic variables on the effectiveness of monetary policy in terms of private sector credit, this study includes some interaction in the benchmark model. First, the BM and GDPPC interaction term is included. GDP per capita is one of the factors which can affect financial development directly, and the effect of base money on private credit could differ, depending on the level of GDP per capita. The interaction term is negatively significant (Table 5, column 1), which suggests that the impact of monetary policy on private credit becomes smaller along with the increase in GDPPC. This verifies our former finding that monetary policy to manage base money loses effectiveness in higher-income countries. In developed countries, the financial system has already reached a high level, so that monetary policy is not very relevant to credit creation by banks and firms do not solely depend on bank loans for finance. In rich countries, increasing base money is not enough to boost private credit or financial development as the

Table 5. Results with interaction terms

Dependent Variable: Private sector credit over GDP

VARIABLES	(1) All Countries	(2) All Countries	(3) All Countries	(4) All Countries
BM	0.860*** (0.139)	0.572*** (0.107)	0.136* (0.0800)	0.0422 (0.180)
INF	-0.139*** (0.0272)	-0.127*** (0.0284)	-0.0453 (0.0322)	-0.0578* (0.0349)
GDPPC	0.183*** (0.0355)	0.00709 (0.0260)	0.205*** (0.0283)	0.170*** (0.0400)
GADP	0.126*** (0.0225)	0.133*** (0.0302)	0.174*** (0.0321)	0.125*** (0.0354)
BM * GDPPC	-0.0642*** (0.0131)			
STOCKM		0.367*** (0.0726)		
BM * STOCKM		-0.119*** (0.0278)		
NETINT			-0.185 (0.121)	
BM * NETINT			0.0921* (0.0469)	
BANKCON				-0.515*** (0.149)
BM * BANKCON				0.0246 (0.0424)
Constant	0.696* (0.391)	1.534*** (0.358)	0.0369 (0.399)	2.984*** (0.842)
Observations	732	430	459	379
R-squared	0.357	0.487	0.555	0.528
Number of countries	126	92	125	113

Note:

1) Standard errors in parentheses (*** p < 0.01, ** p < 0.05, * p < 0.1)

2) *ibid.*

recent experiences of Japan, the USA, and some other European countries illustrate. They did not fully succeed in increasing private credit through quantitative easing policy. There is also a discernible distinction between the two country groups. In the case of advanced countries, the coefficient of the interaction term is more negative than that of developing countries. Thus, the level of GDP per capita reduces the impact of monetary policy more severely in advanced countries (Appendix Table A2).

Although STOCKM is considered another determinant of financial development, effectiveness of monetary policy may also be affected by stock market development, too. We include the interaction of STOCKM and BM to assess how it is associated with the effect of base money on private credit. This interaction term is negatively significant (Table-5, column 2). This suggests that the development of the stock market has a negative impact on the effectiveness of monetary policy to promote private credit. This is because if the stock market or capital market is highly developed, then firms can easily obtain funds when they have difficulty in getting loans from the banking system. This result complies with

the findings of Kashyap *et al.* (1993)¹⁴⁾. This finding is also consistent with the former finding in that effectiveness of monetary policy is greater in developing countries, where stock markets are also less developed in general, as we already report. Furthermore, the negative effect of stock market development on monetary policy effectiveness is significant only for advanced countries (Appendix Table A2). This could be because a certain level of economic development is necessary for this effect to be realized. Although NETINT increases the effect of base money on private sector credit because it measures the efficiency of the banking system, there is no evidence that bank concentration affects the impact of base money on private credit as well as financial development (Table 5, columns 3 and 4).

4.4 Robustness of our study

To check the robustness of our results, liquid liability and private sector credit only by banks are used as a proxy to measure financial development separately. Liquid liability is collected from the GFDD which is also known as broad money or M3.¹⁵⁾ The BM is found to be positively and significantly associated with liquid liability (Appendix Table A3). This is the same result for the impact of base money on private credit as we reported in the previous section. However, when we divide the countries, BM is significant to M3 in both groups but the coefficient is much stronger for the developing country group (Appendix Table A3). One of the reasons is that by definition base money is a component of M3, so it has a direct effect on liquid liability. With the economic and banking sector development, new financial products are continuously developed, deposits in different forms increase, and the multiplier effect becomes greater than it was earlier. Thus, the effect of monetary policy on liquid liability could become smaller in more developed countries compared with less developed ones. In contrast, increasing base money has no direct effect on private sector credit in high-income countries¹⁶⁾ and this is because the level of private credit depends on many other factors. When we use domestic credit to the private sector by all financial institutions (FIs), we get results almost similar to those we got when we use domestic credit to the private sector by banks only (Appendix Table A4). Although private sector credit and liquid liability are both used to measure the level of financial development, they are different by definition. Because of differences in definition and multiplier effects, we find more significant results in advanced countries when liquid liability over GDP is used as a proxy for financial development.

5. Conclusions and Policy Recommendation

Monetary policy can influence economic activities by altering the credit condition of the market. Financial development, measured by private sector credit over GDP, can promote

economic growth, which is the ultimate objective of monetary policy. Many studies examine determinants of financial development. However, there are only a few studies that investigate the effectiveness of monetary policy in this aspect and how the central bank can influence financial development, in particular, in developing countries. In this study, we empirically investigate the effectiveness of monetary policy in terms of the effect of monetary policy to manage base money on financial development measured by private sector credit over GDP. In general, we find that base money can influence private sector credit positively, and the relationship is highly significant, especially in developing countries. When samples are divided into developed and developing countries for the whole period from 1960 to 2013, we find that the effect of base money on financial development is significant only in developing countries. So, conventional monetary policy is effective in developing countries.

When the time periods are divided into before and after 1985, the results are reversed between developed and developing countries. For the advanced countries, the impact of base money on private sector credit is positive before 1985, but it becomes insignificant afterward. In the case of developing countries, the result is opposite as the effect of base money is insignificant to private credit before 1985, while it is significant after that. Thus, we may conclude that with the lower level of growth and financial development, base money may have a significant impact on financial development, while its impact decreases along with the higher level of growth and financial development. When we divide the country group into advanced, middle-income, and low-income countries, we find a significant result for middle-income countries and also in low-income countries, though slightly weaker. This finding suggests that monetary policy is the most effective when the level of development is not too high or not too low. Besides, the effect of base money on private sector credit becomes smaller along with a higher level of growth. Stock market capitalization is a proactive factor of financial development, but it reduces the effectiveness of monetary policy. Bank concentration always has a negative effect on private credit irrespective of advanced or developing countries, but no influence over monetary policy effectiveness is found. Our result suggests that in countries where the extent of financial development is not high compared with advanced countries, monetary authorities have effective control over private credit level and monetary policy can influence financial development.

In conclusion, for advanced countries, an increase in the money supply through base money would not be a proper way to promote private sector credit and financial development. Policymakers should instead consider building the confidence of the financial institutions to create credit more. In the case of developing countries where financial development is limited and monetary policy has a great influence over the credit level, the change in base money to control the money supply exerts a significant effect on private sector credit and financial development. Since institutional quality and stock market development have positive impacts on financial development, and these factors do not reduce the mone-

tary policy effectiveness in developing countries, policymakers and regulators should undertake more efforts to develop these institutions.

Notes:

- 1) The credit channel of the money transmission mechanism consists of two sub-channels including the bank lending channel and the balance sheet channel. In the bank lending channel, monetary policy influences the bank reserve and bank deposits which ultimately affect the availability of bank loan. On the other hand, in the balance sheet channel monetary policy influences the stock prices and net worth of the firms which also affect the capability of the firms to get loans from the bank. For more details see Mishkin (2004).
- 2) For more details of monetary transmission channels, see Mishkin (2004).
- 3) In the money supply channel, monetary policy of the central bank affects the commercial banks' reserve which also influences the short-term nominal interest rate as well as the real interest rate.
- 4) Monetary policy tools or instruments include reserve requirement, an open market operation, REPO, Reverse REPO, etc.
- 5) Financial variables include the price of financial instruments and the most common financial variable is the interest rate.
- 6) Domestic credit to the private sector refers to financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment.
- 7) We use bank concentration in our model because increasing bank concentration weakens the bank lending channel which ultimately affects private credit and as well as financial development.
- 8) See King *et al.* (1993), Bittencourt *et al.* (2014), Gillman and Kejank (2007), Bittencourt (2008), Kim and Lin (2010), Demirguc-Kunt and Levine (1996), Augusto de la *et al.* (2014), Gomez *et al.* (2005), Mishra *et al.* (2012), and Huang (2010).
- 9) The countries with GNI per capita \$1,025 or less in 2015 are the low-income group, while lower middle-income economies are those with GNI per capita between \$1,026 and \$4,035. Those with GNI per capita between \$4,036 and \$12,475 are the middle-income group, and countries with a GNI per capita of \$12,476 or more are classified as the high-income group. We merge the lower middle, and upper middle-income groups to construct a developing country group.
- 10) In particular, this study reports that an increase in the monetary base does not increase bank lending because banks hold on to the increased money as bank excess reserves, which further increases the base money. This is because excess bank reserve in the central bank is part of reserve money. Financial systems in advanced countries are more sophisticated and well developed, and firms and households have many options to offset monetary policy shocks. This may be one of the reasons for their results.
- 11) They find that financial development reduces monetary policy effectiveness.
- 12) Spread has a negative impact and banking competition has a positive impact on private credit.
- 13) It should be also noted that from 1960 to 1984, we don't have enough observations for the developing countries. Most of the countries started to report the data from 1980. We have only

257 observation for 72 countries in the first period but in the second period, we have 643 observations for 127 developing countries.

- 14) This study reports that the issuance of commercial paper rises when the monetary policy is contractionary when the capital market is developed.
- 15) Liquid liabilities are also known as broad money or M3. They are the sum of currency and deposits in the central bank (M0), plus transferable deposits and electronic currency (M1), plus time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2), plus travelers checks, foreign currency time deposits, commercial paper, and shares of mutual funds or market funds held by residents.
- 16) Bank credit is defined as the sum of loans and advances and the discounting different types of bills and documents.

References

- Ahmed S. and I. M. Ezazul (2004). The Monetary Transmission Mechanism in Bangladesh: Bank Lending and Exchange Rate Channels. *The Bangladesh Development Studies*. Vol. 30, No. 3/4, 31-87.
- Alam, M. R. (2015). Effectiveness of Monetary Policy in Bangladesh. *The Journal of Developing Areas*. 49(2), 363-372.
- Bernanke, B. S. and M. Gertler (1995). Inside the Black Box: The credit Channel of Monetary Policy Transmission. *Journal of Economic Perspectives*. Vol. 9, No. 4, 27-48.
- Bernanke, B. S. and I. Mihov (1998). Measuring Monetary Policy. *The Quarterly Journal of Economics*. Vol. 113, No. 3, 869-902.
- Boivin J. and M. P. Giannoni (2006). Has Monetary Policy Become More Effective? *The Review of Economics and Statistics*. Vol. 88, No. 3 (Aug., 2006), 445-462.
- Bittencourt, M., R. Gupta and L. Stander (2014). Tax evasion, financial development and inflation: Theory and empirical evidence. *Journal of Banking and Finance*. 41, 194-208.
- Bittencourt, M. (2011). Inflation and financial development: Evidence from Brazil. *Economic Modelling*. 28(1-2), 91-99.
- Carranza, L. J. E. Galdon-Sanchez and J. Gomez-Biscarri (2010). Understanding the Relationship between Financial Development and Monetary Policy. *Review of International Economics*. 18(5), 849-864.
- Chuku A. C. (2009). Measuring the Effects of Monetary Policy Innovations in Nigeria: A Structural Vector Autoregressive Approach. *African Journal of Accounting, Economics, Finance and Banking Research*. Vol. 5. No. 5.
- Demirguc-Kunt A. and R. Levine (1996). Stock Market Development and Financial Intermediaries: Stylized Facts. *The World Bank Economic Review*. Vol. 10, No. 2, 291-321.
- Egert, B., and R. Macdonald (2009). Monetary Transmission Mechanism in Central and Eastern Europe: Surveying the Surveyable. *Journal of Economic Surveys*. Vol. 23, No. 2, pp. 277-327.
- Fawley, B. W., and C. J. Neely (2013). Four stories of quantitative easing. *Federal Reserve Bank of St. Louis Review*. 95(1), 51-88.
- Friedman M. (1968). The Role Of Monetary Policy. *American Economic Review*. Volume LVIII, Number 1.
- Gillman M. and M. Kejak (2007). Inflation, Financial Development and Human Capital based Endogenous Growth: an Explanation of Ten Empirical Findings. Centre for Dynamic Macroeconomic Analysis Conference Papers.

- Gregorio J. D. and P. E. Guidotti (1995). Financial Development and Economic Growth. *World Development*. Vol. 23, No. 3, 433-448.
- Huang Y. (2010). *Determinants of Financial Development*. Palgrave Macmillan. <http://www.oapen.org/search?identifier=392749>
- Isakova A. (2008). Monetary Policy Efficiency in the Economies of Central Asia. *Czech Journal of Economics and Finance*. 58, no. 11-12.
- Jayaraman, T. and C. Choong (2009). Monetary Policy Transmission Mechanism in Fiji: An Empirical Analysis of the Quarterly Model. *IJBM International Journal of Business and Management*. 3 (11).
- Jonas, M. R. and S. K. King (2008). Bank Efficiency and The Effectiveness of Monetary Policy. *Contemporary Economic Policy*. 26(4), 579-589.
- Kashyap, A. J. Stein and D. Wilcox (1993). Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance. *American Economic Review*. Vol. 83, Issue 1, 78-98.
- Khan M. S. and A. S. Senhadji (2001). Threshold Effects in the Relationship Between Inflation and Growth. *IMF Staff Papers*/ Vol. 48, No. 1.
- Kim, D. and S. Lin (2010). Dynamic Relationship Between Inflation and Financial Development. *Macroeconomic Dynamics*. 14(03), 343-364.
- Kim S. (1999). Do monetary policy shocks matter in the G-7 countries? Using common identifying assumptions about monetary policy across countries. *Journal of International Economics*. 48, 387-412.
- King, R. G., and R. Levine (1993). Finance and Growth: Schumpeter Might Be Right. *The Quarterly Journal of Economics*. 108(3), 717-737.
- Law, S. H., and M. S. Habibullah (2009). The Determinants of Financial Development: Institutions, Openness and Financial Liberalization. *South African Journal of Economics*. 77(1), 45-58.
- Levine R. (1997). Financial Development and Economic Growth: Views and Agenda. *Journal of Economic Literature*. Vol. 35, No. 2, 688-726.
- Levine. R., N. Loayza and T. Beck (2000). Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics*. 46(1), 31-77.
- Mishra, P., P. Montiel, P. Pedroni and A. Spilimbergo (2014). Monetary policy and bank lending rates in low-income countries: Heterogeneous panel estimates. *Journal of Development Economics*, 111, 117-131.
- Mishra, P., P. J. Montiel and A. Spilimbergo (2012). Monetary Transmission in Low-Income Countries: Effectiveness and Policy Implications. *IMF Economic Review*. 60(2), 270-302.
- Mishkin F. (2009). Is Monetary Policy Effective During Financial Crises? *American Economic Review*. Vol. 99, No. 2, 573-577.
- Montiel P. J. (1991). The Transmission Mechanism for Monetary Policy in Developing Countries. *IMF Staff Papers*, 38(1), 83.
- Ndikumana L. (2014). Implications of monetary policy for credit and investment in sub-Saharan African countries. University of Massachusetts at Amherst, working paper series number 356.
- Ngalawa, H. and N. Viegli (2011). Dynamic Effects of Monetary Policy Shocks In Malawi. *South African Journal of Economics*. 79(3), 224-250.
- Olivero M., P. Y. Li and B. N. Jeon (2011). Consolidation in banking and the lending channel of monetary transmission: Evidence from Asia and Latin America. *Journal of International Money and Finance*. 30(6), 1034-1054.
- Orlowski L. T. (2015). Monetary expansion and bank credit: A lack of spark. *Journal of Policy Mod-*

- eling*. 37(3), 510-520.
- Rafiq S. (2015). Monetary Policy Transmission and Financial Stability in a LIC: The Case of Bangladesh. IMF Working Papers, WP/15/231.
- Ramlogan C. (2004). The transmission mechanism of monetary policy. *Journal of Economic Studies*. Vol. 31, Issue. 5, 435-447.
- Ramos-Tallada, J. (2015). Bank risks, monetary shocks and the credit channel in Brazil: Identification and evidence from panel data. *Journal of International Money and Finance*. 55, 135-161.
- Thanh, S. D. (2015). Threshold effects of inflation on growth in the ASEAN-5 countries: A Panel Smooth Transition Regression approach. *Journal of Economics, Finance and Administrative Science*. 20(38), 41-48.
- Vinayagathan, T. (2013). Inflation and economic growth: A dynamic panel threshold analysis for Asian economies. *Journal of Asian Economics*, 26, 31-41.
- Younus S. (2003). The Impact of Monetary Policy on the Bank Portfolio in Bangladesh. *Bank Parikrama*. Volume XXVII and XXIX.

Appendix

Table A1. Summary statistics

Descriptive statistics		Mean	Std. Dev.	Min	Max
All countries					
	Private credit over GDP	35.80	34.47	0.41	293.30
	Base money over GDP	13.50	13.63	0.24	258.32
	Liquid liability over GDP	47.22	38.75	0.84	370.43
	Stock market capitalization over GDP	45.43	54.98	0.01	471.12
	Bank Concentration Ratio	75.78	20.78	9.49	100
	Net Interest Margin	5.15	3.2	0.03	39.24
Advanced countries					
	Private credit over GDP	64.41	42.90	2.79	293.30
	Base money over GDP	12.85	10.35	2.09	92.43
	Liquid liability over GDP	74.52	50.43	6.03	370.43
	Stock market capitalization over GDP	66.23	60.68	1.30	471.12
	Bank Concentration Ratio	75.53	22.48	21.86	100
	Net Interest Margin	2.83	1.53	0.14	14.2
Developing Countries					
	Private credit over GDP	23.41	19.97	0.41	145.30
	Base money over GDP	13.73	14.63	0.24	258.32
	Liquid liability over GDP	35.41	24.31	0.84	234.66
	Stock market capitalization over GDP	29.67	44.22	0.01	380.34
	Bank Concentration Ratio	75.88	20.10	9.49	100
	Net Interest Margin	6.00	3.24	0.03	39.24

Sources: WDI, GFDD, IFS, and ICRG

Table A2. Results with Interaction term in country groups

Dependent Variable: Private sector credit over GDP

VARIABLES	(1) Advanced Countries	(2) Developing Countries	(3) Advanced Countries	(4) Developing Countries
BM	1.147*** (0.385)	1.026*** (0.158)	0.835*** (0.177)	0.549*** (0.137)
INF	-0.109*** (0.0366)	-0.0873** (0.0356)	-0.108*** (0.0358)	-0.122*** (0.0427)
GDPPC	0.550*** (0.0915)	0.176*** (0.0399)	0.401*** (0.0719)	0.0487** (0.0242)
GADP	0.0494* (0.0285)	0.128*** (0.0292)	0.0862* (0.0447)	0.154*** (0.0414)
BM * GDPPC	-0.100*** (0.0364)	-0.0526*** (0.0150)		
STOCKM			0.356*** (0.118)	0.232** (0.113)
BM * STOCKM			-0.191*** (0.0419)	-0.0561 (0.0432)
Constant	-2.071** (0.992)	-0.314 (0.444)	-2.104*** (0.758)	0.910** (0.419)
Observations	217	515	173	257
R-squared	0.497	0.300	0.508	0.474
Number of countries	38	88	36	56

Note:

1) Standard errors in parentheses (*** p < 0.01, ** p < 0.05, * p < 0.1)

2) *ibid.*

Table A3. Results with another measure of financial development

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	All Countries	Advanced Countries	Developing Countries	All Countries	Advanced Countries	Developing Countries	All Countries	Advanced Countries	Developing Countries	All Countries	Advanced Countries	Developing Countries
BM	0.350*** (0.0301)	0.139*** (0.0400)	0.468*** (0.0381)	0.217*** (0.0306)	0.110*** (0.0401)	0.296*** (0.0468)	0.175*** (0.0350)	0.109** (0.0455)	0.218*** (0.0542)	0.166*** (0.0378)	0.109** (0.0526)	0.197*** (0.0613)
INF	-0.115*** (0.0165)	-0.0977*** (0.0245)	-0.0667*** (0.0217)	-0.0740*** (0.0180)	-0.104*** (0.0253)	-0.0269 (0.0261)	-0.0466** (0.0222)	-0.0916*** (0.0299)	0.0197 (0.0322)	-0.0566** (0.0225)	-0.111*** (0.0308)	0.00489 (0.0333)
GDPPC	0.0245*** (0.00566)	0.208*** (0.0343)	0.0286*** (0.00609)	0.0386*** (0.0137)	0.206*** (0.0526)	0.0358*** (0.0147)	0.147*** (0.0214)	0.264*** (0.0628)	0.135*** (0.0235)	0.153*** (0.0233)	0.219*** (0.0643)	0.147*** (0.0264)
GADP	0.0852*** (0.0140)	0.0223 (0.0196)	0.0897*** (0.0179)	0.105*** (0.0200)	0.117*** (0.0364)	0.112*** (0.0253)	0.0957*** (0.0237)	0.0744* (0.0406)	0.116*** (0.0305)	0.0919*** (0.0243)	0.103** (0.0411)	0.0994*** (0.0333)
STOCKM				0.0499*** (0.0185)	-0.101** (0.0443)	0.0562*** (0.0211)	0.0374 (0.0235)	0.00161 (0.0509)	0.0445* (0.0267)	0.0208 (0.0252)	-0.0257 (0.0603)	0.0268 (0.0285)
NETINT							0.0297 (0.0347)	0.106** (0.0499)	-0.0593 (0.0470)	0.0479 (0.0370)	0.121** (0.0532)	-0.0322 (0.0518)
BANKCON										-0.0523 (0.0764)	-0.0364 (0.192)	-0.0557 (0.0868)
Constant	2.485*** (0.115)	1.676*** (0.366)	1.889*** (0.144)	2.489*** (0.165)	1.624*** (0.456)	2.076*** (0.218)	1.394*** (0.230)	0.717 (0.582)	1.185*** (0.289)	1.650*** (0.435)	1.355 (0.978)	1.452*** (0.539)
Observations	734	216	518	431	173	258	326	129	197	296	118	178
R-squared	0.364	0.509	0.398	0.434	0.473	0.476	0.500	0.498	0.561	0.492	0.526	0.521
Number of countries	126	38	88	92	36	56	91	36	55	86	35	51

Note:

1) Standard errors in parentheses (***) $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ 2) *ibid.*