Monetary policy framework and financial procyclicality: international evidence

Kyungsoo Kim, Byoung-Ki Kim and Hail Park[1]

Introduction

The recent global financial crisis has highlighted the importance of financial procyclicality and its role in increasing systemic risk. The Financial Stability Forum (2009, p 8) defined financial procyclicality as "the dynamic interactions (positive feedback mechanisms) between the financial and the real sectors of the economy". Financial procyclicality, according to this definition, does not refer only to the fluctuations of financial variables around a trend. Rather, as noted by Landau (2009), it encompasses all of the following three components: fluctuations around the trend, changes in the trend itself, and possible cumulative deviations from the equilibrium value. To better understand financial procyclicality, therefore, we need to investigate the positive feedback mechanism destabilising the financial system.

There is a growing literature on this subject and, as we understand, two suspects for causing the global financial crisis have come to the fore: central banks' loose monetary policy and financial intermediaries' behaviour. These two suspects are likely to be interdependent,[2] which is in fact the exact topic that Adrian and Shin (2008) dealt with. Bean et al (2010) and Dokko et al (2009) also acknowledged this possibility. Indeed, monetary policy is transmitted to the real economy due to the existence of links between monetary policy and financial intermediaries' behaviour. Furthermore, the interdependence between the two suspects in the current interest rate-oriented monetary policy framework has become unimaginably tighter.[3] Financial intermediaries can always tap the central bank under the interest rate-oriented monetary policy framework, because the central bank's high-powered money is injected into the financial system on an on-demand basis to keep short-term market rates closely aligned with the policy rate. Interbank transactions involving maturity transformation pave a silky way for this overnight funding to be extended into long-term loans to the ultimate borrowers. This process can cause excessive leverage by financial intermediaries, and can thus increase financial procyclicality.

This paper seeks international evidence, by examining country-level panel data from 14 countries with an inflation targeting framework and a floating exchange rate, that interbank transactions under an interest rate-oriented monetary policy framework can foster or accelerate financial procyclicality.

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[1] Kyungsoo Kim is Professor in the Economics Department of Sungkyunkwan University. He was Deputy Governor and Head of the Institute for Monetary and Economic Research of the Bank of Korea at the time of the conference. Byoung-Ki Kim and Hail Park are economists at the Economic Research Institute of the Bank of Korea. The views expressed in this paper are those of the authors and do not necessarily represent those of the Bank of Korea.

[2] There is a huge literature on the monetary policy transmission channels that explicitly incorporates financial intermediaries' behaviour. See Bernanke and Gertler (1995) and Borio and Zhu (2008).

[3] This does not necessarily imply that the central bank can more easily control financial intermediaries' behaviour under the current monetary policy framework. Kim et al (2010) report that the two suspects' interdependence is evident during boom and bust periods while being insignificant during normal periods.

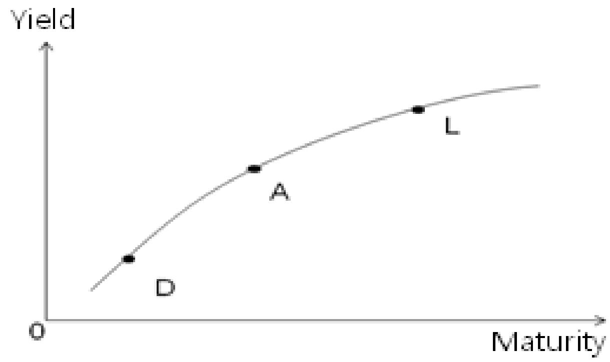
Interbank transactions, monetary policy framework and monetary policy[4]

This paper seeks international evidence, by examining country-level panel data from 14 countries with an inflation targeting framework and a floating exchange rate, that interbank transactions under an interest rate-oriented monetary policy framework can foster or accelerate financial procyclicality (FP hereafter).

Consider an upward-sloping yield curve, as shown in Figure 1. Bank 1 takes a deposit at D and makes a loan at L. It can then enjoy profits from the vertical difference between points L and D multiplied by the volume of the loan (or deposit), at the risk of maturity mismatch by the horizontal difference between points L and D multiplied by the volume of the loan. In this way maturity is transformed, and the maturity transformation (MT hereafter) is the essence of the banking activity.

Figure 1

Interbank transactions involving MT



Suppose that Bank 2 comes in and issues an interbank liability to Bank 1. Instead of making a loan, Bank 1 lends to Bank 2 at A and Bank 2 in turn supplies the loan at L. Through this interbank liability, MT is exploited: Bank 1 shares the profit with Bank 2 with the benefit of less exposure to the risk of maturity mismatch. In fact, one can imagine that other banks also issue interbank liabilities and share profits through exploiting MT.

Through the creation of interbank liabilities, however, systemic risk emerges. If for some reason Bank 2 becomes insolvent, then it may ignite a chain effect on Bank 1. In fact, when MT is exploited by many banks, the entire banking system may be exposed to potential systemic risk. Therefore, even though MT can reduce the risk of maturity mismatch at the individual firm level, the aggregate risk or systemic risk will rise.

Interbank liabilities, however, do not automatically increase bank loans to the ultimate borrowers. As can be seen in Figure 1, MT, no matter how massive it is, only splits profit and risk between the banks engaged in such activities. But experience says interbank liabilities do in fact increase lending to the ultimate borrowers, the liquidity for which must come from somewhere else.[5]

[4] This part draws heavily on Kim et al (2010). Be advised, however, that Kim et al adopted a more formal approach.

[5] Shin (2009) noted that lending to the ultimate borrowers must be funded either from the equity of financial intermediaries or by borrowing from creditors outside the intermediary sector.

This paper explores the possibility that an interest rate-oriented monetary policy framework fosters or accelerates FP. Under the current interest rate-oriented monetary policy framework, financial intermediaries can always tap the central bank provided they are willing to pay the policy rate. This is because the central bank's high-powered money is injected on an on-demand basis into the financial system to keep the short-term market interest rates closely aligned with the policy rate. Loose monetary policy in this environment can induce massive interbank transactions involving MT financed by the additional supply of high-powered money, which translates into a huge increase in loans to the ultimate borrowers, and in turn raises financial stability issues.[6]

Data and empirical analysis

Our country-level data set covers 14 countries for the years 2002–09: the United Kingdom, Sweden, Iceland, Australia, New Zealand, South Africa, Brazil, Chile, Colombia, Mexico, Peru, Indonesia, Korea and Thailand. These countries are selected from among those adopting inflation targeting and floating exchange rate arrangements. Core assets are defined as the loans of the banks; thus, we use claims on the private sector in deposit money banks. Non-core liabilities[7] consist of bonds, liabilities to other banking institutions, foreign liabilities etc. The monthly series of core assets, non-core liabilities, monetary base, and broad money (M2 hereafter) are taken from the IFS (International Financial Statistics) data set. The series of the short-term and long-term interest rates are obtained from the IFS and Bloomberg. The growth rates of core assets, non-core liabilities, monetary base and M2 are employed in the empirical analysis. All growth rates are year-on-year rates, calculated as the differences in logarithms of the variables at times t and t-12; accordingly, the sample period for the estimation is between 2003 and 2009.

We investigate the effects of non-core liability growth on core asset growth, monetary base growth and M2 growth, using the dynamic panel method. In order to examine these relationships, the following regression models are considered:

$$\mathrm{CA}_{it} = \beta_1 \mathrm{CA}_{it-1} + \beta_2 \mathrm{NCL}_{it} + \beta_3 \mathrm{Z}_{it} + \mathrm{f}_i + \varepsilon_{it}, \quad (1)$$

$$\mathrm{M\_BASE}_{it} = \beta_4 \mathrm{M\_BASE}_{it-1} + \beta_5 \mathrm{NCL}_{it} + \beta_6 \mathrm{Z}_{it} + \mathrm{f}_i + \varepsilon_{it}, \quad (2)$$

$$\mathrm{M2}_{it} = \beta_7 \mathrm{M2}_{it-1} + \beta_8 \mathrm{NCL}_{it} + \beta_9 \mathrm{Z}_{it} + \mathrm{f}_i + \varepsilon_{it}, \quad (3)$$

where CA_{it} is the core asset growth rate of individual country i in the year t, NCL_{it} the non-core liability growth rate, $\mathrm{M\_BASE}_{it}$ the monetary base growth rate and $\mathrm{M2}_{it}$ the M2 growth rate, Z_{it} denotes the control variables, and f_i is an individual fixed effect.

The short-term interest rate and the term spread between long-term and short-term interest rates are regarded as the control variables in Equation (1), while only the short-term interest rate is employed as a control variable in Equations (2) and (3). We use dynamic panel

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6 Adrian and Shin (2008) pointed out that loose monetary policy might encourage risk appetite so that financial intermediaries would want to borrow short and bear illiquid balance sheets. Giavazzi and Giovannini (2010) also claimed that inappropriate monetary policy in the form of a low policy rate as a result of overlooking the risk of a financial crisis could induce excessive MT and increase the probability of such a crisis. This, they emphasised, could push the economy into a low-interest-rate trap, since the crisis would require low interest rates to keep the financial intermediaries alive.

7 We use non-core liabilities as a close proxy for interbank liabilities, and core assets for loans to the ultimate borrowers. Shin and Shin (2010) distinguished between core and non-core liabilities of the banking sector. Core liabilities are held by the ultimate domestic creditors, such as the domestic household sector, while non-core liabilities are held by other financial intermediaries or foreign creditors.

analysis because the dependent variables are substantially affected by their own lagged values. More precisely, we use the difference GMM method employing the lagged dependent variables as instrumental variables, as proposed by Arellano and Bond (1991).

Effect of non-core liabilities on core assets

We report the estimation results in Table 1. The coefficients of the non-core liability growth rate are very similar across different model specifications, in the range of 0.020 to 0.021, with significance at the 1% levels. The values in parentheses are the robust standard errors adjusted for heteroskedasticity. Including other control variables such as the short-term interest rate and the term spread does not seem to affect the role of non-core liability growth. We find positive coefficients on the term spread between long-term and short-term interest rates, implying that a higher term spread has a positive effect on core asset growth. The effects of short-term interest rates on core asset growth are negative. However, the effects of the control variables are statistically insignificant. Our findings suggest that an increase in core asset growth will be induced by a rise in non-core liability growth.

Table 1

Regression of core asset growth on non-core liability growth

(Sample period: 2003–09)

Dependent variable: Core asset growth	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Core asset growth (–1)	0.936***	0.935***	0.937***	0.936***
	(0.008)	(0.007)	(0.009)	(0.008)
Non-core liability growth	0.020***	0.021***	0.021***	0.021***
	(0.004)	(0.005)	(0.005)	(0.005)
Short-term interest rate		–0.050		–0.033
		(0.080)		(0.081)
Term spread			0.054	0.026
			(0.092)	(0.086)
Number of countries	14	14	14	14
Number of observations	1129	1129	1129	1129
AR(2) test (p-value)	0.967	0.969	0.975	0.972
Hansen test (p-value)	1.000	1.000	1.000	1.000

Note: The values in parentheses are robust standard errors. *, **, and *** indicate statistical significances at the 10%, 5%, and 1% levels, respectively.

Effects of non-core liabilities on the monetary base and M2

From Table 2, we find that non-core liability growth has a significantly positive effect on monetary base and M2 growth. They are in a range between 0.031 and 0.034 for monetary base growth and between 0.042 to 0.044 for M2 growth, suggesting that the increase in non-core liability growth does lead to increases in monetary base as well as M2 growth. This means that, under an interest rate-oriented monetary policy framework, the central bank increases the money supply when private credit via non-core liabilities increases rapidly. The models including another control variable (short-term interest rate) show slightly lower coefficients in comparison with the models incorporating dependent lagged variables and non-core liability growth as explanatory variables. Overall, the results show that an increase in non-core liabilities induces increases in both the core asset (private credit) and monetary variables (monetary base, M2).

Table 2

Regression of monetary base and M2 growth on non-core liability growth

(Sample period: 2003–09)

	Dependent variable: Monetary base growth		**Dependent variable: M2 growth**	
	Model 1	**Model 2**	**Model 1**	**Model 2**
Monetary base growth (–1)	0.771***	0.766***		
	(0.082)	(0.093)		
M2 growth (–1)			0.676***	0.670***
			(0.156)	(0.166)
Non-core liability growth	0.034*	0.031*	0.044*	0.042*
	(0.019)	(0.018)	(0.024)	(0.022)
Short-term interest rate		0.192		0.142
		(0.419)		(0.204)
Number of countries	14	14	14	14
Number of observations	1139	1139	1141	1141
AR(2) test (p-value)	0.223	0.212	0.258	0.250
Hansen test (p-value)	1.000	1.000	1.000	1.000

Note: The values in parentheses are robust standard errors. *, **, and *** indicate statistical significances at the 10%, 5%, and 1% levels, respectively.

Results of panel-VAR model

In addition to the single equation models estimated above, a VAR model could be considered as usual, since one of our main interests is the interactions between non-core liability growth and monetary variable growth. However, our dataset consists of panel data on 14 countries from 2003 to 2009; we should hence use a panel-VAR methodology instead of a traditional VAR model.

A Panel-VAR model is specified as $Z_{it} = \Phi_0 + \Phi_1 Z_{it-1} + f_i + \varepsilon_{it}$, where Z_{it} is the two-variable vector comprising non-core liability growth together with monetary base growth or M2 growth or the money growth factor, f_i the individual fixed effect, and ε_{it} the error term.

In addition to monetary base and M2 growth, we extract their first principal component, which is the common factor in the variations of monetary base and M2 growth. This approach has the benefit of controlling the idiosyncratic shocks to each monetary variable. We order the variables with non-core liability growth placed first, and then the monetary variable. After the individual fixed effects are removed, we estimate the dynamics of the vector as a first order VAR, by GMM.

From the results of the orthogonal impulse responses to one standard deviation shocks, a shock to non-core liability growth significantly increases monetary base growth, M2 growth, and the money growth factor; this effect peaks after about two or three months and then gradually dies off.

Conclusion and policy implications

Our findings suggest that under the current interest rate-oriented monetary policy framework, which has made monetary policy and macroprudential policy inseparable, the central bank needs to take into account the endogeneity of asset prices and credit cycles when formulating monetary policy. More importantly, this suggestion applies not only to the United States but to a broad range of countries.

Note that our argument so far has centred around the way of setting the policy rate, and has not considered deployment of macroprudential policy tools such as capital requirements and buffers, forward-looking loss provisioning, liquidity ratios etc. In particular, we have argued that the central bank should set the policy rate, giving consideration to its effects on financial procyclicality.[8] Having said this, we also acknowledge that, on some occasions, monetary policy in the form of policy rate adjustments may not be sufficient to ward off asset price bubbles.[9] And we are open to the possibility that the central bank may additionally need a more adequate set of tools, other than the policy rate alone, if it is to sufficiently dampen financial procyclicality.[10]

The fact that the current interest rate-oriented monetary policy is designed to accommodate credit shocks requires that the central bank build up its ability to identify these shocks in a timely manner. Detecting these shocks is not easy in practice and we also acknowledge that both type I and type II errors matter – that is, missing an existing credit shock, or falsely detecting a credit shock that actually does not exist – since these would lead to inappropriate monetary policy. However, this does not necessarily mean that the central bank should develop an early warning system or a Taylor-type policy rule augmented with a variable that represents the status of financial fragility. We doubt that an early warning system that emits a binary signal or a simple rule-based monetary policy can do the job, but suspect rather that the central bank needs to closely monitor a wide range of data and variables showing the status of financial intermediaries and financial markets.

Finally, we would like to add that the central bank needs to beware of the possibility that communication would become more difficult and credibility would be damaged because the central bank might have to set the policy rate at a higher level in order to prevent financial

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[8] Once a financial crisis occurs, even setting the policy rate at zero would not be sufficient in the current interest rate-oriented monetary policy framework. This is because interbank transactions involving MT would stop functioning in the crisis. Supplying high-powered money into the overnight or short term money market would therefore have little impact on the longer term bond markets. The central bank may need to transact directly with financial intermediaries at a wide range of maturities – in Figure 1 on page 5, this implies that the central bank intervenes at all of the maturities, points D, A and L – which justifies the major central banks' responses to the recent financial crisis including their broadenings of eligible collateral and counterparties for open market operations and providing liquidity through longer-term facilities.

[9] Many authors have pointed out that the policy rate is a blunt and sometimes poor instrument for dealing with asset price bubbles and financial stability. See Dale (2009) and Blanchard et al (2010).

[10] It is worthwhile noting that many economists and scholars, Blanchard et al (2010) and the Squam Lake Working Group on Financial Regulation (2009) to name but a few, have recently recommended that the central bank should be given an explicit mandate for financial stability and should be a macroprudential regulator.

procyclicality from strengthening.[11] Enhancing transparency would in this regard be necessary to maintain central bank credibility.

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[11] See Dale (2009).