CHAPTER 7

Interest Rate Transmission in a New Monetary Policy Framework

MA Jun

China’s 13th Five-Year Plan highlighted the need for transition to a market-based monetary policy framework. The transition will involve changing the intermediate target of monetary policy from measures of money supply (such as M2) to a policy interest rate.

All central banks in developed economies and in many emerging market economies have completed this transition in the past few decades. In most countries, the transition from monetary targeting to interest rate targeting was driven largely by three factors:

• The correlation between the quantitative target—such as money supply—and economic growth and inflation has weakened, making it more difficult to achieve prescribed economic goals and price stability through controlling the money supply.

• Money demand has become less stable and predictable in light of financial innovation. Targeting the money supply alone may generate unintended volatility in market-driven interest rates.

• The monetary policy transmission mechanism from the policy rate to market interest rates (such as bond yields and deposit and lending rates) and the real economy has become more effective.

As China moves toward an interest-rate-based monetary policy framework, gaps remain. The country has largely met the first two conditions (as mentioned above) for the transition to targeting interest rates, but the influence of policy rates on market rates remains questionable. It is unclear to what extent a change in the policy rate would affect bond yields and deposit and lending rates (which eventually affect the real economy).

The author is Chief Economist of the Research Bureau of the People’s Bank of China (PBC). The opinions expressed in this chapter are those of the author and do not necessarily represent those of the PBC or the IMF. The contents of this chapter are based on the Chinese language book by Ma and Ji (2016).
Better understanding of the transmission mechanism, particularly on its channels and effectiveness, is critical for three reasons:

- If empirical research concludes that interest rate transmission is completely ineffective, China should not advance hastily toward the new framework to guide the economy.
- If the transmission is effective, but this is not well documented by empirical studies, policymakers may be reluctant to push the reform. As a result, the outdated and less-effective framework might stay in place for too long.
- If the transmission mechanism is somewhat imperfect but uncertainty surrounds the degree of influence or the underlying factors for gaps, policymakers may not be able to carry out well-targeted reform to improve the transmission mechanism.

This chapter summarizes the research findings on China’s monetary policy transmission mechanism based on Ma and Ji 2016, drawing on major theoretical and empirical studies to summarize the need for a new intermediate target for monetary policy. Results from static and dynamic general equilibrium models are used to analyze the transmission mechanism in a perfect regime without friction, which serves as a benchmark for the discussion of the current regime and the factors that limit the effectiveness of transmission. Empirical results on the effectiveness of interest rate transmission in China relative to other countries are included. The chapter also discusses soft budget constraints for local government financing vehicles (LGFVs) and state-owned enterprises (SOEs) and their impact on interest rate transmission. It demonstrates the need for an interest rate corridor to reduce volatility in rates, which will help monetary transmission, looks at other factors that inhibit interest rate transmission, and provides specific policy recommendations.

THE NECESSITY OF CHANGING THE INTERMEDIATE TARGET

Central banks have a core mandate to achieve their final goals (such as price, employment, and output) through their monetary policy tools. To reach the final goals, a central bank aims to achieve an intermediate target, which is either a money supply indicator or an interest rate, with reasonable precision through application of policy instruments (such as open market operations or a reserve requirement ratio). The intermediate target should be closely related to the final goals.

International experience suggests that over the past few decades most central banks have abandoned money supply measures as the intermediate target and shifted to using an interest rate. The transition is largely due to a significant weakening of the relationship between money supply and the real economy (Table 7.1). Friedman and Kuttner (1992) found that, based on a vector autoregression model, the correlation between money supply and nominal income
and prices in the United States began to weaken significantly in the 1980s. Through a Granger causality test and variance decomposition analysis, Bernanke and Blinder (1992) noted that the federal funds rate had more forecasting power on real variables in the economy than M1 and M2, which contributed to the shift to the federal funds rate as an intermediate target in the United States. In 1975, Canada launched “monetary gradualism” to contain inflation risks by targeting M1 range. Since inflation remained high even as Canada was able to achieve its M1 target for a few years, this illustrates the weakening relationship between money supply and economic variables. A former governor of the Bank of Canada remarked that “we did not abandon money supply; it abandoned us.”

What has caused the weakening of the correlation between money supply and real economy indicators? Most research has demonstrated that all countries experienced instability in money demand during the transition from a monetary policy framework. Many factors may cause shocks to money demand. They include financial innovation; technological advances; and changes in expectation, monetary deepening, and opening of the capital account. Financial innovation, for example, accelerates the intermediation of liquidity to new financial instruments (some are included in money supply statistics while others are not), which adds volatility to the money supply. Technological advances improve the efficiency of payments and therefore may reduce money demand, while the monetization of the economy tends to increase it (Yi 2004). In addition, the volume of demand for local currencies by nonresidents is difficult to estimate in an open capital account.

Research also suggests that fixing money supply as an intermediate target would bring excessive interest volatility. Walsh (2010) established a general equilibrium model that includes the New Keynesian Phillips curve with a forward-looking IS curve and a money demand function. The model shows that as money demand is unstable, the targeting of specific money supply growth would generate volatility in market interest rates, which in turn would generate excessive volatility in the real economy. Our empirical study based on data from 12 countries that have made the transition from monetary targeting

<table>
<thead>
<tr>
<th>Economy</th>
<th>Posttransition Intermediate Target</th>
<th>Timing of Anchoring Monetary Policy Using Interest Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>Federal funds rate</td>
<td>1980s</td>
</tr>
<tr>
<td>Germany</td>
<td>Refinance rate</td>
<td>1980s</td>
</tr>
<tr>
<td>Japan</td>
<td>Overnight borrowing rate</td>
<td>1980s</td>
</tr>
<tr>
<td>Korea</td>
<td>Overnight interest rate</td>
<td>1990s</td>
</tr>
<tr>
<td>India</td>
<td>Repo rate</td>
<td>1990s</td>
</tr>
<tr>
<td>Taiwan Province of China</td>
<td>Discount rate</td>
<td>1990s</td>
</tr>
<tr>
<td>Australia</td>
<td>Overnight interest rate</td>
<td>1980s</td>
</tr>
<tr>
<td>Canada</td>
<td>Overnight interest rate</td>
<td>1980s</td>
</tr>
</tbody>
</table>

Source: Authors.

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Interest Rate Transmission in a New Monetary Policy Framework

The transition from a monetary policy framework to interest rate targeting shows that the more stable a country’s money supply growth, the higher the volatility of short-term interest rates (Figure 7.1). Excessive volatility in interest rates would make it more difficult for private lenders and borrowers to predict profits and costs, and therefore dampen incentives for investment and consumption. Market participants might also hoard liquidity to avoid risks.

China’s data also show a significant weakening of the correlation between the intermediate target of the M2 growth rate and the real economy. Fixing M2 growth at a particular rate no longer ensures that economic goals are achieved. Instead, it often leads to excessive interest rate volatility. Specifically, monetary targeting causes the following:

- **Significant weakening of the correlation between quantitative goals and real economy indicators.** Our calculation shows that the correlation between the M2 growth rate and the lagged nominal GDP growth rate was 0.43 during 1990–2006, and declined to 0.29 during 2007–15 (Figure 7.2). Similarly, the correlation between M2 growth and lagged growth in consumer prices was 0.75 between 1990 and 2006 and dropped to 0.06 during 2007–15. The weakening of the correlation illustrates the challenges of using M2 as the intermediate target for monetary policy. Bai and others (2016) employ a series of structural vector autoregressive

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**Figure 7.1. Volatility of Interest Rate and Money Supply Growth in the Transition from a Monetary Policy Framework to Interest Rate Targets**

[Graph showing the relationship between volatility of money aggregate growth rate and volatility of short-term interest rate.]

Source: Authors’ estimates.

Note: BRA = Brazil; CAN = Canada; CHN = China; GBR = United Kingdom; IND = India; JPN = Japan; KOR = Korea; MEX = Mexico; MYS = Malaysia; THA = Thailand; USA = United States; ZAF = South Africa.
(SVAR) models with variables such as M2 growth, short-term interest rates (seven-day repo rate), inflation rates (consumer price index [CPI] year-over-year growth rate and producer price index year-over-year growth rate), and output (industrial value added) growth. Their findings also indicate that the transmission efficiency of China’s monetary policy has experienced a structural change since 2011.

• **Monetary targeting also causes excessive volatility in market rates.** Analysis of China’s short-term interest rate volatility over the past 15 years (after controlling for the trend of the seven-day repo rate using HP filters) shows that the standard deviation of short-term interest rates has risen almost threefold since 2006 from 0.24 to 0.90. The coefficient of variation (standard deviation divided by average interest rate) shows that the overnight interest rate volatility is several times higher in China than in the Europe, Japan, Korea, and the United States. We believe that the fundamental cause of higher interest volatility in China in recent years has been that money

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1Bai and others (2016) further decompose the CPI growth rates by upstream and downstream industries and add more macro variables such as global oil price and real effective exchange rate to the SVAR models, with well-designed identification ordering. They show that the weakening transmission efficiency of monetary policy is robust among different model settings.
demand has become increasingly unstable but money supply growth has not been flexible enough to accommodate the demand shocks.

Money demand in China has faced structural changes since 2008 (Liao and Tapsoba 2014). The $R^2$ in a regression of money demand function was 0.51 between 1990 and 2006, and declined to 0.38 during 2007–15. It is evident that money demand function in China has become unstable.

The above two conditions—declining correlation between M2 and the real economy and rising interest rate volatility—suggest that the transition to a monetary policy framework centered on a policy rate is inevitable. The third condition for a successful transition is a proper interest rate transmission mechanism. If the policy rate does not transmit effectively to other market rates, including bond yields and lending and deposit rates, the move to the new framework will not effectively allow policymakers to achieve the end goals of monetary policy.

At present, there is no consensus on whether the third condition has been met. The answer to this question will form the basis for determining whether China is ready to transition to a new monetary policy framework. Accordingly, subsequent sections analyze the theoretical framework of interest rate transmission in China in both static and dynamic models, followed by empirical analysis. Specific bottlenecks are also identified that inhibit interest rate transmission in China, and reform options are analyzed.

**INTEREST RATE TRANSMISSION UNDER A PERFECT REGIME**

Although there is broad consensus that China’s interest transmission faces significant bottlenecks, few studies have examined the question using the systemic framework featured in the next sections, which summarize the findings of our analysis of China’s interest rate transmission mechanism based on static and dynamic general equilibrium models.

First, the mechanics of interest rate transmission under an ideal regime are analyzed, that is, one without quantitative controls and other institutional restrictions. A static model and a dynamic stochastic general equilibrium (DSGE) model consisting of agents, including the central bank, commercial banks, enterprises, and investors, is developed (Ma and Wang 2014; Ma, Wang, and Li 2015; Ma and others 2015). These models describe the mechanics of how the policy rate is transmitted to market interest rates, including bond yields and lending and deposit rates, and calculate the transmission

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2Research has shown that the demand for money is stable only when the money stock, income, and the opportunity cost of money remain at a long-term cointegrating relationship. When the demand for money is stable, it can be estimated based on aggregate income (or aggregate output) and the short-term interest rate. In the regression of $m_t = α_t + β_t X_t + γ_t r_t + ε_t$, the larger the $R^2$, the more predictable and stable the demand for money.

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efficiency through calibration of the dynamic model. Considered first is the case without institutional restrictions such as a cap on the loan-to-deposit ratio, quantitative restrictions on loans, interest rate controls, or access restrictions on bond markets.

The analysis shows that without institutional restrictions, policy rate transmission to market rates is effective. That is, a change in the policy rate leads to a change in other market rates in the same direction, with the degree of response depending on the preference and cost coefficients of market participants. Moreover, the transmission of the policy rate to bond yields is mainly through arbitrage in the bond market, while the transmission to deposit and lending rates is mainly achieved through portfolio rebalancing of banks and investors.

- **Bond yields.** From a bank’s perspective, when the policy rate rises (for example, due to contractionary open market operations), a liquidity shortage in the banking system would lead to a decline in funds available for banks to invest in bonds, which drives up bond yields. In a developed financial market, where ample and effective instruments for arbitrage exist, the transmission will be rapid, leading to an arbitrage between bonds of different maturities (shorting long bonds when the policy rate rises). The arbitrage allows changes in the policy (short-term) rate to be quickly transmitted to yields on bonds of medium- and long-term tenure.

- **Lending rates.** When the short-term policy rate rises, bond yields will rise (as above). Banks will then allocate more assets to bonds, reducing funds available for lending. The decline in funds for lending in the whole banking system will, in turn, drive up lending rates.

- **Deposit rates.** When the policy rate rises, it drives up bond yields. Residents will increase their investment in bonds and reduce savings (held in bank deposits). The decline in savings will incentivize banks to raise rates to keep deposits.

### INSTITUTIONAL CONSTRAINTS ON INTEREST RATE TRANSMISSION

Various institutional restrictions in China have constrained the interest rate transmission mechanism. The legacy restrictions from quantitative and price control regimes inevitably weaken the efficiency of policy rate transmission. The theoretical model developed by Ma and Wang (2014) shows that a plethora of factors—such as the loan-to-deposit ratio, quantitative loan limits, the relatively high required reserve requirement, soft budget constraints on some borrowers, and regulatory arbitrage by shadow banking—have all helped weaken interest rate transmission.

Empirical results from our DSGE model described in Ma and others 2015 also illustrate that institutional restrictions have blocked transmission of the policy rate to market interest rates (Table 7.2). The smooth transmission that would
exist in a perfect market is possible because agents such as banks and households can freely reallocate assets to achieve their profit or utility maximization goals. In reallocating the assets (among bonds, bank loans, deposits), they affect market prices (interest rates). Institutional constraints or disguised taxation on bank operations (such as a high deposit reserve requirement) increase the cost, or “friction,” for asset and liability rebalancing (that is, they restrict the flexibility of reallocation of assets and liabilities) or directly limit asset allocation (quantitative limits on the loan-to-deposit ratio and caps on loans are examples). These restrictions eventually block the efficient transmission of policy rates to deposit and lending rates. Five specific conclusions are made for China:

• **The deposit reserve requirement has been excessively high.** In the past, due to the current and capital account “twin surpluses” in China’s international balance of payments, the PBC, the central bank, had to raise the reserve requirement to keep overall liquidity under control. However, our models show that raising the reserve requirement would weaken the transmission from policy rate to bond yields and bank deposit and lending rates. For instance, our DSGE model shows that, compared with the 10 percent reserve requirement regime, a reserve requirement of 20 percent of bank deposits would result in about an 8 percent loss in the efficiency of the interest rate transmission. Our empirical study using data of listed companies also indicates that a high reserve requirement significantly weakens the transmission from short-term market rates to bank lending rates.

• **Binding caps on the loan-to-deposit ratio weaken the transmission.** Our theoretical model suggests that the cap on the loan-to-deposit ratio will weaken the transmission from the policy rate to lending rates. Empirical results from our DSGE model also show that the more binding the cap on the loan-to-deposit ratio, the weaker the transmission of the policy rate to lending rates. At the extreme, the transmission mechanism could completely fail. Our empirical study of data from listed companies does suggest that

| Table 7.2. Impact of Different Institutional Constraints on Interest Rate Transmission |
|----------------------------------|------------------|
| **Institutional Constraint**     | **Policy Rate Transmission** | **Lending Rates** | **Deposit Rates** | **Bond Rates** |
| Deposit Reserve Ratio            | Effective        | Weakened          | Weakened          | Weakened       |
| Loan-to-Deposit Ratio            | May fail         | Weakened          | Uncertain         | Strengthened   |
| Quantitative Limit on Loans      | May fail         | Weakened          | Weakened          | Strengthened   |
| Bond Issue Quota                 | Effective        | Strengthened      | Strengthened      | Strengthened   |
| Bond Transaction Cost            | Effective        | Strengthened      | Weakened          | Strengthened   |
| Soft Budget Constraint           | Effective        | Weakened          | Weakened          | Strengthened   |
| Lack of Market Liquidity         | Effective        | Weakened          | Weakened          | Strengthened   |
| Shadow Banking                   | Effective        | Weakened          | Weakened          | Strengthened   |

Source: Author’s theoretical models.

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the cap on the loan-to-deposit ratio has weakened in a statistically significant way the transmission of the policy rate to market interest rates.

- **Quantitative loan limits squeeze the transmission.** Our theoretical model shows that when quantitative limits on loans are binding for all banks, a change in policy rate will have no impact on lending rates; as such, a change in the policy rate cannot be transmitted to lending rates at all. When a quantitative limit on loans is applied to selected banks only, the transmission from the policy rate to lending rates still exists but is weaker. At the same time, the transmission from the policy rate to deposit rates and bond yields would also weaken. This conclusion is supported by our empirical test based on the DSGE model.

- **Soft budget constraints on enterprises skew lending rates.** Due to implicit guarantees, some LGFVs and SOEs face soft budget constraints. The theoretical and empirical models show that enterprises under soft budget constraints have access to loans at lower interest rates and tend to borrow more than they would if such constraints did not exist. It is also demonstrated that as a result of soft budget constraints, the transmission of the policy rate to market interest rates would be less effective than in an economy where all firms faced hard budget constraints.

- **Shadow banking also weakens the transmission.** Some shadow banking activities in China (such as trust loans) are driven by regulatory arbitrage—such as evading quantitative limits on capital requirements, reserve requirements, and caps on loan-to-deposit ratios. It is demonstrated that although shadow banking may increase overall financing in the economy, it also tends to weaken the transmission of the policy rate to the real economy through banks and the bond market.

In addition, studies on how bond issuance quotas, high transaction costs, and liquidity shortages may affect interest rate transmission have been conducted. Our basic conclusion is that all these situations would, to a varying degree, lower the efficiency of interest rate transmission.

**Measuring the Effectiveness of Interest Rate Transmission**

Our empirical analyses found that interest rate transmission is generally less efficient in China than in developed economies and some emerging market economies. Several methodologies are used to estimate the impact of a change in the short-term interest rate (policy rate) on bond yields and on bank lending rates. Our conclusion is that although changes in China’s short-term interest rates do affect bond yields and lending rates, their influence is weaker than in developed economies and some developing economies. At the same time, the transmission through the bond market is stronger than through the banking system.

**Transmission through the Bond Market**

Our analysis shows that transmission of short-term rates to bond yields is less effective in China than in other countries. A beta analysis to compare the
transmission of short-term interest rates with Treasury bond yields in China and four other countries—India, Korea, the United Kingdom, and the United States—found that changes in China’s short-term interest rates do have a noticeable impact on bond yields of different maturities. The sensitivity (beta) varies across bonds of different maturities. In particular, the transmission effect of short-term interest rates on bond yields tends to be weaker for longer maturities. It is also found that, relative to India, Korea, the United Kingdom, and the United States, changes in short-term interest rates in China have a smaller impact on medium- and long-term Treasury bond yields. In particular, the average sensitivity of Treasury bond yields to short-term interest rate changes is about 30 percent smaller in China than in other countries (Table 7.3).

Similarly, results also stand using SVAR. The SVAR model is used to estimate and identify the impact of monetary policy shocks on yield curves in China and the United States. To single out the impact of short-term rates on bond yields, variables such as the output gap, money supply, and consumer price inflation are controlled for in the model. In addition, the predictive power (the ability to transmit information through expected channels) of the yield curve is analyzed. Specifically:

- The impulse response of a short-term interest rate shock on the Chinese Treasury bond yield is statistically significant. But such a response is weaker than in the United States. This conclusion is consistent with the cross-country beta analysis.
- During 2010–15, the impulse response of China’s bond yields to short-term interest rate shocks improved somewhat. This may indicate that bond market transmission has benefited from rising liquidity and the development of derivatives products.
- China’s Treasury bond yields are somewhat predictive of GDP growth, consumer price inflation, and interest rates. This implies that the yield curve can, to some degree, enhance policy rate transmission through the expectation channel.

Table 7.3. Sensitivity of Treasury Bond Yields to Short-Term Interest Rates

<table>
<thead>
<tr>
<th>SHIBOR</th>
<th>6 Months</th>
<th>2 Years</th>
<th>5 Years</th>
<th>10 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-Day Repo Rate</td>
<td>0.65</td>
<td>0.55</td>
<td>0.30</td>
<td>0.16</td>
</tr>
<tr>
<td>United States</td>
<td>0.55</td>
<td>0.49</td>
<td>0.32</td>
<td>0.19</td>
</tr>
<tr>
<td>Korea</td>
<td>0.83</td>
<td>0.64</td>
<td>0.46</td>
<td>0.26</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.73</td>
<td>0.64</td>
<td>0.61</td>
<td>0.47</td>
</tr>
<tr>
<td>India</td>
<td>0.82</td>
<td>0.72</td>
<td>0.69</td>
<td>0.45</td>
</tr>
<tr>
<td>SHIBOR</td>
<td>0.75</td>
<td>0.40</td>
<td>0.43</td>
<td>0.36</td>
</tr>
</tbody>
</table>

Source: Author’s estimates.
Note: SHIBOR = Shanghai Interbank Offered Rate.

*See more details about the SVAR model in Annex 7.1.*
In sum, China’s short-term interest rate shocks do transmit to bond yields, though with weaker effects than in the United States (as shown in Tables 7.4 and 7.5). Based on data from the past five years, when comparing the maximum response of all maturities, the average bond-yield sensitivity to a change in the short-term interest rate in China is about 77 percent that in the United States.

Many factors have contributed to the weaker transmission in China’s bond market than in bond markets in other countries. It is believed that the difference can be explained by the Treasury bond maturity structure, inadequate liquidity in segments of the bond market, underdevelopment of the derivatives market, and restrictions on market access for certain financial institutions. These factors have weakened or distorted interest rate transmission.

**Transmission through the Banking System**

It is found that interest rate transmission through the banking system is much less efficient in China than in the United States. Using several models, the transmission of market interest rates to bank lending rates is measured. The correlation between China’s short-term market interest rate and the prime lending rate is between 0.4 and 0.5. A regression analysis using data on listed banks shows that the elasticity of lending rates to short-term market rates is between 0.60 and 0.67, if the impact of central bank benchmark rates is not controlled for. The elasticity falls to 0.16–0.17 after controlling for changes in benchmark rates. These two estimates

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Table 7.4. Impulse Response of Treasury Bond Yields to Short-Term Interest Rates: A United States–China Comparison (Percent, 2002–15)

<table>
<thead>
<tr>
<th>Maturity</th>
<th>China</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current Response</td>
<td>Maximum Response</td>
</tr>
<tr>
<td>1 Year</td>
<td>28</td>
<td>68</td>
</tr>
<tr>
<td>3 Year</td>
<td>15</td>
<td>47</td>
</tr>
<tr>
<td>5 Year</td>
<td>8</td>
<td>31</td>
</tr>
<tr>
<td>7 Year</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>10 Year</td>
<td>−5</td>
<td>−27</td>
</tr>
<tr>
<td>20 Year</td>
<td>−6</td>
<td>−29</td>
</tr>
</tbody>
</table>

Source: Author’s estimates.

Table 7.5. Impulse Response of Treasury Bond Yields to Short-Term Interest Rate: United States–China Comparison (Percent, 2010–15)

<table>
<thead>
<tr>
<th>Maturity</th>
<th>China</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current Response</td>
<td>Maximum Response</td>
</tr>
<tr>
<td>1 Year</td>
<td>39</td>
<td>65</td>
</tr>
<tr>
<td>3 Year</td>
<td>26</td>
<td>49</td>
</tr>
<tr>
<td>5 Year</td>
<td>14</td>
<td>41</td>
</tr>
<tr>
<td>7 Year</td>
<td>6</td>
<td>37</td>
</tr>
<tr>
<td>10 Year</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td>20 Year</td>
<td>2</td>
<td>15</td>
</tr>
</tbody>
</table>

Source: Author’s estimates.
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can be seen as the upper and lower bounds of the effectiveness of short-term rate transmission to lending rates. In the United States, the effectiveness of policy rate transmission to bank lending rates is about 0.8, according to Gambacorta, Illes, and Lombardi (2014). This implies that the effectiveness of short-term rate transmission to bank lending rates in China is 20–80 percent that in the United States, with a mean value of about 50 percent. In other words, China's interest rate transmission through the banking system is probably about half that in the United States.

Several factors explain the weakness in market rate transmission to lending rates in China. First, in the past few years China's short-term interest rates have been fairly volatile, leaving banks unwilling to use market rates as the basis for pricing loans. Second, commercial banks have been equally reluctant to use Treasury yields as the benchmark for deposit interest or for pricing loans. Third, interest rate hedging instruments are not yet fully developed, and banks have not been permitted to enter the bond futures market. Fourth, securitization, which could establish a link between market rates and lending rates, is still nascent. Fifth, our empirical study, using data from 16 banks, shows that several policy and institutional factors have significantly weakened the market rate transmission to lending rates. These factors include the cap on the loan-to-deposit ratio, the high reserve requirement, and soft budget constraints mentioned earlier.

The Effect of Soft Budget Constraints

Soft budget constraints are widely perceived as limiting the effectiveness of interest rate transmission. Since LGFVs and SOEs are less sensitive to changes in interest rates as borrowers, monetary policy employing the interest rate as an intermediate target struggles to achieve the objective of macroeconomic stability. Soft budget constraints are reflected in two ways:

- The financing cost does not necessarily reflect changes in liquidity conditions and risks (since changes in the policy rate and credit risk do not effectively alter the financing costs for firms under soft budget constraints).
- Financing behavior is insensitive to interest rates (since changes in interest rates do not necessarily affect the amount that firms under soft budget constraints can borrow). At the same time, excessive borrowing by firms with soft budget constraints crowds out private sector entities in the loan and bond markets.

Empirical analyses were conducted to assess the extent to which soft budget constraints affect interest rate transmission. In doing so, the sensitivity of LGFV bonds and the aggregate bond market issuance to changes in interest rates was estimated in a sample of 3,820 LGFV bonds sold between January 1997 and September 2014. The model included variables such as the coupon rate and size of bonds issued, the financial performance of the issuer, credit rating, macroeconomic conditions, market interest rates, and fiscal conditions in the region where the issuing LGFV was located. The model was used to test the sensitivity of LGFV bond sales and funding costs to changes in market interest rates, using that of non-LGFV bonds as a benchmark. Several key findings were made:
• The pricing of LGFV bonds has become increasingly sensitive to changes in short-term market rates. Our model shows that for every 1 percentage point rise or fall in the interbank seven-day repo rate, the coupon rates of LGFV bonds move 0.34 percentage point in the same direction. Moreover, in recent years, the LGFV coupon rates reflect more significantly the financial health (or credit risks) of the issuers. The credit rating of LGFV bonds has also exercised some market discipline on the LGFV bond issuance. The higher the rating of a bond and its issuer, the lower the coupon rate.

• The size of LGFV bond issuance has become sensitive to the real risk-free rate. However, rising risk premiums have not yet effectively influenced the volume of LGFV financing.

• Amendments to the budget law in September 2014 to separate LGFV debt from that of local governments should contribute to weakening the expectation of implicit guarantees on LGFV debt. Reforms guided by the revised Budget Law will exercise a more rigid budget constraint on local governments and their financing platforms. As the budget constraints are being hardened, LGFV borrowing should become increasingly market based and more sensitive to changes in interest rates. This will contribute to improvement in the interest rate transmission mechanism.

**Stabilizing Short-Term Rates through an Interest Rate Corridor**

Market acceptance of a policy rate is an important step toward building the new monetary policy framework. Only when the market recognizes the policy rate as the guiding monetary policy signal will financial institutions and the bond market price deposits, loans, and bonds according to how it changes. It is believed that stabilizing the short-term interest rate is a condition for the formation of the policy rate. For this purpose, it is suggested that the People's Bank of China establish an interest rate corridor.

Operational experience from many countries suggests that an interest rate corridor can effectively reduce short-term interest rate volatility (see Niu and others 2015). When liquidity is in short supply, the interest rate corridor can stem excessive demand for liquidity caused by “panic borrowing” by financial institutions on the interbank market. In times of unpredictable liquidity shocks, the interest rate corridor acts as an automatic stabilizer.

Moreover, an interest rate corridor can reduce the cost of operating monetary policy. A highly credible interest rate corridor reduces the need for commercial banks and other financial institutions to hoard funds. As a result, it reduces the size and frequency of PBC interventions in the open market and limits the chance

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4Under the revised Budget Law, the Ministry of Finance and local People’s Congress have direct “quantitative control” over local government debt limits, while LGFVs no longer receive implicit government guarantees. The reform also intends to improve the transparency of local government budgets and strengthen the supervision of LGFV financing through the local People’s Congress, and by making balance sheets of local governments public.
that the policy rate will reach the top of the interest rate corridor. The optimal range of the interest rate corridor depends on the central bank’s aversion to volatility in interest rates, the cost of the liquidity facility and open market operations, and the size of external shocks.

It is now necessary for China to establish an interest rate corridor. Difficulty in stabilizing interest rates has occurred primarily because of many unpredictable shocks to money demand. Shocks have resulted from financial innovation, capital account liberalization, fiscal operations, firms selling shares to the public, and seasonal factors. Interest rate volatility is measured by the coefficient of variation (average daily interest rate standard deviation divided by average interest rate) of overnight rates. Between 2012 and June 2015 the coefficient of variation for the Shanghai Interbank Offered Rate (SHIBOR) was 1.7 times that of the dollar rate volatility in the London Interbank Offered Rate (LIBOR), 1.9 times the overnight rate volatility in Korea, 3 times the overnight rate volatility in Japan, and 4.4 times the overnight rate volatility in India.

Adopting an interest rate corridor would help stabilize commercial banks’ expectations, avoid sudden spikes in interest rates that would exacerbate liquidity hoarding, and eventually help stabilize interest rates. Unless volatility in short-term interest rates is reduced significantly, commercial banks will not be willing to adopt them as the basis for pricing loans and deposits, which is the basis for interest rate transmission.

The creation of an interest rate corridor requires a set of corresponding reforms. For example, the M2 growth rate as an intermediate target of monetary policy needs to lose its central role in the decisions of top policymakers in the move toward interest rate stability. A more liberal system of qualified collateral for the standby loan facility needs to be introduced, alongside improvement in its transparency. A better framework for analyzing the linkages between interest rates, money supply, and real economic indicators will be essential to improving liquidity management and operation of the interest rate corridor. Interagency coordination and information sharing should also be strengthened so that liquidity forecasting can be improved and to reduce interest rate volatility caused by “unpredictable” demand.

Other Factors Affecting Transmission

The foregoing analyses focused on the determinants of interest rate transmission as directly related to monetary policy operations. These include, among others, the reliance on an M2 growth target, the use of quantitative instruments (such as the cap on the loan-to-deposit rate, quantitative limits on loans, and high reserve requirements for banks), the lack of market acceptance for short-term rates and bond yields to serve as the basis for pricing financial products, the underdevelopment of interest rate derivative products, and restrictions on access to the bond market. However, a few other factors have also deterred the transmission of short-term market rates to funding costs for corporates.

The following problems reduce funding availability and push up borrowing costs for small enterprises, technology firms, and green firms, even if liquidity is
abundant in the interbank market and short-term rates are very low. In other words, they also serve as “blockages” to the efficient functioning of interest rate transmission.

- **Maturity mismatch due to excessive reliance on bank financing.** In China, more than 60 percent of social financing comes from bank lending. However, since the average maturity on Chinese banks’ liabilities is only six months, banks are unable or unwilling to provide sufficient long-term loans for fear of taking too much risk. This means that even if the PBC has injected sufficient liquidity into the system, it may not result in a substantial increase in long-term financing—and therefore long-term interest rates may not fall as much as expected. One solution is to develop the corporate bond market, which will enable more companies to raise long-term funds directly from the market.

- **Mismatch of risk preferences between capital providers and fundraisers.** Again, most funds available are from banks, which have a strong preference for low-risk projects. However, the majority of new companies pose significantly higher risks than banks are willing to accept. If regulators force banks to extend more loans to risky companies such as small enterprises, higher nonperforming loans in the banking system may result. This mismatch of risk preferences between lenders and borrowers has also contributed to the funding difficulties of these firms. The main solution to this problem is to develop a healthy equity market, by avoiding regulatory disruptions to public share sales and providing support to various forms of private equity financing (including angel investors, venture capitalists, and private equity funds).

- **Regulatory restrictions on small banks.** Village banks in rural China sometimes offer much lower lending rates to small and micro firms than microlenders in the same locations (field-based evidence suggests by as much as 9 percentage points). This is because village banks are allowed to take very low-cost deposits (at an annual rate of 4–5 percent) but microlenders are not. Microlenders can use only their own funds (capital) or borrow from third parties at an annual rate of 12–13 percent. So why not authorize more village banks so as to reduce the funding costs of small firms? The answer is that regulations require all village banks to have an established bank as a “main sponsor.” Even though many investors are interested in launching new village banks, they are unable to find sponsors. Most large banks are not interested in holding the shares of these minibanks because this would increase their reputational risk on a return that would be of negligible size. Therefore, while the intention of this regulation is to prevent financial risks, it also impedes the development of village banks and their potential to play an important role in reducing borrowing costs for firms.

- **Lack of specialized guarantee facilities.** Specialized guarantee agencies or programs can substantially reduce the risk premiums and funding costs of firms. For example, in 2005, the U.S. Congress authorized a guarantee program operated by the U.S. Department of Energy to support loans to
new energy projects. Since initially the “experts” believed 10 percent of these loans would likely default, the government allocated budgetary funds to cover the expected losses. However, by putting in place an operation involving the best venture capital investors and technology professionals, the final loss rate was only 2.28 percent. With a very small amount of public funds, the government successfully mobilized about 50 times the amount of private funds and thereby accelerated the development of this strategic industry. In China, partial guarantees for loans to support energy-saving projects under the International Finance Corporation’s China Utility-Based Energy Efficiency Finance program proved equally successful thanks to professional management. Between 2006 and 2015 the program supported 170 projects, and the average default rate was less than 1 percent. China has already established many guarantee companies, but many of them lack specialization and professional managers. Some guarantee companies cover all sectors and invest in many different regions, although their risk management capacity is weaker than that of banks. Some guarantee companies started by local governments are run by former government officials who do not have professional experience, and their incentive structures make it difficult to attract professional talent. The key to future success is to develop specialized guarantee agencies across a few sectors and regions and to ensure that they operate in accordance with market-based approaches.

• **Underdevelopment of credit information system.** Asymmetric information has been another cause of funding difficulties for many small firms. In the absence of financial data, credit histories of borrowers, and other due-diligence information, banks will generally not provide loans. When they do, the loans tend to be very costly and carry very stringent collateral and guarantee requirements. World Bank studies suggest that establishment of a credit information system can substantially improve the availability of funds to small firms. In China, the credit information system has evolved over 20 years to play a positive role in corporate financing. However, the system still faces several problems, including the lack of integration of data in the hands of different government agencies, the dominance of government ownership, and limited application of big data technologies. Development of a more effective credit information system should involve the integration of corporate credit data with information from industrial and commerce bureaus, tax administrations, public security bureaus, environmental agencies, and customs. It should introduce market competition from privately owned credit bureaus, apply various big data and data-mining technologies, and include transaction data to help quantify the likelihood that borrowers will default.

**POLICY RECOMMENDATIONS**

Transitioning to a new monetary policy framework that uses interest rates as the intermediate target will require an effective transmission mechanism.
Improving the mechanism through reforms is thus essential over the next few years. The following reforms will help improve the transmission mechanism:

1. **Changing the point target of M2 growth to monitoring an M2 growth range.** Market rates are determined jointly by money demand and supply. With financial innovations and opening up of the capital account, money demand will become increasingly unstable. Targeting a specific M2 growth rate may artificially create excessive volatility in short-term interest rates. Banks will therefore be reluctant to use market rates to price loans and deposits, making it difficult to form a policy rate and an effective interest rate transmission mechanism.

When the money demand function is not stable, improving the flexibility of money supply is important. This means that it is needed to allow M2 growth to deviate from the preset M2 growth target. It is suggested that the current M2 growth target be changed from a point (12 percent for example) to a range (such as 9–15 percent) for monitoring purposes. This change would have three effects: (1) Changing the target of M2 growth rate from a point to a range will demonstrate a greater tolerance for M2 volatility and a greater emphasis on interest rate stability. This will create an accommodating condition for the establishment of the interest rate corridor. (2) The change from “target” to the term “M2 growth rate for monitoring” means there will no longer be an absolute ceiling and floor. (3) A shift (with a transition period of the next few years) from a target point to a monitoring range will signal the gradual approach adopted by the central bank in moving toward the new monetary policy framework, as opposed to a sudden abandonment of the M2 target.

Once the M2 monitoring range and the interest rate corridor are in place, the resulting improvement in market confidence in short-term rate stability will lay the foundation for the transition to a new monetary policy framework that uses the interest rate as the intermediate target. The role of the M2 growth rate or range will further diminish over the longer term.

2. **Establishing an interest rate corridor in phases to limit market rate volatility and foster the market acceptance of the policy rate.** It is necessary to create an interest rate corridor to lower interest rate volatility and establish conditions to guide the formation of the policy rate. In China’s context, the process may take several years. A possible road map will consist of several steps: (1) creating a de facto interest rate corridor around an implicit policy rate without necessarily announcing it (as M2 will likely remain the official intermediate target for a while) and (2) gradually narrowing the de facto interest rate corridor. In the process, the declining interest rate volatility will guide markets to develop expectations that a certain short-term interest rate will become the policy rate in the future. Banks will then become more inclined to

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The reason is that demand for money faces random shocks and thus causes interest rate volatility when money supply growth is fixed. To lower interest rate volatility, volatility in money supply growth must be allowed to rise.

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price their products based on this interest rate and other market rates. The prime lending rates will also increasingly reflect the movements of this policy rate. (3) When these elements are in place, the central bank can formally announce the elimination of the benchmark deposit and lending rates, and the new policy framework will be anchored to the short-term policy rate instead of the M2 growth rate. The central bank can then establish an official, or explicit, interest rate corridor, with the interest rate for the standby loan facility as the ceiling and the interest rate for excess reserves as the floor. Within the official corridor, a narrower de facto interest rate corridor can be maintained through frequent open market operations, supported by a proper collateral system for accessing the central bank’s liquidity provisions.

3. Reducing or removing legacy policy constraints on interest rate transmission. Reforms can focus on the following areas:
   - Removing the cap on the loan-to-deposit ratio. Consensus has been reached to abolish the cap on the loan-to-deposit ratio. In August 2015 the Standing Committee of the National People’s Congress amended the Commercial Banking Law and changed the cap on the loan-to-deposit ratio to a monitoring indicator.
   - Removing the quantitative limits on bank loans. In the future, the macro-prudential management framework should no longer focus on setting quantitative loan limits for individual banks; instead it should focus on providing incentives for prudent bank behaviors with respect to capital adequacy, liquidity, and asset quality. In January 2016 the introduction of the Macro-Prudential Assessment Framework by the People’s Bank of China had already taken a step in that direction.
   - A gradual reduction of the legal reserve requirement. Due to the change in China’s balance-of-payments situation, foreign exchange reserve accumulation is no longer the source of monetary expansion. To ensure adequate liquidity in the financial system, the PBC will need to gradually lower the legal reserve requirement to improve the money multiplier while expanding the monetary base through the use relending facilities and open market operations. When choosing between expanding the monetary base and increasing the money multiplier (through cuts in the reserve requirement), considerations will need to take into account that a cut in the reserve requirement could help interest rate transmission and lower banks’ operating costs, as well as corporate sector financing costs. At the same time, avoiding an excessively high reserve requirement can help improve Chinese banks’ international competitiveness.

4. Speeding up reforms that harden budget constraints for local governments, LGFVs, and SOEs. Fiscal reforms to reclassify local government debt and improve its disclosure will tighten local government off-budget constraints. Efforts to establish a municipal bond market through the debt-swap program, better credit rating, and mandatory disclosures will also reduce their off-bud-
get borrowing. Under the reformed system, local governments and LGFVs will be more self-disciplined in borrowing, thereby reducing the need for quantitative limits on borrowing imposed by the central bank or bank regulator. At the same time, increasing the sensitivity of SOEs’ borrowing to interest rate changes through more forceful SOE reforms will be essential.

5. **Improving the functioning of the bond market.** The bond market can be improved in several ways. First, the government can improve the maturity structure of sovereign bond issuance to help strengthen monetary policy transmission. Compared with Australia, the United Kingdom, the United States, and other countries, issuance of Chinese Treasury bonds with maturities below two years and above 10 years is not frequent enough. In particular, the issuance frequency of Treasury bonds with maturity less than two years is only one-tenth of that in the United States. Second, banks should be allowed to trade Treasury bond futures, and efforts should be made to further develop interest rate swaps and inflation-linked bonds. Third, market access restrictions should be eased or removed to allow more foreign investors to participate in the domestic bond markets. Efforts should include increasing the QFII and RQFII quota, streamlining the review and approval procedures for quota management, and removing market access controls on the domestic interbank market. Fourth, the market must be allowed to play a greater role in banks’ pricing of financial products. Banks will increasingly price their loans and deposits as well as other financial products based on market rates. This would require strengthening the market-based pricing mechanism through the elimination of quantitative restrictions and more effective pricing of credit risks.

6. **Complementary reforms include the following:** Further develop the corporate bond market to provide new funding sources for mid- and long-term projects to ease the maturity mismatch facing banks and corporates. Speed up the development of equity financing channels and avoid government disruption to the initial public offering function of the stock market. Relax market access restrictions on banks serving SMEs. Incubate guarantee companies with sector specialties to reduce unnecessary risk premiums. Develop the credit information system by integrating data managed by different ministries and encourage market competition.

**CONCLUSIONS**

China is moving toward a new monetary policy framework with interest rates as its intermediate target. However, a critical condition for the successful transition to the new framework is effective transmission from the policy rate to market rates, including deposit and lending rates as well as bond yields. Our research found that multiple factors, such as the cap on the loan-to-deposit ratio,
quantitative loan limits, the deposit interest rate ceiling, the high reserve require-
ment, soft budget constraints on some borrowers, excessive volatility of short-
term rates, and the lack of derivative instruments, may weaken the interest rate
transmission mechanism. Numerical simulations based on our DSGE model
further indicate that the cap on the loan-to-deposit ratio, quantitative loan limits,
and the deposit interest rate ceiling dampen the transmission efficiency the most
compared with other financial friction and distortions.

Improving interest rate transmission through reforms is essential over the
next few years. Establishing an interest rate corridor could reduce interest rate
volatility and improve the market acceptance of the policy rate, while encour-
aging banks to price loans based on market rates. Other reforms that could help
strengthen interest rate transmission include shifting from an M2 growth target
to an indicative range, removing quantitative loan limits, lowering the reserve
requirement ratio, hardening budget constraints for LGFVs and SOEs, devel-
oping the interest rate derivatives market, and reducing access restrictions on
the bond market.
ANNEX 7.1. SVAR MODEL SPECIFICATION

Based on Bernanke and Mihov (1995), a simple SVAR model is constructed to empirically identify the monetary policy stance in China, as demonstrated below:

\[ A_0 Z_t = A_1 Z_{t-1} + A_2 Z_{t-2} + \ldots + A_q Z_{t-q} + e_t. \]

A subtle difference in the vector, \( X_{2t} \), between China and the United States is allowed. Specifically, for China,

\[
Z_t = \begin{bmatrix} X_{1t} \\ S_t \\ X_{2t} \end{bmatrix},
X_{1t} = \begin{bmatrix} G^P_t \\ CPI_t \end{bmatrix},
S_t = \begin{bmatrix} R_t \end{bmatrix},
X_{2t} = \begin{bmatrix} M2_t \\ R^7_t \\ YearX_t \end{bmatrix},
\]

while for the United States,

\[
Z_t = \begin{bmatrix} X_{1t} \\ S_t \\ X_{2t} \end{bmatrix},
X_{1t} = \begin{bmatrix} G^P_t \\ CPI_t \end{bmatrix},
S_t = \begin{bmatrix} R_t \end{bmatrix},
X_{2t} = \begin{bmatrix} YearX_t \end{bmatrix},
\]

where \( G^P_t \) denotes the output gap, and \( CPI_t \) denotes CPI year-over-year growth rate. \( YearX_t \) is the bond yields with different maturities, and \( R_t \) expresses the central bank benchmark rate. As measures of quantity-based and price-based monetary policies in China, \( M2_t \) and \( R^7_t \) denote the M2 year-over-year growth rate and interbank interest rate, respectively, to capture its transitional monetary policy framework.

Two separate subsamples from January 2002 to June 2015 are selected to estimate the impulse responses to benchmark interest rate shocks before and after the global financial crisis. The identification strategy simply follows the lower triangular matrix, as defined below:

\[
A_0 = \begin{bmatrix} a_{11} & 0 & 0 & 0 & 0 & 0 \\ a_{12} & a_{22} & 0 & 0 & 0 & 0 \\ a_{13} & a_{23} & a_{33} & 0 & 0 & 0 \\ a_{14} & a_{24} & a_{34} & a_{44} & 0 & 0 \\ a_{15} & a_{25} & a_{35} & a_{45} & a_{55} & 0 \\ a_{16} & a_{26} & a_{36} & a_{46} & a_{56} & a_{66} \end{bmatrix},
\]

and

\[
A_0 = \begin{bmatrix} a_{11} & 0 & 0 & 0 \\ a_{12} & a_{22} & 0 & 0 \\ a_{13} & a_{23} & a_{33} & 0 \\ a_{14} & a_{24} & a_{34} & a_{44} \\ a_{15} & a_{25} & a_{35} & a_{45} & a_{55} \\ a_{16} & a_{26} & a_{36} & a_{46} & a_{56} & a_{66} \end{bmatrix},
\]

for China and the United States, respectively.

To measure the mentioned variables above, inflation rates are introduced (monthly smoothed CPI year-over-year growth rate for China and core CPI year-over-year growth rate for the United States), as well as central bank benchmark rates (the one-year deposit rate for China, and the federal funds rate for the United States), an interbank interest rate for China (seven-day repo rate), money supply for China (M2 year-over-year growth rate), and bond yields for China and the United States with different maturities (one year, two...
year, five year, seven year, 10 year, 20 year). Data for the China output gap are based on estimates of the macroeconometric model developed by the macroeconomic forecasting team of the PBC Research Bureau and are smoothed monthly, while those for the United States are from reports of Oxford Economics.

The estimation results of our SVAR model are consistent with those from the beta analysis.
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