APPENDIX

Commodity and Financial Cycles in Resource-based Economies

Marina Tiunova, Bank of Russia

Graphs of impulse response functions of credit cycle indicators and other macro variables in response to positive commodity price shocks

Figure 1. Graphs of impulse response functions of Russian credit cycle indicators and other macro variables in response to a positive oil price shock of 1 p.p.

Figure 1 continues on p. 138
Continuation, Figure 1 begins on p. 137

Source: author’s calculations
Figure 2. Graphs of impulse response functions of Columbian credit cycle indicators and other macro variables in response to a positive oil price shock of 1 p.p.

Source: author’s calculations
Figure 3. Graphs of impulse response functions of Chilean credit cycle indicators and other macro variables in response to a positive copper price shock of 1 p.p.

Source: author’s calculations
Figure 4. Graphs of impulse response functions of Brazilian credit cycle indicators and other macro variables in response to a positive iron ore price shock of 1 p.p.

Source: author’s calculations
**Figure 5.** Graphs of impulse response functions of Canadian credit cycle indicators and other macro variables in response to a positive oil price shock of 1 p.p.

*Source: author’s calculations*
Figure 6. Graphs of impulse response functions of Australian credit cycle indicators and other macro variables in response to a positive coal price shock of 1 p.p.

Source: author’s calculations
Experience of the application of macroprudential policies in commodity exporters

Cerutti et al. (2017) provide information about the number of MPP instruments used in individual economies in 2000–2013. The authors calculate the so-called MPP index as equal to the number of MPP instruments used by each country out of the 12 possible (the MPP index therefore takes a value from 0 to 12):

1. countercyclical capital buffer;
2. leverage ratio;
3. time-varying/dynamic loan-loss provisioning;
4. loan-to-value ratio (LTV);
5. debt-to-income ratio (DTI);
6. limits on domestic currency loans;
7. limits on foreign currency loans;
8. reserve requirements ratios;
9. levy/tax on financial institutions;
10. capital surcharges on SIFIs;
11. limits on interbank exposures;
12. concentration limits.

Thus, the higher the value of the MPP index, the wider the range of MPP instruments used in a specific economy and the higher its level of macroprudential regulation. It can be observed that, among the countries covered by our research, Chile, Columbia, and Canada demonstrate the highest levels of macroprudential regulation (Table 1).

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Source: Cerutti et al. (2017)

1. Russia

Lately, the Bank of Russia has repeatedly applied macroprudential regulation instruments where necessary.

In 2006–2007, in the context of increased inflow of private foreign capital to the Russian financial market, banks started to actively increase their external borrowing, which led to growth of up to 20% in the share of banks’ external debt in the total liabilities of the banking sector (Bank of Russia, 2016). This, in turn, was related to the risks of refinancing existing debt, as well as currency risks.
To prevent an increase in systemic financial risk, the Bank of Russia made the decision to increase the required reserve ratios for credit institutions, especially for debts to foreign banks: the indicator grew from 4.5% in January 2008 to 8.5% as of 1 September 2008.

The Global Financial Crisis of 2007–2009, which was followed by a widespread downturn in economic and lending activities, as well as capital outflow from developing markets, prevents us from drawing a final conclusion on the effectiveness of the measures taken. At the same time, the increased ratio of required reserves enabled the Russian banking system to accumulate additional liquidity of about 400 billion roubles, which helped it to maintain adequate liquidity in the crisis period.

The next episode of the use of MPP instruments in Russia was the regulation of the unsecured consumer lending market in 2013. In 2011–2012, the Russian consumer lending market was experiencing a boom: the annual growth rate of the indicator in the middle of 2012 was about 60%, which was significantly higher than the growth rate for corporate loans of 24.4%.

In response, the Bank of Russia increased the minimum amount of loss provisions for unsecured consumer loans and the risk ratios used in calculating capital adequacy with regard to loans with increased total cost of loan (TCL). These instruments were introduced gradually on three occasions from 1 January 2013 to 1 January 2014.

As a result of these measures, the annual growth rate of consumer loans with an increased risk level dropped to 27% as of 1 April 2014. There was a reduction in the share of outstanding loans with high TCL: in the period from 1 October 2013 to 1 April 2014, the share of loans with TCL of 35–45% and over 45% decreased by 8.0 pp to 51.8% and by 10.6 pp to 20.3% (Bank of Russia, 2014). There was also an increase in the provisions of banks specialising in unsecured consumer loans: the provisioning coverage ratio for these loans in this category of banks grew from 1.9% as of 1 January 2013 to 4.3% as of 1 January 2015 (Bank of Russia, 2016).

The third significant episode of the use of MPP instruments was in 2016. In the second half of 2014, the Russian financial market was characterised by significantly heightened uncertainty (a decrease in global oil prices and intensified geopolitical risks). By that time, the Russian banking system had developed a relatively high level of dollarisation of banks' claims and liabilities, which led to growth in the volatility of the required ratios of credit institutions and the overall risk level, as a substantial share of loans in foreign currency had been issued to companies without sufficient foreign currency revenue.

In 2015–2016, in pursuance of its MPP, the Bank of Russia gradually introduced increased risk ratios for retail and corporate loans (to companies without sufficient foreign currency revenue), as well as for investments in foreign currency liabilities (Danilova and Elizarova, 2017). In 2016, the Bank of Russia also increased the required reserve ratios for banks' foreign currency liabilities to households and companies.

The regulator’s measures resulted in a decrease in the volume of foreign currency loans and an increase in domestic currency loans. Also, in the first nine months of 2016, the share of foreign currency nominated liabilities in the banking sector decreased by 5.9 pp to 18.8%, excluding foreign currency revaluation.

To continue limiting consumer lending risks, starting from 1 October 2019¹, the Bank of Russia is introducing a debt burden ratio (DBR) and will calculate risk ratios depending on TCL and DBR (Bank of Russia, 2019).

2. Columbia

The economic authorities of Columbia make fairly extensive use of macroprudential regulation instruments to protect the national economy against external shocks.

¹ See http://cbr.ru/Press/event/?id=2678.

Vargas et al. (2017) describe the scope of Columbia’s MPP starting from 2000. After the crisis of 1998–2000, Columbia experienced a gradual economic recovery. Reduced risk premiums for investments in national financial instruments led to the concentration of economic agents in the national banking system. In the second half of 2006, the consumer lending market started to gradually overheat. With significant growth in loan supply, weighted average loan rates started to increase, despite the toughened monetary policy (the Central Bank of Columbia pursued a policy of inflation targeting).

To mitigate financial risks (expansion of the current account deficiency, accelerated growth of consumer expenditures and deterioration in the quality of banks’ credit portfolios), the economic authorities resorted to reserve requirements. Marginal reserve requirements for the value of local bank deposits were introduced, as well as unremunerated reserve requirements for all types of currency debts and for foreign portfolio investments. The combination of these instruments helped effectively restrain expenditure and lending dynamics: in the second half of 2008, the country’s economic activities gradually cooled off.

The authors note that, despite the downturn in global business activities during the crisis period, there are a number of research studies confirming the statistically and economically significant role of MPP instruments in restraining the lending boom.

The second episode of successful macroprudential regulation was in 2011, when the regulator introduced provisions for consumer loans (reserve requirements were abandoned by the authorities because of their considerable influence on the overall lending level). This mechanism is still in use today.

Strictly speaking, reserve requirements are not MPP instruments. The traditional macroprudential instruments used in Columbia are LTV and DSI limits on mortgage loans and countercyclical provisions for loans.

Vargas et al. (2017) also analysed the effect of MPP instruments (dynamic provisions and marginal reserve requirements) on solvency indicators (capital adequacy ratio) and liquidity (cash and bonds in the total value of assets) of banks in 2005–2009. The author’s model proves that an increase in dynamic provisions and marginal reserve requirements leads to a reduction in risk-weighted assets, and, consequently, contributes to the improvement of the banking sector’s solvency. Both of the MPP instruments in question reduce the probability of default for a specific bank.

Gómez et al. (2017) used the model of panel regression with fixed effects to demonstrate that the introduction of countercyclical reserve requirements and dynamic provisions for commercial loans helped restrain lending growth rates in 2006–2009. The effectiveness of the use of these instruments varied depending on the structural characteristics of particular commercial banks: the use of provisions and reserve requirements was less effective in banks with more assets (or deposits in liabilities) and so also more liquid assets.

Thus, empirical research shows that the use of MPPs in the period in question helped restrain the upturn in the credit cycle, including in periods of increased prices on global commodity markets. This conclusion is confirmed by the estimates of this paper’s empirical model.
3. Chile

Cifuentes et al. (2017) assess the effectiveness of Chile’s MPP for the last two decades. The authors note the high level of financial stability in Chile, namely: 1) the absence of systemic financial crises in the country since 1982; 2) a lower volatility of bank lending than in other EMEs and developed countries (in specific periods of time) in 1990–2014; 3) the reduced susceptibility of Chile’s economy to the negative effects of the Global Financial Crisis; 4) the predominance of Tier 1 capital in the banking sector’s capital.

After a major bank crisis in the 1980s, the economic authorities developed a serious regulatory and supervisory framework to oversee the situation in the banking sector. The possibilities for and limitations on banks’ activities were clearly defined. Restrictions on concentration, limits on interbank lending, and restrictions on LTV restrictions, leverage level, loan provisions and currency risk hedging instruments were introduced (Gambacorta and Murcia, 2017).

In 2004–2006, requirements for loan loss provisions were increased, which restrained the growth rates of consumer lending. At the end of 2012, the regulator took note of the large share of mortgage loans with a high LTV level. Then, at the end of 2016, provisions were introduced for high-risk mortgage loans (even expectations surrounding the use of this instrument caused a reduction in the growth rates of mortgage lending).

The authors note that financial stability was maintained by pursuing a policy of inflation targeting with a floating exchange rate regime (introduced in 1990) and establishing control over transborder capital flows. To reduce the sensitivity of internal macroeconomic variables, the country used the following instruments: reserve requirements for the flow of short-term speculative capital, limits on capital outflow, reserve requirements for foreign currency deposits, limits on bank currency revaluation, and unremunerated reserve requirements for capital inflow. Moreover, for a relatively long time, Chile pursued a rather conservative fiscal policy.

4. Brazil

De Moura and Bandeira (2017) describe episodes of the successful use of MPP instruments in Brazil. At one point or another, the country used such instruments as a countercyclical capital buffer, countercyclical capital requirements, LTV and DTI limits, limits on currency mismatch, reserve requirements, and limits on currency positions on the spot market. According to Gambacorta and Murcia (2017), Brazil applied increased risk ratios for certain types of mortgage and car loans, countercyclical reserve requirements (2008–2009 and 2010–2011), liquidity ratios, LTV for certain types of mortgage loans, currency risk limits (2007), and restrictions on operations with derivatives (2011).

In 2009–2010, the Central Bank of Brazil successfully handled risks on the auto loans market. The boom in the auto loans market was characterised by a substantial share of long-term loans with high LTV. At that point, the regulator introduced increased capital requirements for these categories of loans. Later, the fiscal authorities used instruments for influencing adjacent areas of the financial markets: capital requirements were introduced for consumer loans, and limits were established for minimum payments on credit cards.

After the Global Financial Crisis, the Central Bank of Brazil strove to loosen the terms for providing liquidity on the domestic financial market: in the context of real depreciation, the Carry Trade strategy had lost its attractiveness, market players had reached margin call, and banks’ liquidity positions had deteriorated. Then, in March–December 2010, reserve requirements were significantly reduced or even cancelled in some cases for financial institutions faced with a currency liquidity deficit. A more substantial decrease in reserve requirements was observed with regard to large banks that provided currency liquidity to small and middle-sized banks.
To address the problem of currency liquidity deficiency, the Central Bank of Brazil provided currency in the form of swap contracts, which helped market players to secure themselves against currency risks in view of the probable weakening of the national currency. Thus, the regulator performed interventions on the currency market while preserving currency reserves. These regulatory instruments also reduced the volatility of currency risks.

To protect the national economy and the financial sector against global capital flows in 2011, unremunerated reserve requirements were set at 60% for the amount of the banks’ short position in excess of USD 3 billion on the currency spot market or in the bank’s Tier 1 capital.

Barroso et al. (2017) show that the policy of reserve requirements pursued by the Bank of Brazil in 2008–2015 was effective in restraining loan offerings. However, its effect was asymmetric: the increase in lending in response to the softening of reserve requirements was twice the size of the reduction of this indicator in the case of tougher regulation.

5. Canada

According to Cerutti et al. (2017), like Chile and Columbia, Canada has used MPP instruments extensively.

Allen et al. (2017) is dedicated to assessing the effect of macroprudential regulation instruments on the residential lending market (households’ strategy for raising borrowings and the amount of demand for mortgage loans) in Canada in 2005–2010. To approximate the policy of the macroprudential authorities, information about the limits imposed on LTV and DTS (Debt-To-Service) loan amortisation were used.

The maximum admissible amortisation (the upper limit of the share of monthly income allocated for mortgage repayment) was raised by 15 pp to 40% in 2006–2007, and then restricted to 25% in 2008.

In 2006, the LTV limit was relaxed by 5 pp to 100%, and toughened again to 95% in 2008.

The authors came to the conclusion that MPP measures proved generally effective in reducing financial risks. However, LTV restrictions were more effective in restraining demand for mortgage loans on the part of households and reducing the probability of default as compared to DTS.

Use of fiscal rules in the countries under study

Along with monetary and macroprudential policy, countercyclical fiscal policy facilitates a decrease in the dependence of national economies and financial systems on the dynamics of the global commodity cycle. Pieschacón (2012) shows that the “stacking” of data on the correlation between commodity market and fiscal sector variables in Norway (which pursues fiscal policy with budget rules) with data on Mexico’s economy leads to a decrease in the Mexican economy’s dependence on oil price shocks. Snudden (2016) notes that, even if an optimal monetary policy is pursued, supplementing it with an effective budget rule promotes a decrease in overall macroeconomic volatility. In commodity-producing countries, commodity and financial cycle parameters are intercorrelated; the latter parameter significantly influences fiscal indicators (Borio et al., 2016). The authors conclude that the drafting of budget rules promotes a decrease in the correlation between financial and fiscal indicators. Based on data on eight Latin American countries for 1990–2014, Alberola et al. (2016) demonstrate that, in countries implementing a fiscal rule, tax and expenditure policy (TEP) is the most efficient instrument for economic stabilisation. Alberola and Sousa (2017) point to the interrelation between the commodity
cycle and fiscal indicators, while significant influence of the commodity cycle on the nature of the budget function was identified only in countries with initially countercyclical TEP. The authors stress the need to implement budget rules in the context of countercyclical budget regulation ("lean against the wind"). In general, the conclusions of the research cited confirm (to a certain extent) the importance of countercyclical budget rules for reducing the correlation between the commodity and financial cycles in commodity-producing countries.

The IMF database of fiscal rules\(^2\) contains information about the number of budget rules adopted in 1985–2015 in various countries worldwide, including in the countries covered in this work (Table 2).

**Table 2. Number of budget rules adopted in the countries in question in 1985–2015**

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Note: There are four varieties of budget rule (BR): expenditure rules, revenue rules, budget balance rules, and debt rules. The average number of budget rules is calculated for 2000–2015. The countries are ranked according to their average number of valid budget rules. Countries with the most budget rules are ranked the highest, and those with the least are ranked the lowest.

Source: IMF, authors’ calculations

Based on the data from Table 2, it can be noted that, in 2000–2015, Australia had the most budget rules on average and the highest level of implementation of countercyclical fiscal policies. The developing economies of Brazil and Columbia demonstrate a relatively high use of fiscal rules. Russia, on the contrary, is distinguished by its shorter use of fiscal rules intended to regulate only individual fiscal indicators: the budget balance in 2007–2008 and budget expenditure in 2013–2015.

**References**


