

Balance sheet structure indicators and the financial cycle

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Abstract

This paper presents the dynamics of financial cycle and the associated fluctuations in balance sheet structure indicators in Russia. Namely, we calculate a range of indicators (such as Non-core Liabilities, Loans to Deposits Ratio, Net Stable Funding Ratio, Liquidity Creation) and their transformations and examine their developments in the cross-section of emerging market economies. We conduct econometric analysis of the significance of the macroeconomic effects stemming from these developments.

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The views expressed in this paper are those of the authors. They do not necessarily represent the position of the Bank of Russia.

1. Introduction

The balance sheet structure indicators are extensively used for identification of financial imbalances for financial stability purposes. The literature on the macroeconomic effects of these developments is relatively scarce. Yet, as pointed out in e.g. in ECB (2011) the changes in banks funding structure (such as changes in the supply of deposits) may have substantial effect on banks behavior.

In these paper we attempt to identify such affects by following the approaches outlined in Shin and Shin (2011), Cornett et al. (2011) and Gatev and Strahan (2006).

2. Banks balance sheet developments in Russia

During the 2000s, Russian banking sector had undergone a significant transformation. Although it remained small in terms of net assets to GDP when compared to other emerging economies (Fungáčová and Solanko, 2009a), credit flows to the real sector have increased rapidly in recent years and become an important determinant of cash flows in the economy. The rapid growth of deposits (resulting in part from the cross-border cash inflows in conditions of heavily managed exchange rate regime) have provided banks with a rich resource for lending. Similar conditions have been seen in Asian economies with similar monetary policy regimes (Mohanty and Turner, 2010). Russia turned to the fiscal mechanism of the sovereign wealth fund to absorb foreign currency from central bank interventions. This approach proved insufficient to prevent rapid money stock growth in the face of an expansion in government spending and large capital inflows that triggered additional forex purchases. Moreover, the amount of foreign currency earnings diverted into sovereign wealth funds was linked by design solely to oil price fluctuations.

An important distinction between Russian and Asian banks was that the size of the lending booming exceeded deposit growth in 2006–2008, causing funding gaps to emerge. Russian banks relied on external borrowing to finance this gap; interbank lending in particular became dominated by transactions with foreign counterparties (Fungáčová and Solanko, 2009b).

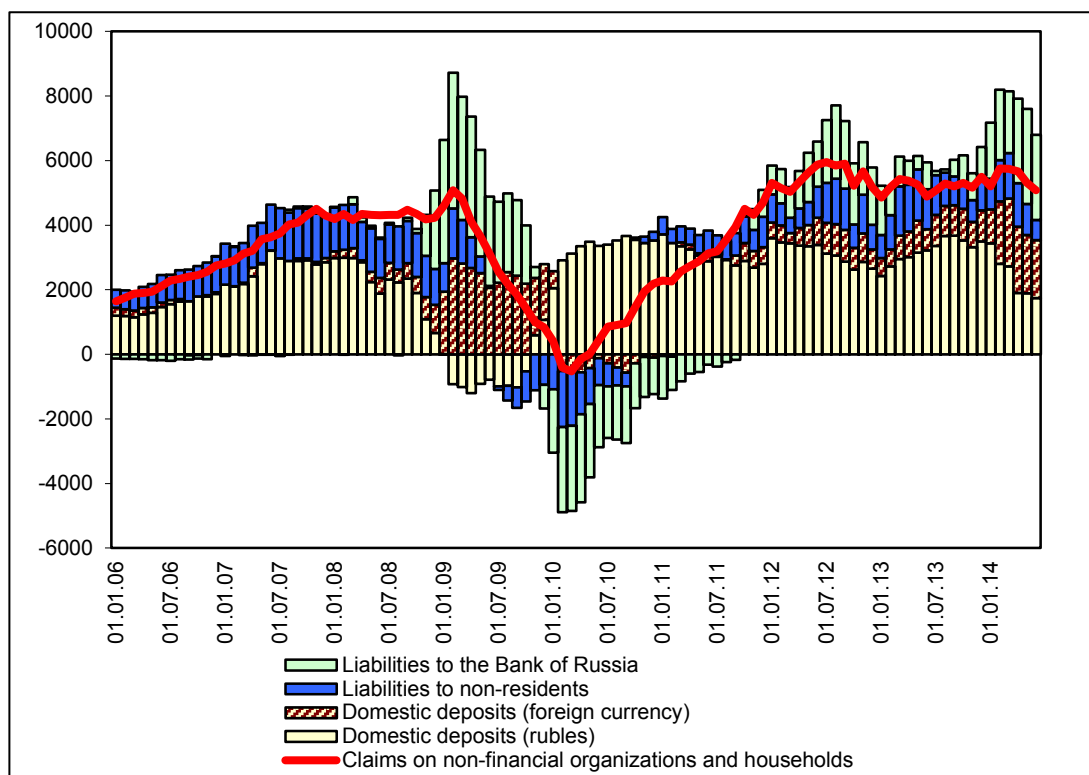
Matters came to a head with the Lehman Brothers collapse in September 2008. Capital flows reversed and the erosion of the trade balance from falling oil prices put significant depreciation pressure on the ruble. Concerned about the possibility of the deterioration of balances in case of sharp depreciation, the Bank of Russia (CBR) implemented a “controlled devaluation” in approximately 1% increments against its dual-currency basket. That strategy involved substantial forex sales that depleted the CBR’s gold and currency reserves by US\$ 213 billion. The performance of the US dollar from August 2008 to April 2009 helped the private sector (and in particular, the banking sector) offset currency mismatches created by large foreign debt accumulated over previous years. As implemented, this strategy reinforced expectations of further depreciation and induced additional demand (including speculative) for foreign currency. Combined with the general loss of confidence in the banking system, ruble deposits shrank by 15% during 2008Q4–2009Q1. The CBR was forced to raise interest rates to stem capital outflow.

Tightening was only a temporary measure against depreciation pressures on the ruble. As soon as the forex market stabilized in February 2009, the CBR started to lower interest rates. The CBR and Russian government also introduced a package of measures aimed at providing additional liquidity. These measures not only sought to preserve financial stability but also implement the monetary stance. Along with the recommencement of CBR forex purchases in the latter half of 2009, these steps led to rapid accumulation of excess liquidity in the banking sector. Money market rates dropped sharply and soon were again fluctuating near CBR's overnight deposit standing facility rates as before the crisis. Remarkably, financing the government budget deficit directly from the sovereign wealth funds had a mechanical effect on the broad money stock. Deposits growth resumed in 2009 with virtually no support from the banking system. In fact, the preferences of banks for different types of assets evolved noticeably during the post-crisis period. With the reversal of the ruble's exchange rate dynamics in mid-2009, investor preference for foreign assets as risk-free (and extremely profitable during the depreciation period) investments was replaced with purchases of government securities (treasury notes and CBR bonds).

Main liabilities of Russian banking system and claims to NFOs and households

(annual growth, bn. roubles)

Figure 1



Increased bank lending was not observed until 2010Q2. But later the rapid growth reignited and over the last several years exceeded significantly the deposits growth rate. This time the banks relied extensively on market-based refinancing facilities of the Bank of Russia on routine basis (which was different from the emergency liquidity providing operations in 2009). In the beginning of 2014

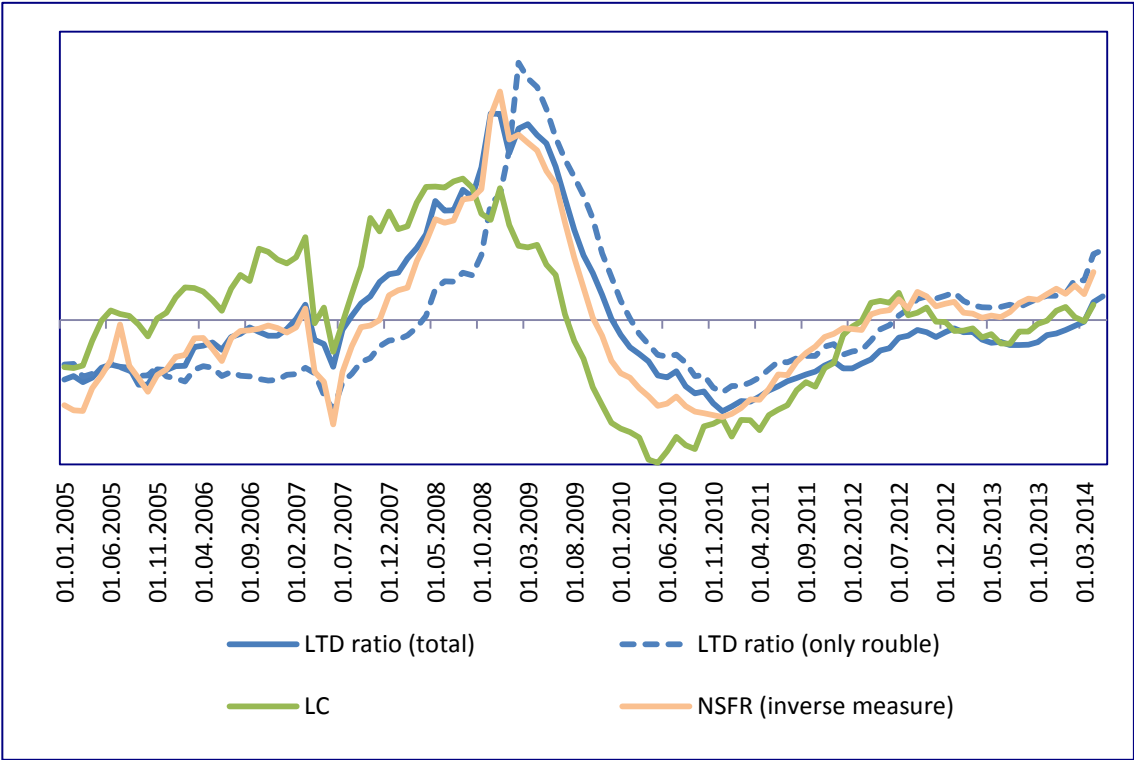
macroeconomic uncertainty in Russia provoked the outflow of deposits further extending the disbalance between loans and deposits developments.

The increase in share of unstable liabilities on the banks balance together with continuing tendency of growth in illiquid banking assets may be represented by several indicators. One of the indicators which characterize this change is loans-to-deposits ratio (LTD). Recent dynamics of credit growth shows an excessive speed in comparison with deposits at the first half of 2014, which led to reduction of LTD. The imbalance in loans and deposits dynamics was due to outflow of rouble deposits in foreign currency and, partly, in in foreign currency deposits. Besides a simple LTD ratio we used other composite indicators in order to characterize banking balance sheet structure, for instance, Net Stable Funding Ratio³ (NSFR) or Liquidity Creation⁴ (LC) (see Annex 1 for the details of calculation). All of both indicators present similar representation of balance sheet structure evolution in the Russian banking sector.

Balance sheet structure indicators in Russia

(standardized, seasonally adjusted)

Figure 2



³ The computation of indicator was based on Vasquez, F., Federico, P. (2012). The indicator is taken as an inverse measure for comparability purpose.

⁴ The computation of indicator was based on Fungacova, Z., Weill, L. (2012). Indicator is taken as the ratio by total assets of banking sector.

3. International comparison

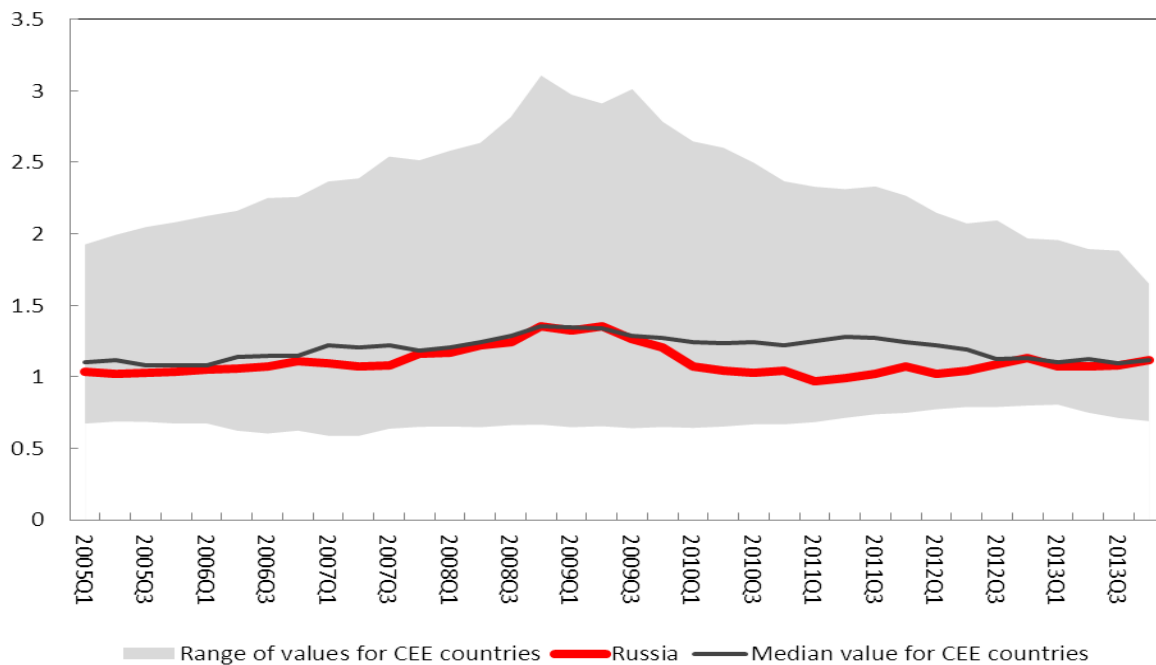
An alteration of assets and liabilities structure can potentially cause a change in behavior of certain banks and/or the whole banking sector. In order to assess the degree of illiquidity of Russian banking balance sheets, we have compared dynamics of LTD ratio in Russia with the cross-section of emerging markets.⁵

In general, the LTD ratio in Russia is a quite low and stable in comparison with broad range of values in other emerging markets (Figure 3), which can be considered as a sign of relatively low liquidity risks for the banking system and no significant constraints for loan supply and economic growth.

LTD ratio

(absolute values)

Figure 3



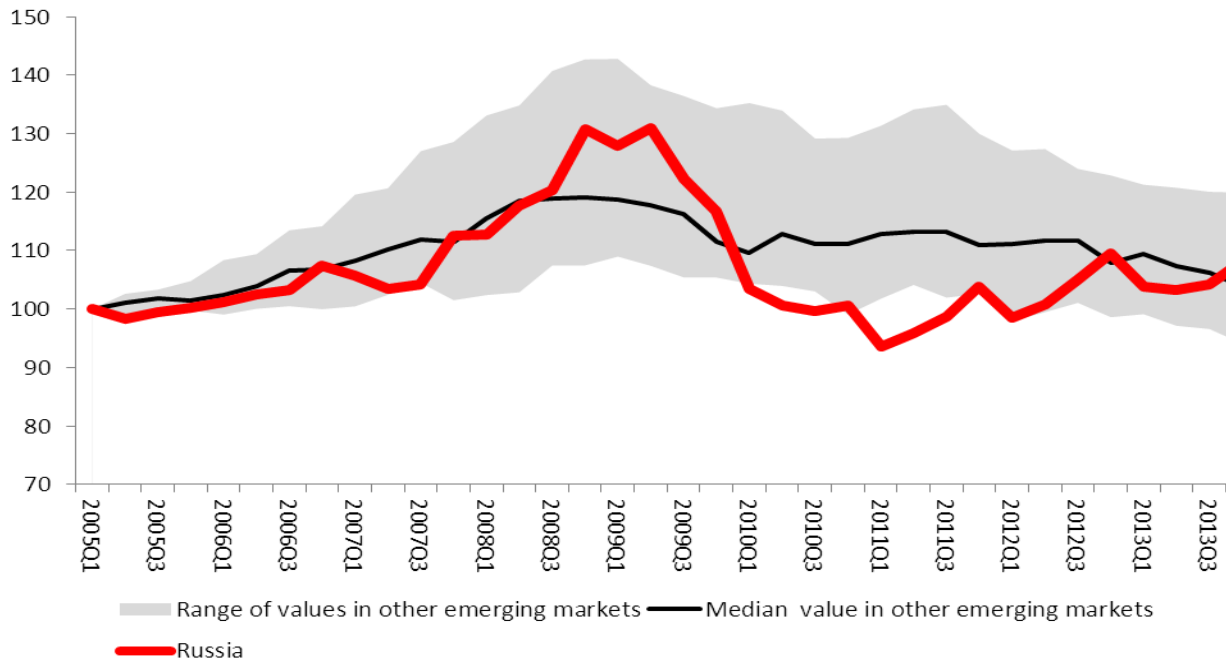
This observation may potentially be misleading if we assume that the long term equilibrium LTD ratio may differ substantially among countries. In this case it is the change of LTD ratio that may serve as an indicator of a build-up of financial imbalance. The developments of LTD ratios centered around 2005Q1 (Figure 4) show that the magnitude of changes of this indicator in Russia was quite large.

⁵ The sample includes Argentina, Azerbaijan, Armenia, Belarus, Bolivia, Brazil, Bulgaria, Chile, Colombia, Croatia, Czech Republic, Ecuador, Estonia, Georgia, Hungary, Indonesia, Kazakhstan, Korea, Latvia, Lithuania, Macedonia, Malaysia, Mexico, Moldova, Philippines, Poland, Romania, Serbia, Slovak Republic, Slovenia, Thailand, Ukraine.

LTD ratio

(I quarter 2005=100%)

Figure 4



4. Empirical model

In order to examine the relevance of balance sheet structure indicators for macroeconomic developments we conduct econometric analysis. We are mostly interested in the effect changes in balance sheet structure on loan supply. First we estimate panel⁶ regression (Table 1). The results generally confirm the significance of changes in funding structure (measured as the ratio of non-core liabilities⁷ to total liabilities) for loan supply (measured as the ratio of claims to domestic non-financial sector to total assets).

We also estimate a VAR-model comprising 4 variables: non-core liabilities to broad money ratio (*nc*); the spread between loans and deposits interest rates (*spread*); log of real GDP(*y*); claims on domestic private real sector to total assets ratio (*l*). All variables are in first differences and standardized. Seasonal dummy variables are also included. The lag length of VAR is set to 4.

⁶ Countries in the cross-section include Bulgaria, Croatia, Czech, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Ukraine. The time sample is from 2001Q1 to 2011Q4.

⁷ Non-core liabilities are calculated as the sum of liabilities to non-residents, liabilities to domestic financial institutions, liabilities to the central bank.

Panel regressions estimates

Table 1

Explanatory variable	OLS estimates [t-statistic]	GMM estimates [t-statistic]
<i>Non-core liabilities to broad money ratio</i>	-0.09 [-2.41]	-0.08 [-1.81]
<i>GDP yoy growth</i>	0.1 [5.9]	0.07 [2.03]
<i>Stock index yoy growth</i>	0.05 [1.14]	-0.01 [-0.21]
<i>Interest spread</i>	-0.06 [-1.63]	-0.04 [-0.64]
Lagged dependent variable	0.32 [6.95]	0.64 [4.25]
Constant	0.08 [1.74]	0.04 [0.98]
Observations	363	350
Adjusted R-squared	0.37	0.45

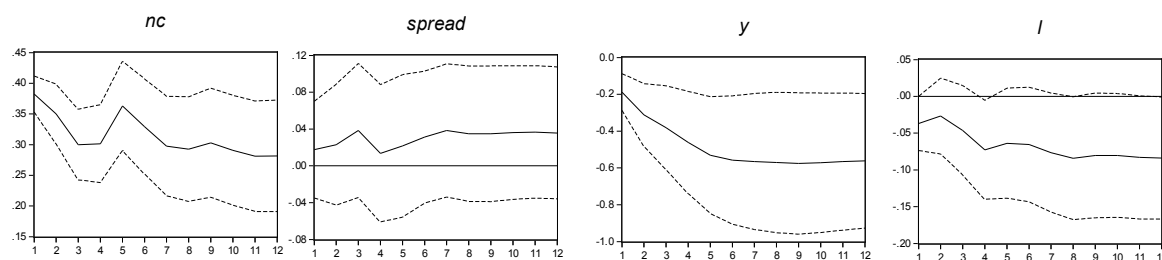
Dependent variable: Δ Claims on domestic private real sector to total assets_{t-1}

Regressions include cross-section fixed-effects. Two lags of explanatory variables are used as instruments in GMM regression.

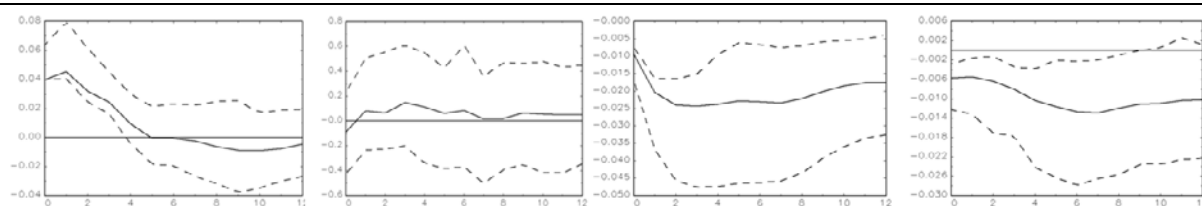
We estimate panel and stand-alone (for Russia) versions of the model. To check we if our results are sensitive to the crisis developments we cover the period 2008Q4–2009Q1 with dummy variables in the stand-alone version. The impulse response functions⁸ confirm that increase in non-core liabilities (Figure 5) may force the banks to rebalance the asset side of the balance sheet by decreasing supply of loans to non-financial sector (other impulse responses are reported in Annex 2).

⁸ We have used Cholesky identification with the following ordering: *nc, spread, y, l*.

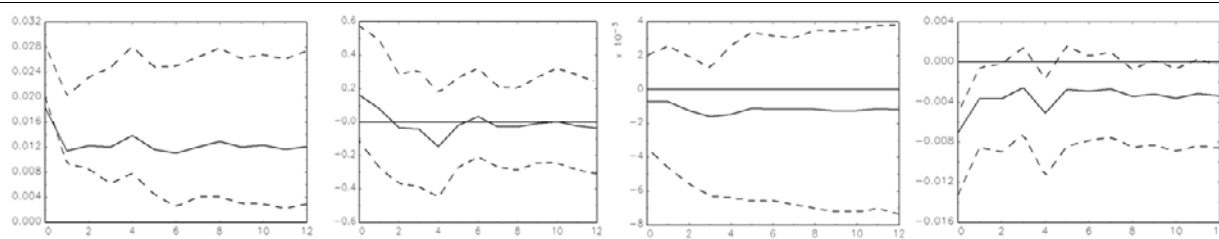
Panel VAR impulse-response functions ($\pm 2S.E$)



Stand-alone VAR impulse-response functions (with 95% bootstrapped Hall percentile CI)



Stand-alone VAR with dummy-variables impulse-response functions



5. Conclusions

There had been a number of episodes when the funding structure of Russian banking system has changed significantly. These changes may have had a significant macroeconomic impact. Namely, the exogenously driven expansion of deposits stock in 2009–2010 could be one of the reasons behind recommencement of rapid credit growth and recovery of aggregate demand. Meanwhile more recent developments that led to deterioration of the balance sheet structure are likely to exert a restraining influence on loan developments.

Annex 1

Net Stable Funding Ratio (NSFR)

$$NSFR = \frac{\sum_i w_i L_i}{\sum_j w_j A_j}, \text{ where } L_i \text{ is the total amount of liability in group } i, A_j \text{ is the}$$

total amount of assets in group j , w_i is a weight of particular group i , w_j is a weight of particular group j , $i \in [1,3], j \in [1,3]$.

The group index	Assets		Liabilities	
	Description of category (A_j)	Value of weight (w_j)	Description of category (L_i)	Value of weight (w_i)
1	<i>Cash; correspondent accounts in Central Bank and other banks;</i>	0	<i>Deposit liabilities, debt securities ;</i>	0
2	<i>Interbank loans and securities;</i>	0.35	<i>Banking deposits;</i>	0.7
3	<i>Other assets</i>	1	<i>Other liabilities</i>	1

Liquidity creation (LC)

$$LC = (0.5 \times \text{illiquid assets} + 0 \times \text{semi-liquid assets} - 0.5 \times \text{liquid assets}) + (0.5 \times \text{liquid liabilities} + 0 \times \text{semi-liquid liabilities} - 0.5 \times \text{illiquid liabilities}) - 0.5 \times \text{equity}$$

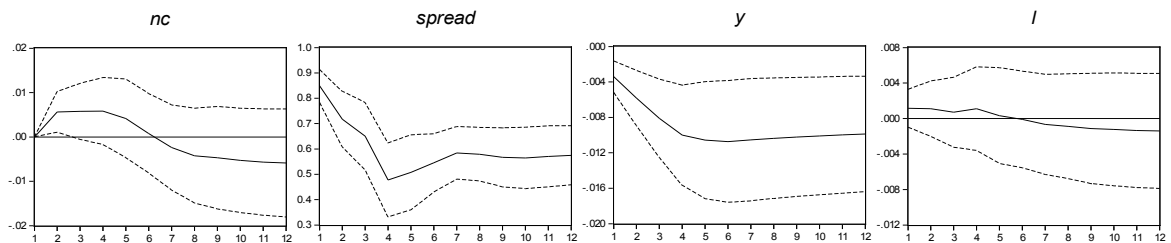
Illiquid assets	Semi-liquid assets	Liquid assets
<i>Loans to non-banking private sector</i>	<i>Interbank loans</i>	<i>Correspondent accounts in Central Bank and other banks</i>
<i>Other assets</i>	<i>Loans to government</i>	<i>Debt securities</i>
Liquid liabilities	Semi-liquid liabilities	Illiquid liabilities
<i>Notes and bank acceptance</i>	<i>Debt securities</i>	<i>Other liabilities</i>
<i>Deposit money of non-banking private sector</i>	<i>Time deposits of non-banking private sector</i>	<i>Equity and capital</i>
<i>Interbank liabilities</i>		

Annex 2

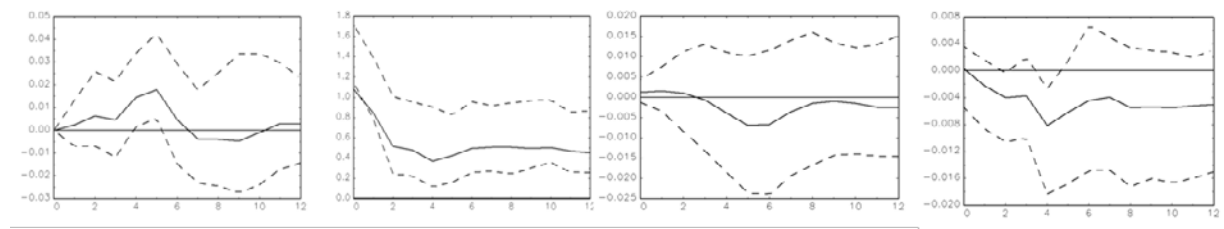
Impulse-response functions analysis: shock to *spread*

Figure 1

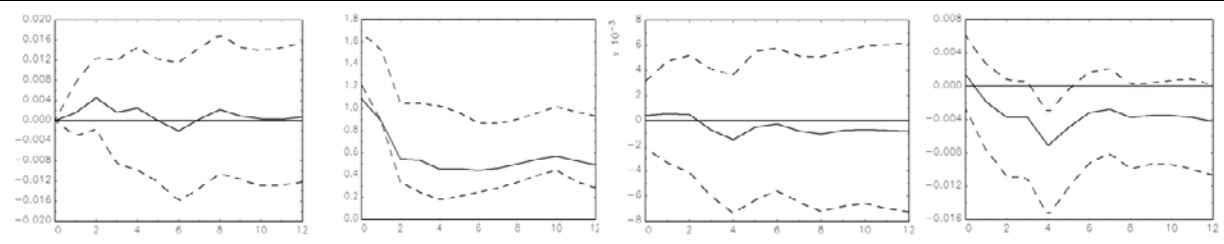
Panel VAR impulse-response functions ($\pm 2S.E$)



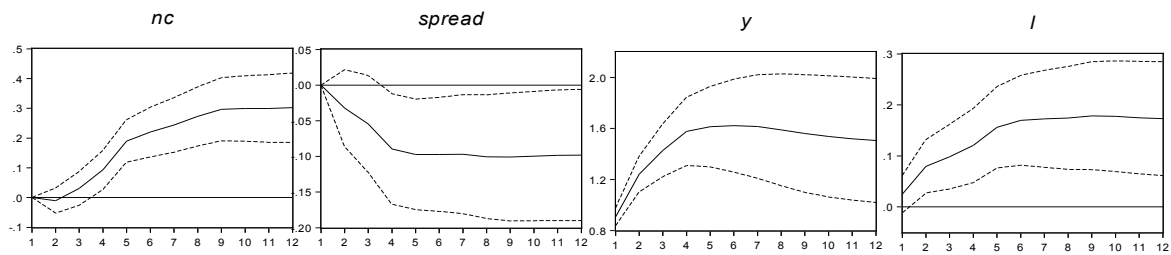
Stand-alone VAR impulse-response functions (with 95% bootstrapped Hall percentile CI)



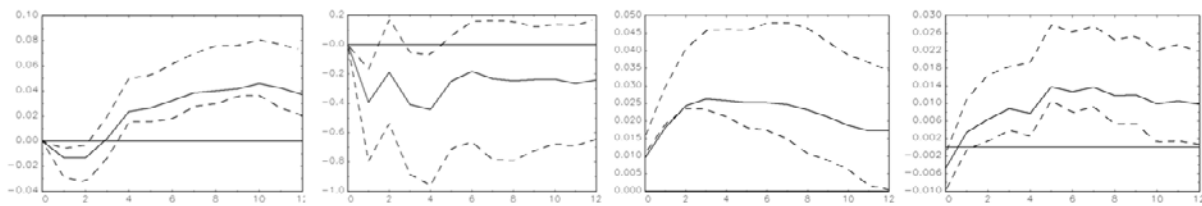
Stand-alone VAR with dummy-variables impulse-response functions



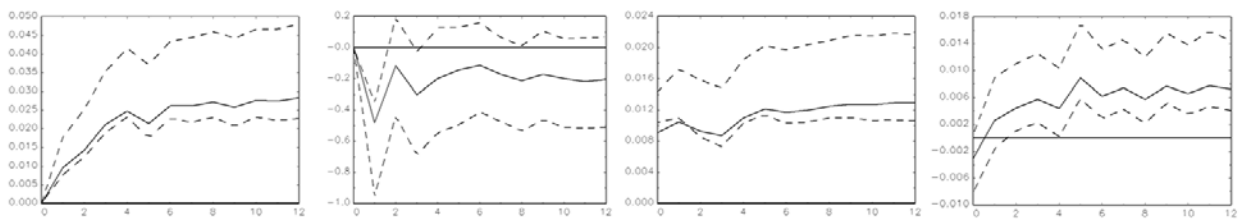
Panel VAR impulse-response functions ($\pm 2S.E$)



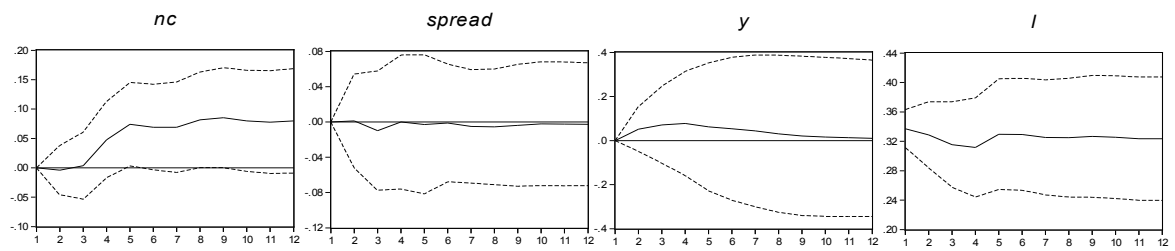
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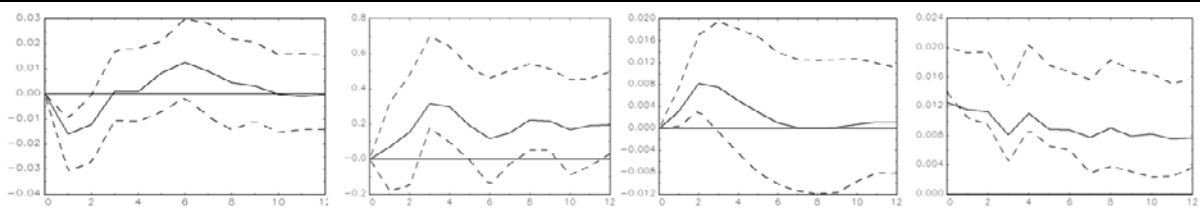
Stand-alone VAR with dummy-variables impulse-response functions



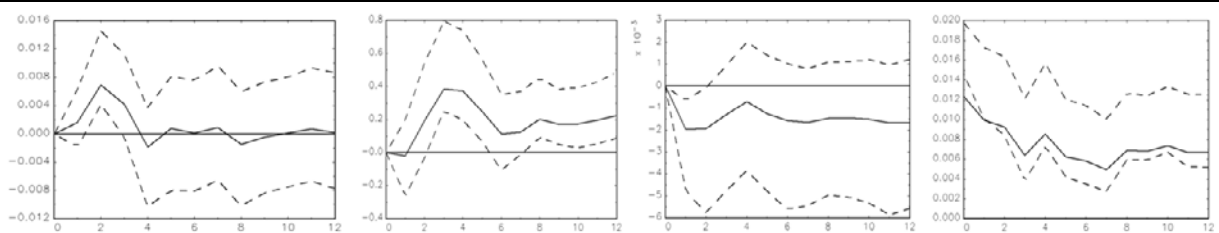
Panel VAR impulse-response functions ($\pm 2S.E$)



Stand-alone VAR impulse-response functions (with 95% bootstrapped Hall percentile CI)



Stand-alone VAR with dummy-variables impulse-response functions



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