

# Does Bank Liquidity Creation Contribute to Economic Growth?

**Jarko Fidrmuc<sup>+</sup>**

Zeppelin University, Friedrichshafen

**Zuzana Fungáčová<sup>#</sup>**

Bank of Finland Institute for Economies in Transition (BOFIT), Helsinki

**Laurent Weill<sup>\*</sup>**

EM Strasbourg Business School, University of Strasbourg and Bank of Finland Institute for Economies in Transition (BOFIT), Helsinki

## Abstract

The financial crisis has shown that the liquidity creation function of banks is critical for the economy. In this paper, we empirically investigate whether bank liquidity creation fosters economic growth in a large emerging market, Russia. We follow the methodology of Berger and Bouwman (2009) to measure bank liquidity creation using a rich and exhaustive dataset of Russian banks. We perform fixed effects and GMM estimations to examine the relation of liquidity creation with economic growth for Russian regions for the period 2004-2011. Our results suggest that bank liquidity creation strengthens economic growth. This effect was not halted by the financial crisis. Our conclusion thus supports a positive impact of financial development on economic growth in Russia.

**JEL Codes:** E44, G21.

**Keywords:** growth, bank liquidity creation, financial development.

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<sup>+</sup> Zeppelin University Friedrichshafen, Department of Economics, Am Seemoser Horn 20, D-88045 Friedrichshafen, Germany. Email: jarko.fidrmuc@zu.de

<sup>#</sup> Bank of Finland Institute for Economies in Transition (BOFIT), Snellmaninaukio, PO Box 160, FI-00101 Helsinki, Finland. Email: zuzana.fungacova@bof.fi

<sup>\*</sup> Institut d'Etudes Politiques, Université de Strasbourg, 47 avenue de la Forêt Noire, 67082 Strasbourg Cedex, France. Email : laurent.weill@unistra.fr

## **I. Introduction**

The aim of our research is to investigate the impact of bank liquidity creation on economic growth by examining this question in one large emerging country, Russia. Our study builds on the finance-growth literature and our goal is to investigate a critical channel through which finance might contribute to economic growth.

Following the seminal paper by King and Levine (1993), the question of how financial development affects growth has received great attention among researchers. Levine and Zervos (1998) document that stock market liquidity and banking development are both positively and robustly correlated with future economic growth, capital accumulation and productivity growth. Rajan and Zingales (1995, 1998) find that in countries with more developed financial markets the provision of external finance to industrial sectors allows them to develop disproportionately faster. Beck, Levine and Loayza (2000) find that financial development boosts economic growth primarily by improving resource allocation and accelerating total factor productivity growth, and that banks promote economic growth by reducing the cost of external finance of firms.

Overall, the papers in the finance-growth nexus literature confirm that financial sector development positively associates with economic growth. Further, several channels explain why some countries have well-developed growth-enhancing financial systems, including stock market liquidity, financial sector and bank development, as well as bank lending and credit extension.

However, the impact of bank liquidity creation that represents a comprehensive measure of bank output on economic growth has not been assessed. As explained by Berger and Bouwman (2009), banks create liquidity by financing relatively illiquid assets with relatively liquid liabilities. The liquidity-creating role of banks is fundamental in the economy.

We propose to investigate whether bank liquidity creation is growth-enhancing. In his survey of this literature, Levine (2005) observes that the channels through which financial development positively impacts growth all rest on the fact that the financial system emerges to ease information, enforcement, and transactions costs in financing decisions and transactions. More importantly, financial systems reduce costs to ease the

exchange of goods and services. Indeed, financial development contributes to develop media of exchange that consequently facilitate the exchange of goods and services. This function of the financial system is directly related to the liquidity creation role of banks in the economy. Therefore, by examining the role of liquidity creation on enhancing growth, we provide new evidence concerning one specific aspect of financial development.

Our research contributes to the recent literature on bank liquidity creation, while placing it in a broader macroeconomic context. The recent financial crisis has confirmed that the liquidity creation function of banks is critical for the economy. A few recent studies provide evidence on the volume of bank liquidity creation in some countries as well as the determinants of liquidity creation (Berger et al., 2010; Fungáčová and Weill, 2012; Horvath, Seidler and Weill, 2013). However, whereas there is commonly accepted view that bank liquidity creation contributes to improvement in the financing conditions in the economy and facilitates transactions between economic agents, empirical evidence confirming its macroeconomic impact is still missing. Our study thus contributes to filling this gap in the literature.

We aim to provide new evidence on the liquidity creation channel which we expect will lead to an increase in the volume of credit, better financial sector development, and, consequently, higher levels of economic growth. Our fieldwork is Russia, which is a large emerging economy that provides a good opportunity to investigate whether bank liquidity creation is growth enhancing for three reasons. First, the “finance-growth nexus” issues are of particular interest in the context of emerging countries, and especially given that the recent financial crisis has shown that such countries have a great role to play in restoring global financial output. Second, the measurement of bank liquidity creation requires very detailed data at the bank level, which is available for Russia on a quarterly basis from the Central Bank of Russia. This rich panel dataset on all banks in Russia allows us to measure liquidity creation following the methodology of Berger and Bouwman (2009), which requires the classification of all bank assets and liabilities as either liquid, semi-liquid, or illiquid. Third, all estimations will be performed at the regional level. The availability of information on the number of branches by bank and by region enables us to proxy liquidity creation for each bank in each region, thus obtaining regional measures of bank liquidity creation that we link to

data on economic growth for these regions. We employ both fixed effects panel estimations as well as the generalized method of moments methodology for dynamic panel data estimations (Arellano and Bover, 1995; Blundell and Bond, 1998) to control for potential endogeneity in our key variables.

The results of our analysis represent significant contribution to the literature on the “finance-growth nexus” and bank liquidity creation as they help better understand the mechanisms through which financial development influences economic growth. Moreover, they also contribute to a better understanding of the relation between financial development and economic growth in Russia, as a limited number of papers have examined this issue. Berkowitz and DeJong (2010) provide an analysis of the determinants of growth in Russia during the transition in which they show that the emergence of bank-issued credit has contributed to favor growth since 2000. Berkowitz, Hoekstra and Schoors (2012) use the natural experiment of the creation of specialized banks in the last years of the Soviet Union to investigate whether banking development contributes to growth. They find mixed evidence on the positive impact of banking development on growth: banking contributes to employment but does not favor investment and per capita income.

These mixed results can be related to the findings that the effect of financial development is dependent of the level of economic development (Rioja and Valev, 2004; Arcand, Berkes and Panizza, 2012). The relation between financial development and growth would be the strongest for middle-income countries and could even turn negative for high-income countries.

The rest of the article is structured as follows. Section 2 discusses the data. Section 3 presents the methodology used to measure liquidity creation and to perform estimations. Section 4 displays the findings, and section 5 concludes.

## II. Data

We employ several sources of data to construct a unique dataset for our estimations. Macroeconomic data concerning Russian regions come from the Russian Federation Federal State Statistics Service, Rosstat. Out of 83 Russian regions we exclude some because they are significant outliers, war regions or autonomous regions<sup>1</sup> below oblast level. The aggregate data on bank loans at regional level come from the Central Bank of the Russia (CBR). In some cases we use the data that are collected from these original sources and stored in the CEIC Russia Premium Database.

Our annual panel data set covers the period from 2004 to 2011. This time period is based on the availability of data for economic growth at the regional level as well as the data for the measures of bank liquidity creation. We calculate these measures by employing the bank-level financial statement data for Russian banks from Interfax, a financial information agency that collects and organizes data from the CBR.<sup>2</sup> This dataset contains data on all banks in Russia and has the detailed financial information necessary for the calculation of liquidity creation measures. The breakdown of loan portfolios enables us distinguish between corporate, household, and government loans; deposits are classified by type; securities portfolios are reported by asset classes; and there is detailed information on the maturity of all liabilities. The data is cleaned so that we drop the observations for which the ratio of total loans to total assets is lower than 5% and the observations for which the sum of all deposits equals to 0 as these institutions are clearly not involved in standard banking activities. To calculate liquidity creation measures we thus benefit from over 27,000 bank-quarter observations for more than 1,100 Russian banks. We also hand-collect data on the location of the banks and their branches from the CBR website. We use this information to allocate the liquidity created calculated for individual banks to regions.

Taking all the restrictions set by different data sources into account we end up with the dataset that contains over 512 observations for 64 regions available for the

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<sup>1</sup> We neither include autonomous regions nor several Caucasus regions that are affected by military conflicts (Chechnya, Ingushetia, Ossetia, and Dagestan). We also exclude Kalmykia, Chukotka and Vologda because these regions are either characterized by insufficient data quality or are outliers.

<sup>2</sup> For a more detailed description of the dataset, see Karas and Schoors (2005).

estimations. The descriptive statistics of the main variables as well as their correlations are displayed in Table 1.

### III. Methodology

#### III.1 Liquidity creation measures

The liquidity creation measures are calculated using the approach developed by Berger and Bouwman (2009). In the three-step procedure they suggest to start by classifying the bank balance sheet items as liquid, semi-liquid or illiquid. This classification is based on the ease, cost, and time necessary for banks (customers) to turn their obligations into liquid funds (withdraw funds). We also take Russian-specific factors, e.g. active trading in certain securities, into account.

In the second step the weights are assigned to all the items. In line with financial intermediation theory that banks create liquidity by transforming illiquid assets to liquid liabilities, positive weights are assigned to these two balance sheet categories. We apply negative weights to liquid assets, illiquid liabilities, and capital, since bank liquidity creation is destroyed if illiquid liabilities are used to finance liquid assets.

The following equation (1) illustrates the functional form used to measure bank liquidity creation. Based on it in the third step liquidity creation is calculated.

$$\begin{aligned}
 \text{Liquidity Creation} = & \{ \frac{1}{2} \times \text{Illiquid Assets} + 0 \times \text{Semi-Liquid Assets} - \frac{1}{2} \times \text{Liquid} \\
 \text{Assets} \} + & \{ \frac{1}{2} \times \text{Liquid Liabilities} + 0 \times \text{Semi-Liquid Liabilities} - \frac{1}{2} \times \text{Illiquid Liabilities} \\
 & \} - \frac{1}{2} \times \text{Capital} \quad (1)
 \end{aligned}$$

We consider two measures of bank liquidity creation. They differ in the definitions of the right-hand side terms of the above equation 1. The first liquidity creation measure, LC1, is based on a category classification of balance sheet items. The second measure, LC2, is a liquidity creation measure that relies on a maturity classification of bank balance sheet items. Table 2 provides a detailed description of balance sheet items used

to calculate both liquidity creation measures, their classification according to categories and maturities, and the weights assigned to each grouping.

The liquid assets category for LC1 consists of cash holdings, correspondent accounts with other banks (i.e. central bank, commercial resident and nonresident banks), investments in promissory notes, investments in debt securities (firms, governments and banks), and investments in stocks. When classifying loans we follow the literature in that corporate loans are considered illiquid assets since banks generally lack the option of selling them to meet liquidity needs. All the other types of loans, including loans to households, loans to government including foreign government and interbank loans, are classified as semi-liquid assets. As mortgage lending is relatively recent phenomenon in Russia, the majority of loans to households are still short-term loans to buy consumer goods. We view loans to households as semi-liquid following the idea that items with shorter maturity tend to be more liquid than longer-term items, notwithstanding rare loan securitization in Russia. Other loans together with intangible assets, fixed assets and other assets are included in the category of illiquid items.

Turning to the liability side, we first define liquid liabilities. Settlement accounts of banks, firms, households and government are considered liquid because customers can easily withdraw these funds without penalty. Also, securities issued by banks (bonds and promissory notes) for which liquid market exists in Russia are classified as liquid. Unlike these, deposit and savings certificates have only emerged in recent years and they are included in the semi-liquid category. This category also contains term and other deposits because it may be costly to withdraw them immediately. Other liabilities are included in the illiquid category. The same holds true for the equity.

The second liquidity creation measure (LC2) is based on the maturity classification of balance sheet items. Indeed, maturity-based information provides us with important additional information to define liquidity creation in a more precise and objective manner. On the asset side the most important item are the loans. Our dataset contains the detailed information concerning the maturity of all the loans. We use this data to classify the loans with maturity less than one year as semi-liquid and the loans with longer maturities as liquid. All the other categories correspond to the classification used for the liquidity creation measure LC1.

Following similar logic as adopted on the asset side, deposits stand out as the most significant item at the liability side. Our data enables us to distinguish term deposits with the maturity lower than one year which we classify as semi-liquid and term deposits with longer maturity considered as illiquid. Since the maturity classification of the other liability items can be well proxied by the nature of these items, we classify them in the same way as with the first liquidity creation measure.

The above described calculation provides us with liquidity creation measures for individual banks at different points in time. In order to be able to merge this data with the dataset of regional variables we need to calculate liquidity creation in each of the regions. We use the distribution of bank branches as a proxy for banking output in a given region. Following this logic we use the number of bank branches as weights to allocate the corresponding part of liquidity created by a bank to a given region. We then sum the liquidity creation by regions and by time. This way we get a proxy for liquidity created by banks in a given region. This procedure is applied to both liquidity creation category measure and liquidity creation maturity measure.

### **III.2 Model specification**

Given a relatively low number of regions with complete data, we do not estimate cross-section models even if they are often used to document the preliminary stylized facts in the literature. We should also keep in mind that Russian data are more volatile than the growth data for OECD countries or selected emerging economies analyzed in the previous research.

Therefore, we rely on the estimation of a fixed effects model between 2004 and 2011 as the starting point of the empirical analysis. Our benchmark regression equation is specified as

$$\dot{y}_{it} = \alpha_i + \beta lc_{it} + \sum_{k=1}^K \gamma_k X_{kit} + \varepsilon_{it} \quad (1)$$

where the subscript  $i$  stands for region index and  $t$  is a time index;  $\dot{y}_{it}$  is annual growth rate of gross regional product (GRP) in percent,  $lc_{it}$  is a measure of bank liquidity



creation by the banks described in the previous subsection, and  $X_{it}$  is a matrix of additional control variables. Variable  $lc_{it}$  is the ratio of bank liquidity creation to GRP which we use to measure the level of financial intermediation. We use two alternative measures one based on the category and the other on the maturity classification.

The set of control variables employed in our estimations includes the variables traditionally used in the finance-growth literature. We control for human capital by employing the variable *Education* which is the proportion of employees with higher education. The degree of openness of a region is measured by *Openness to trade* defined as the proportion of exports and imports in GRP. We also consider *Government Expenditures* as a proxy of government size and *Inflation* in the estimations. As oil is crucial commodity that influences growth in Russia we include *Oil Price* variable as additional control. Time dummy variables are included as well.

Fixed effects estimations however do not take into account the dynamic properties of the analyzed time series. Moreover, we need to consider possible reverse causality and endogeneity problems. Liquidity creation may be endogenous in our estimations, e.g. due to reverse causality, as the bank can extend financial means especially in the growing regions. In similar empirical settings, several authors accounted for the potential endogeneity problems by applying instrumental variable estimation techniques. Yet another important concern is that economic shocks are often highly persistent and affect economic developments for several years. Therefore, we control for dynamic properties of our data by estimating a dynamic panel model:

$$\dot{y}_{it} = \alpha_i + \rho \dot{y}_{it-1} + \beta lc_{it} + \sum_{k=1}^K \gamma_k X_{kit} + \varepsilon_{it} \quad (2)$$

In the estimation of (2) we apply the one-step system GMM estimator according to Arellano and Bover (1995) and Blundell and Bond (1998), which enables one to tackle the problem of endogeneity. We use one lag of the dependent variable (annual growth rate of GRP) and instrument all the regressors. As internal instruments, we use one lag of each of the endogenous variables. Time effects are included as exogenous instruments. The set of control variables,  $X_{it}$ , includes the same variables as before: *Education*, *Openness to Trade*, *Inflation*, and *Government Expenditures*. We also include the *Oil Price* as exogenous variable.

## **IV. Results**

This section presents our results for the impact of liquidity creation on economic growth.

### **IV.1 Main estimations**

Table 3 sets out the main results. We present the results obtained with fixed effects and with GMM by considering alternatively liquidity creation based on maturity and on category.

We obtain the same results with fixed effects and with GMM. We have a positive coefficient for liquidity creation measure in all estimations, but the coefficient is only significant when liquidity creation is computed based on maturity classification. This measure is based on the maturity of different balance sheet items that is provided in our data and thus can be considered a more objective than the category based measure. Taking into account this fact we interpret our results as providing some support for the positive influence of liquidity creation on economic growth.

Our results tend to confirm that the liquidity creation role of banks is positive for the economy. From a broad perspective, they contribute to the literature on the finance-growth nexus by providing evidence on the impact of a broad measure of bank output, liquidity creation. From a Russian perspective, they provide some support to the impact of financial development to enhance economic growth in this country. By doing so, they are not at odds with the scarce studies on this issue, as Berkowitz and DeJong (2010) show the beneficial impact of banking development on Russian growth in the 2000s but Berkowitz, Hoekstra and Schoors (2012) conclude on ambiguous effects of banking development on growth in Russia.

They can also be connected to the studies showing the influence of the level of economic development on the link between financial development and growth (e.g. Rioja and Valev, 2004). Russia would rather be in the situation of a country for which greater bank liquidity creation enhances growth.

We now turn to the analysis of the control variables. We observe that many of them are not significant in the estimations. *Education* and *Government Expenditures* are never significant. This result can be explained by short time series and relatively low time variation of these variables. Indeed, *Education* and *Government Expenditures* are nearly constant within the analyzed seven years and their effects might thus be covered by the fixed effects. *Openness to Trade* which shows larger within variance during the analyzed period is as one would expect positively related to the growth performance. It is however only marginally significant in the fixed effects estimations and not significant in GMM estimations. Furthermore, *Inflation* which shows relatively high fluctuations both between and within the regions is significant in the fixed effect estimations and exhibits a negative impact on growth performance of the Russian regions. These results with low significance are not in line with the general literature on the finance-growth nexus, but they support the former works on Russia which also find a lack of significance for many standard determinants of economic growth. Growth in Russia seems to follow a different pattern than what is observed in other countries.

We find different results for *Oil Price* variable depending on the adopted methodology. While the coefficient is significantly negative in fixed effects estimations, it is positive and significant in GMM estimations.

## **IV.2 Robustness checks**

Overall, our main estimations indicate that liquidity creation has a positive influence on economic growth. We can nonetheless wonder if this impact is influenced by the economic cycle.

Namely, financial development can improve growth performance in calm times, but can amplify output drops in recessions. Finance can be susceptible to shocks and hence can be a factor of fragility which contributes to deteriorate economic performance in troubled times (Krosner, Laeven and Klingebiel, 2007; Dell’Ariccia, Detragiache and Rajan, 2008).

Russia has been particularly affected by economic downturns in the last two decades. Moreover the dependence of this country to the oil and gas markets makes it particularly sensitive to macroeconomic cycles.

To examine this issue, we redo the estimations by adding an interaction term between liquidity creation and a dummy variable (*Crisis*) equal to one if the year is 2009 or 2010. A significant interaction term would mean that the effect of liquidity creation on economic growth is different in normal years and in crisis years. Table 4 reports the results. We observe the same results for liquidity creation variables: they are positive and significant when using the measure based on maturity, but the significance disappears when employing the measure based on category classification. However, we find no significance for the interaction term between liquidity creation and *Crisis* dummy variable in any of the estimations. Thus, we do not conclude that liquidity creation has a significantly different influence on economic growth in crisis years.

In the second robustness check we perform the estimations without considering regions of Moscow and Saint Petersburg. Both of these regions are very specific in the sense that they enjoy a much higher financial development than the average Russian region. Therefore we can reasonably wonder if their inclusion does not influence our main results. Table 5 displays the estimations. We confirm the positive impact of liquidity creation on economic growth, which is only significant when using the liquidity creation measure based on maturity. Thus, the inclusion of the regions of both largest Russian cities does not affect our main findings.

## **V. Conclusion**

In this study, we investigate the impact of bank liquidity creation on economic growth in Russia. By doing so we contribute to the literature on the finance-growth nexus. To investigate our hypothesis we compute two measures of bank liquidity creation for Russian regions following Berger and Bouwman (2009) and link them to growth measures at the regional level.

We find some evidence that the liquidity creation role of banks is beneficial for

economic growth. Liquidity creation has a positive influence on growth, even if this link is only significant when we compute liquidity creation based on maturity classification. We also show that this effect was not halted by the financial crisis.

Our findings have two implications. First, they contribute to the literature on liquidity creation by confirming its impact on this economy. While several studies have looked at the determinants and the measures of liquidity creation, our work is the first showing the major consequences of greater bank liquidity creation. Second, our results provide more insights concerning the impact of financial development on economic growth in Russia. Bank liquidity creation is a comprehensive measure of bank output which informs on financial development. As such, our results tend to show that financial development contributes to growth in Russia.

In any case, to deepen our understanding of the relation between liquidity creation and growth, this topic needs to be explored more within the research agenda for the finance-growth nexus.

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**Table 1.A****Descriptive Statistics of the Main Variables**

	<b>Obs</b>	<b>Mean</b>	<b>Std.Dev.</b>
GRP growth rate, %	512	8.637	9.851
education, %	512	24.447	5.116
government size (log)	512	10.431	1.181
inflation (log of index)	512	0.099	0.025
openness to trade, %	512	0.321	0.277
oil price (USD)	512	69.917	22.561
liquidity creation (maturity version)	512	0.052	0.101
liquidity creation (category version)	512	0.732	0.339

**Table 1.B****Correlation Matrix for the Main Variables**

	growth rate	educ.	gov. size	inflation	openness to trade	oil price	liquidity (mat.vers.)
education	-0.126						
government size	0.017	0.276					
inflation	-0.011	-0.188	-0.191				
openness to trade	0.141	0.176	0.331	-0.002			
oil price	-0.017	0.279	0.246	-0.301	-0.018		
liquidity creation (mat. vers.)	-0.180	0.153	0.203	0.072	0.070	0.452	
liquidity creation (cat. vers.)	-0.294	0.009	-0.127	-0.024	-0.203	0.413	0.468



**Table 2**

**Liquidity Creation Measures**

This table classifies all balance sheet items in terms of their liquidity. The weight of each category is given in parentheses and it is used to calculate two liquidity creation measures following Equation (1). LC1 denotes the category-based liquidity creation measure, where bank activities are classified based on different categories. LC2 is the maturity-based liquidity creation measure, and it rests on a category as well as maturity classification for loans and deposits.

<b>Illiquid liabilities and equity (-1/2)</b>		<b>Semiliquid liabilities (0)</b>		<b>Liquid liabilities (1/2)</b>	
(category)	(maturity)	(category)	(maturity)	(category)	(maturity)
equity (statutory and surplus capital, retained earnings)		securities issued - CDs and CSs		accounts of other entities	
other liabilities		term and other deposits	term deposits (< 1 year)	securities issued - bonds	
	term (> 1 year) and other deposits			securities issued - promissory notes	
				demand deposits	
<b>Illiquid assets (1/2)</b>		<b>Semiliquid assets (0)</b>		<b>Liquid assets (-1/2)</b>	
(category)	(maturity)	(category)	(maturity)	(category)	(maturity)
loans to firms	loans (> 1Y)	loans to households	loans (< 1Y)	cash	
other loans and lease financing receivables		interbank loans (incl. CBR loans)		accounts with banks	
loans in precious metals		loans to government		investments in promissory notes	
intangible assets		loans to foreign government		investments in debt securities	
fixed assets				investments in stocks	
other assets					

**Table 3**  
**Main Estimation Results**

	(1)	(2)	(3)	(4)
	FE	FE	GMM	GMM
liquidity (maturity version)	11.829** (4.981)		16.885** (7.698)	
liquidity (category version)		2.651 (4.007)		2.514 (2.782)
education	-0.133 (0.148)	-0.131 (0.147)	-0.124 (0.249)	-0.134 (0.372)
government size (log)	2.632 (2.908)	3.298 (2.911)	0.516 (0.842)	0.777 (0.825)
inflation	-67.260** (31.677)	-66.945** (31.629)	38.898 (49.581)	56.664 (55.084)
openness	6.307* (3.218)	6.155* (3.259)	0.315 (2.821)	1.126 (2.737)
oil price	-0.110** (0.051)	-0.117** (0.056)	0.156** (0.065)	0.184*** (0.065)
year 2005	-3.361** (1.462)	-3.425** (1.469)	12.485*** (3.372)	13.145*** (4.230)
year 2006	1.394 (1.288)	1.513 (1.292)	6.022** (2.688)	6.356* (3.300)
year 2007	-0.328 (1.527)	-0.408 (1.632)	10.220*** (2.292)	11.016*** (2.909)
year 2008	-2.953 (2.207)	-1.865 (2.349)	3.113 (2.168)	3.025 (2.134)
year 2009	-22.718*** (1.938)	-22.821*** (2.548)	-8.053** (3.209)	-7.246** (3.421)
year 2010	-5.211*** (1.150)	-5.636*** (1.301)	-14.033*** (2.312)	-12.836*** (2.195)
lagged growth			0.026 (0.047)	0.031 (0.048)
Constant	0.307 (28.603)	-7.555 (28.850)	-10.843 (11.410)	-18.841 (18.845)
No. of observations	512	512	512	512
R <sup>2</sup>	0.519	0.515		
No. of regions	64	64	64	64
Hansen test			47.390 [0.618]	44.732 [0.719]
1 <sup>st</sup> order autocorr. test			-4.332 [0.000]	-4.356 [0.000]
2 <sup>nd</sup> order autocorr. test			-1.792 [0.073]	-1.880 [0.060]

Note: Robust standard errors in parentheses and p-values in brackets, \*\*\*, \*\*, and \* denote significance at 1%, 5%, and 10% level, respectively.

**Table 4****Robustness check – financial crisis**

	(1)	(2)	(3)	(4)
	FE	FE	GMM	GMM
liquidity (maturity version)	16.036*** (5.187)		19.785** (8.058)	
liquidity * financial crisis	-14.378 (9.384)		-17.175 (15.469)	
liquidity (category version)		4.621 (3.868)		4.470 (2.900)
liquidity * financial crisis		-2.914 (2.357)		-3.258 (2.598)
education	-0.125 (0.149)	-0.134 (0.147)	-0.209 (0.296)	-0.105 (0.372)
government size (log)	2.808 (2.930)	3.565 (2.966)	0.314 (0.799)	0.853 (0.824)
inflation	-72.359*** (31.432)	-69.906** (31.490)	27.752 (54.714)	51.294 (56.326)
openness	5.904* (3.174)	6.120* (3.192)	-0.036 (2.921)	0.830 (2.611)
oil price	-0.123** (0.053)	-0.134** (0.056)	-0.015 (0.053)	-0.008 (0.052)
year 2005	-3.321** (1.462)	-3.454** (1.474)	-3.826*** (1.386)	-4.003*** (1.440)
year 2006	1.266 (1.293)	1.405 (1.291)	2.004 (1.292)	2.471** (1.200)
year 2007	-0.303 (1.531)	-0.566 (1.645)	-3.311 (2.197)	-4.097* (2.404)
year 2008	-3.205 (2.218)	-2.119 (2.355)	-10.288*** (3.373)	-9.840*** (3.737)
year 2009	-21.813*** (2.041)	-20.891*** (3.365)	-20.450*** (2.547)	-18.999*** (3.351)
year 2010	-4.754*** (1.145)	-3.615 (2.370)	-4.235** (1.782)	-2.945 (2.892)
lagged growth			0.033 (0.050)	0.043 (0.048)
Constant	-0.322 (28.722)	-10.041 (29.385)	12.749 (11.647)	-0.682 (14.105)
No. of observations	512	512	512	512
R <sup>2</sup>	0.521	0.517		
No. of regions	64	64	64	64
Hansen test			47.851 0.560	44.386 0.697
1 <sup>st</sup> order autocorr. test			-4.391 0.000	-4.407 0.000
2 <sup>nd</sup> order autocorr. test			-1.925 0.054	-1.847 0.065

Note: Robust standard errors in parentheses and p-values in brackets, \*\*\*, \*\*, and \* denote significance at 1%, 5%, and 10% level, respectively. Financial crisis – dummy for years 2009 and 2010.

**Table 5****Robustness check – excluding Moscow and St.Petersburg**

	(1)	(2)	(3)	(4)
	FE	FE	GMM	GMM
liquidity (maturity version)	10.818** (5.191)		19.012** (8.299)	
liquidity (category version)		1.266 (4.410)		2.912 (2.096)
education	-0.132 (0.157)	-0.122 (0.156)	0.111 (0.322)	0.301 (0.421)
government size (log)	3.238 (3.119)	3.779 (3.140)	0.692 (1.156)	1.312 (1.124)
inflation	-62.857* (32.026)	-62.498* (32.269)	8.816 (54.979)	26.673 (60.391)
openness	8.015*** (2.995)	7.785** (3.052)	-0.761 (3.406)	-0.065 (3.452)
oil price	-0.109** (0.053)	-0.109* (0.060)	0.111 (0.075)	0.132* (0.078)
year 2005	-3.657** (1.545)	-3.693** (1.566)	12.285*** (3.698)	13.676*** (4.313)
year 2006	1.557 (1.363)	1.714 (1.380)	5.860* (3.048)	6.880** (3.462)
year 2007	-0.509 (1.529)	-0.456 (1.668)	10.017*** (2.659)	11.422*** (3.103)
year 2008	-3.262 (2.332)	-1.942 (2.547)	3.681 (2.314)	3.913* (2.244)
year 2009	-22.466*** (2.009)	-22.081*** (2.769)	-6.473* (3.609)	-4.927 (3.719)
year 2010	-5.216*** (1.203)	-5.441*** (1.402)	-14.936*** (2.595)	-13.666*** (2.504)
lagged growth			0.033 (0.055)	0.045 (0.058)
Constant	-6.636 (30.708)	-13.044 (30.930)	-12.229 (18.337)	-28.770 (22.440)
No. of observations	480	480	480	480
R <sup>2</sup>	0.510	0.507		
No. of regions	60	60	60	60
Hansen test			47.520 0.613	42.648 0.791
1 <sup>st</sup> order autocorr. test			-3.749 0.000	-3.668 0.000
2 <sup>nd</sup> order autocorr. test			-1.284 0.199	-1.167 0.243

Note: Robust standard errors in parentheses and p-values in brackets, \*\*\*, \*\*, and \* denote significance at 1%, 5%, and 10% level, respectively.