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Does bank liquidity creation contribute to economic growth? Evidence from Russia

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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 to economic growth for Russian regions in the period 2004–2012. Our results suggest that bank liquidity creation fosters economic growth. This effect was not washed out 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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1 Introduction

The aim of our research is to investigate the impact of bank liquidity creation on economic growth by examining this question in respect of 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 considerable attention among researchers. Levine and Zervos (1998) document that stock market liquidity and banking development are positively and strongly correlated with future economic growth, capital accumulation and productivity growth. Rajan and Zingales (1995, 1998) find that in countries with relatively well 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 firms' external finance.

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

However, the economic-growth impact of bank liquidity creation – treated as a comprehensive measure of bank output – 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 to the economy.

We propose to investigate whether bank liquidity creation is growth-enhancing. In his survey of this literature, Levine (2005) observes that all the channels through which financial development positively impacts growth rest on the fact that the financial system serves to reduce the costs of information, enforcement, and transactions, which influences financing decisions and transactions. More importantly, financial systems reduce the costs of lubricating the exchange of goods and services. Indeed, financial development contributes to the development of media of exchange and consequently facilitates 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 impact of liquidity creation on enhancing growth, we provide new evidence on 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 on the determinants of liquidity creation (Berger et al., 2010; Fungáčová and Weill, 2012; Horvath, Seidler and Weill, 2014). However, although there is commonly accepted view that bank liquidity creation contributes to the improvement of financing conditions in the economy and facilitates transactions between economic agents, we still lack empirical evidence confirming the macroeconomic impact. Our study thus contributes to the closing of this gap in the literature.

We 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 thus to higher levels of economic growth. Our object of study is Russia – a large bank-based emerging economy. The ratio of banking credit to GDP is below 50%, as in many other emerging markets. State-controlled banks and large banks constitute the core of the banking sector,[1] and these are the banks that also contribute the most to the bank liquidity creation. Russia 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, especially in light of the fact that the recent financial crisis has shown that such countries have a large 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 using 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 crea-

[1] For more details concerning the development and stability of the Russian banking system, see e.g. Fungáčová and Jakubík (2013).

tion 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 Bond, 1991, Arellano and Bover, 1995; Blundell and Bond, 1998) to control for potential endogeneity in our key variables.

The results of our analysis make a significant contribution to the literature on the "finance-growth nexus" and bank liquidity creation, as they help us to better understand the mechanisms by which financial development influences economic growth. They should also contribute to a better understanding of the relation between financial development and economic growth in Russia, given the limited number of papers that have examined this issue. Eller, Fidrmuc and Fungáčová (2013) show that financial variables do not determine output volatility in Russia. 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 growth since 2000. Berkowitz, Hoekstra and Schoors (2014) 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 that while privatized banking increased lending significantly, it did not increase economic growth except when bank retained fewer political connections and when regional property rights were better protected. These mixed results are found to relate to the findings that the effect of financial development is dependent on the level of economic development (Rioja and Valev, 2004; Arcand, Berkes and Panizza, 2012). The relation between financial development and growth should be the strongest for middle-income countries and could even be 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 the estimations. Section 4 displays the findings, and section 5 concludes.

2 Data

We employ data from several sources to construct a unique dataset for our estimations. Our macroeconomic data on Russian regions are from the Russian Federation Federal State Statistics Service, Rosstat. We exclude some of the 83 Russian regions because they are significant outliers, war regions or autonomous regions[2] below oblast level. The aggregate data on bank loans at regional level are from the Central Bank of the Russia (CBR). In some cases we use 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 2012. This period is based on the availability of data that are suitable for studying economic growth at the regional level and for our metrics of bank liquidity creation. These metrics make use of bank-level financial statement data for Russian banks provided by CBR.[3] This dataset includes data on virtually all banks in Russia and has the detailed financial information necessary for calculating our liquidity creation measures. The breakdown of loan portfolios enables us to distinguish between corporate, household, and government loans. Deposits are classified by type and securities portfolios by asset class, and details are given on all liability maturities. The data are cleaned so that we drop the observations for which the ratio of total loans to total assets is below 5% and the observations for which the sum of all deposits equals 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 locations of the banks and their branches from the CBR website. We use this information to allocate among the regions the liquidity created by the individual banks.

Taking all the restrictions of the different data sources into account we end up with the dataset that contains over 576 observations for 64 regions available for the estimations. The descriptive statistics of the main variables as well as their correlations are displayed in Table 1.

[2] We include neither 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.
[3] For a more detailed description of the dataset, see Karas and Schoors (2005).

3 Methodology

3.1 Liquidity creation measures

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

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

Equation (1) defines liquidity creation, which as calculated in the third step:

$$\begin{aligned} \textit{Liquidity Creation} = &(½ \times \textit{Illiquid Assets} + 0 \times \textit{Semi-Liquid Assets} – ½ \times \textit{Liquid Assets}\ ) + \\ &(\ ½ \times \textit{Liquid Liabilities} + 0 \times \textit{Semi-Liquid Liabilities} – ½ \times \textit{Illiquid Liabilities}\ ) \\ &– ½ \times \textit{Capital} \end{aligned} \quad (1)$$

We consider two metrics of bank liquidity creation, which differ in the definitions of right-hand side terms in equation (1). The first liquidity creation measure is based on a category classification of balance sheet items; the second is a liquidity creation measure based on maturity classes of bank balance sheet items. Table 2 provides a detailed description of the 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 the category definition consists of cash holdings, correspondent accounts with other banks (i.e. central bank, commercial resident banks or nonresident banks), investments in promissory notes, investments in debt securities (firms, governments and banks), and investments in stocks. In classifying loans we follow the literature saying 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 a 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, in accord with the idea that items with shorter maturity tend to be more liquid than longer-term items, notwithstanding the rarity of loan securitization in Russia. Other loans, along 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 a liquid market exists in Russia, are classified as liquid. Unlike these, deposit and savings certificates were introduced only in recent years, so 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 for equity.

The second liquidity creation measure 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 is loans. Our dataset contains detailed information on the maturities of all the loans. We use this data to classify loans with maturity less than one year as semi-liquid and the loans with longer maturity as liquid. All the other categories correspond to the classification used for the first liquidity creation measure.

Following a similar logic as adopted for the asset side, deposits stand out as the most significant item on the liability side. Our data enable us to distinguish term deposits with maturity of less than one year, which we classify as semi-liquid, versus term deposits with longer maturities, which are considered 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 calculation procedure gives us 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 for each of the regions. We use the distribution of bank branches as a proxy for banking output in the regions. 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

region and by time. This gives us a proxy for liquidity created by banks in each region. The same method is applied to both the liquidity creation measure and liquidity creation maturity measure.

3.2 Methodology

Given the small number of regions with complete data, we cannot estimate cross-section models although 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 earlier research.

Therefore, we begin our empirical analysis by estimating a fixed effects model for the years 2004–2012. Our benchmark regression equation is specified as

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

where the subscript i is the region index and t is the time index; $\dot{y}_{it}$ is the annual growth rate of gross regional product (GRP) in percent, lc_{it} is one of the two measures of 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 of balance sheet items.

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,* defined as the proportion of employees with higher education. The degree of openness of a region (*openness)* is the proportion of exports plus imports in GRP. We also include in the estimations *government size,* proxied by government expenditure defined as its proportion of GRP, and *inflation,* as well as time effects.

However, fixed effects estimations do not take into account the dynamic properties of the data. 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 a bank can extend financing especially in the growing regions. In similar empirical settings, several authors accounted for potential endogeneity problems by applying instrumental variable estimation techniques. Yet another important concern is that eco-

nomic 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:

$$\dot{y}_{it} = \alpha_i + \sum_{p=1}^{P} \rho_p \dot{y}_{it-p} + \beta lc_{it} + \sum_{k=1}^{K} \gamma_k X_{kit} + \varepsilon_{it} \quad (3)$$

where ρ_1 to ρ_P are autoregressive parameters for P lags of output growth and all other variables are defined as above.

The OLS estimate may be significantly biased when the number of time periods is small (Baltagi, 2008) because lagged values of the dependent variable, y_{it-p}, are correlated with the fixed effects, α_i. Therefore, Arellano and Bond (1991) propose a GMM estimator which removes fixed effects via difference transformations (difference GMM). However, the difference transformation leads to the so-called weak instrument problem when the dynamic terms are close to unity. Arellano and Bover (1995) and Blundell and Bond (1998) build a system of two equations (system GMM) in levels and in first differences.

In the estimation of (3) we compare the one-step difference and system GMM estimators, which enables us to tackle the problem of endogeneity. We use two lags of the dependent variable (annual growth rate of GRP). As long as we have longer time series for regional output growth, the inclusion of its lagged values does not result in any loss of observations. We instrument all control variables because they can be endogenous. As this approach results in a large number of internal instruments, we use the collapse option as proposed by Roodman (2009) for the difference GMM specifications. Similarly, we use only one lag of each endogenous variable in the system GMM estimations. Time effects are included as exogenous instruments.

4 Results

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

4.1 Main estimations

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

We obtain overall the same results with fixed effects and with difference or system GMM. This reflects that the autoregressive coefficients are relatively small but significant. Given this property, difference GMM becomes our preferred method of estimation.

We observe somewhat mixed results concerning bank liquidity creation. On the one hand, there is a positive and significant coefficient for the maturity version of liquidity creation measure in all specifications. On the other hand, in case of the liquidity creation measure based on the category classification, the coefficient is positive but not always significant. The maturity-based liquidity creation measure is however our preferred measure of bank liquidity creation. It is based on the maturity of different balance sheet items as provided in our data and thus can be considered as more objective than the category based measure. Taking this into account, we interpret our results as providing strong support for the positive relation between bank liquidity creation and economic growth.

Our results tend to confirm that the liquidity creation role of banks is positive for the economy. In broad terms, they contribute to the literature on the finance-growth nexus by providing evidence on the impact of a broad measure of bank output, i.e. liquidity creation. From the Russian perspective, they provide support for the impact of financial development on the country's economic growth. By doing so, they are not at odds with the few studies on this issue, including Berkowitz and DeJong (2010), who manifest the beneficial impact of banking development on Russian growth in the 2000s.

Our results also relate to the studies that investigate 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 proceed with an analysis of the control variables. The variable *government size* is negative and significant in most estimations, which suggests that a greater influence of the government in the economy hampers economic growth. *Education* is not significant in the vast majority of estimations, which might be a result of the fact that there are small differences across regions. Moreover, the time period that we consider is from this viewpoint rather short, and education level may be contained in the regional fixed effects. *Openness* is positive in all estimations and significant in about a half of them, including our preferred difference GMM specification with the maturity version of bank liquidity creation. This accords with the view that greater openness to trade contributes to economic growth. Finally, *inflation* exhibits a positive and significant impact on economic growth.

4.2 Robustness checks

Overall, our main estimations confirm that bank liquidity creation is positively related to economic growth. We can nonetheless wonder whether the impact is influenced by cyclical conditions, since financial development can both improve growth performance in normal times and amplify reductions in output in times of recession. Finance can be susceptible to shocks and hence may be a fragility factor that contributes to deterioration of 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 country's dependence on the oil and gas markets renders 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 impact of liquidity creation on economic growth is different in normal versus crisis years. Table 4 reports the results, which are the same for liquidity creation variables: they are positive and significant when using the measure based on maturity. Difference GMM also yields a positive and significant result for the category version of liquidity creation. Thus, the weak overall results for the category measure seem to be influenced largely by the financial crisis. This finding is further supported by our results showing that liquidity creation had a negative, albeit insignificant, impact on growth during the financial crisis in nearly all specifications for both versions of liquidity creation.

In the second robustness check we perform the estimations without considering the regions of Moscow and Saint Petersburg. Both of these regions are unique in the sense that they enjoy a much higher level of financial development than the average Russian region. Therefore one might reasonably wonder whether their inclusion might influence our main results. Table 5 displays the estimations. We confirm the positive and significant impact of bank 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 of the largest Russian cities does not affect our main findings.

5 Conclusion

In this study, we investigate the impact of bank liquidity creation on economic growth in Russia. 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 is positively associated with growth, even though this link is only significant when we compute liquidity creation based on maturity classification. We also show that this effect was not washed out by the financial crisis.

Our findings have two implications. First, they contribute to the literature on the finance-growth nexus by displaying the influence of bank liquidity creation on the economy. While several studies have looked at the determinants and measures of bank liquidity creation, our work is the first to bring out the major consequences of greater bank liquidity creation. Second, our results provide more insights as to the impact of financial development on economic growth in Russia. Bank liquidity creation is a comprehensive measure of bank output which can be considered a proxy for financial development. As such, our results suggest 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 further explored within the research agenda for the finance-growth nexus.

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Tables

Table 1.A Descriptive statistics for the main variables

	Definition	Obs	Mean	Std. Dev.
GRP growth rate	annual growth rate of the gross regional product in %	576	8.221	9.580
education	share of employment with higher education in %	576	24.741	5.166
government size	government expenditures; proportion of GRP	576	20.485	7.210
inflation	inflation rate (producer prices) in %	576	12.357	13.467
openness to trade	proportion of exports and imports in GRP in %	576	32.230	27.690
liquidity creation (maturity version)	maturity measure of bank liquidity creation as share of GRP in %	576	0.060	0.104
liquidity creation (category version)	category measure of bank liquidity creation as share of GRP in %	576	0.729	0.334

Note: all variables are calculated at the regional level

Table 1.B Correlation matrix for the main variables

	growth rate	educ.	gov .size	inflation	openness	liquidity creation (maturity)
education	–0.126					
government size	0.017	0.276				
inflation	–0.011	–0.188	–0.191			
openness	0.141	0.176	0.331	–0.002		
liquidity creation (maturity)	–0.180	0.153	0.203	0.072	0.070	
liquidity creation (category)	–0.294	0.009	–0.127	–0.024	–0.203	0.468

Table 2 Liquidity creation measures

This table classifies all balance sheet items in terms of liquidity. The weight of each category (in parentheses) is used to calculate two liquidity creation measures according to Equation (1).

Illiquid liabilities and equity (–1/2)		**Semiliquid liabilities (0)**		**Liquid liabilities (1/2)**	
(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 – promisory notes	
				demand deposits	
Illiquid assets (1/2)		**Semiliquid assets (0)**		**Liquid assets (–1/2)**	
(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) FE	(2) FE	(3) DFE	(4) DFE	(5) DGMM	(6) DGMM	(7) SGMM	(8) SGMM
liquidity creation	11.279**		13.344**		24.577**		8.409**	
(maturity)	(5.006)		(5.126)		(10.971)		(4.197)	
liquidity creation		1.287		1.500		19.826**		–2.065
(category)		(2.528)		(2.631)		(9.434)		(1.834)
gov. size	–0.536***	–0.534***	–0.519***	–0.518***	–1.000**	–0.683*	–0.114	–0.118
	(0.128)	(0.127)	(0.141)	(0.138)	(0.446)	(0.408)	(0.100)	(0.103)
education	–0.105	–0.106	–0.134	–0.134	0.321	–0.001	–0.642**	–0.646**
	(0.158)	(0.159)	(0.159)	(0.162)	(0.590)	(0.488)	(0.279)	(0.300)
openness	0.056	0.051	0.079*	0.072	0.188**	0.145	0.091***	0.071***
	(0.036)	(0.037)	(0.043)	(0.044)	(0.080)	(0.102)	(0.034)	(0.026)
inflation	0.096**	0.101**	0.098**	0.103***	0.084**	0.080**	0.087***	0.092***
	(0.041)	(0.041)	(0.037)	(0.037)	(0.038)	(0.036)	(0.031)	(0.031)
growth (1st lag)			–0.115**	–0.108**	–0.074	–0.127*	–0.112**	–0.103*
			(0.045)	(0.046)	(0.059)	(0.067)	(0.055)	(0.057)
growth (2nd lag)			–0.161***	–0.154***	–0.125*	–0.175**	–0.171***	–0.162***
			(0.055)	(0.057)	(0.067)	(0.074)	(0.057)	(0.060)
No. of obs.	576	576	576	576	512	512	576	576
R^2	0.534	0.529	0.553	0.547				
No of regions	64	64	64	64	64	64	64	64
No of instr.					68	68	93	93
Hansen test					56.824	58.406	53.529	56.045
					[0.335]	[0.284]	[0.981]	[0.965]
AR1					–5.18	–5.492	–4.818	–4.704
					[0.000]	[0.000]	[0.000]	[0.000]
AR2					–1.067	–0.773	–1.442	–1.552
					[0.286]	[0.440]	[0.149]	[0.121]

Note: FE – fixed effects, DFE – dynamic fixed effects, DGMM – difference GMM (collapsed instrument), SGMM – system GMM (1 lag used as instrument). AR1 – 1st order autocorrelation test. AR2 – 2nd order autocorrelation test. Robust standard errors in parentheses and p-values in brackets. Time effects are included but not reported. ***, **, and * denote significance at 1%, 5%, and 10% level, respectively.

Table 4 Robustness check – financial crisis

	(1) FE	(2) FE	(3) DFE	(4) DFE	(5) DGMM	(6) DGMM	(7) SGMM	(8) SGMM
liquidity creation	13.260**		15.350***		33.278**		10.520**	
(maturity)	(5.161)		(5.118)		(14.358)		(4.277)	
liq * fin crisis	–14.512		–14.723		–36.759		–18.869	
	(12.553)		(12.664)		(25.834)		(11.971)	
liquidity creation		1.802		1.435		19.325**		–1.771
(category)		(2.328)		(2.381)		(9.489)		(1.914)
liq. * fin crisis		–1.351		0.173		0.879		–0.868
		(2.558)		(2.351)		(3.292)		(2.398)
gov. size	–0.539***	–0.529***	–0.522***	–0.518***	–1.075**	–0.691*	–0.109	–0.118
	(0.126)	(0.127)	(0.139)	(0.138)	(0.461)	(0.413)	(0.098)	(0.103)
education	–0.097	–0.107	–0.126	–0.134	0.350	–0.005	–0.650**	–0.648**
	(0.158)	(0.159)	(0.159)	(0.162)	(0.580)	(0.491)	(0.277)	(0.302)
openness	0.053	0.051	0.076*	0.072	0.171**	0.144	0.092***	0.071***
	(0.036)	(0.037)	(0.043)	(0.044)	(0.080)	(0.103)	(0.034)	(0.026)
inflation	0.093**	0.100**	0.095**	0.103***	0.072*	0.081**	0.083***	0.091***
	(0.041)	(0.041)	(0.037)	(0.037)	(0.043)	(0.037)	(0.031)	(0.032)
growth (1^{st} lag)			–0.114**	–0.108**	–0.071	–0.129*	–0.114**	–0.099*
			(0.045)	(0.045)	(0.061)	(0.068)	(0.055)	(0.056)
growth (2^{nd} lag)			–0.163***	–0.155***	–0.128*	–0.176**	–0.177***	–0.159***
			(0.056)	(0.056)	(0.066)	(0.074)	(0.058)	(0.059)
No. of obs.	576	576	576	576	512	512	576	576
R^2	0.536	0.530	0.555	0.547				
No of regions	64	64	64	64	64	64	64	64
No of instr.					68	68	93	93
Hansen test					56.013	58.309	48.772	55.623
					[0.327]	[0.255]	[0.994]	[0.962]
AR1					–5.153	–5.472	–4.846	–4.706
					[0.000]	[0.000]	[0.000]	[0.000]
AR2					–0.850	–0.773	–1.396	–1.576
					[0.395]	[0.439]	[0.163]	[0.115]

Note: FE – fixed effects, DFE – dynamic fixed effects, DGMM – difference GMM (collapsed instrument), SGMM – system GMM (1 lag used as instrument). AR1 – 1^{st} order autocorrelation test. AR2 – 2^{nd} order autocorrelation test. Robust standard errors in parentheses and p-values in brackets. Time effects are included but not reported. ***, **, and * denote significance at 1%, 5%, and 10% level, respectively.

Table 5 Robustness check – excluding Moscow and St.Petersburg

	(1) FE	(2) FE	(3) DFE	(4) DFE	(5) DGMM	(6) DGMM	(7) SGMM	(8) SGMM
liquidity creation	9.864*		11.689**		21.926**		10.605**	
(maturity)	(5.114)		(5.195)		(11.182)		(5.079)	
liquidity creation		–0.078		–0.042		9.199		–0.706
(category)		(2.687)		(2.788)		(8.821)		(1.941)
gov. size	–0.565***	–0.563***	–0.552***	–0.549***	–1.063**	–0.860**	–0.030	–0.050
	(0.131)	(0.130)	(0.143)	(0.141)	(0.468)	(0.411)	(0.080)	(0.080)
education	–0.081	–0.074	–0.114	–0.104	0.545	0.495	–0.906***	–0.988***
	(0.166)	(0.166)	(0.166)	(0.167)	(0.591)	(0.542)	(0.304)	(0.304)
openness	0.074**	0.068*	0.103**	0.095**	0.245***	0.238**	0.071**	0.050*
	(0.034)	(0.036)	(0.042)	(0.044)	(0.087)	(0.093)	(0.032)	(0.028)
inflation	0.094**	0.099**	0.096**	0.102***	0.079**	0.082**	0.089***	0.094***
	(0.042)	(0.042)	(0.037)	(0.037)	(0.039)	(0.037)	(0.031)	(0.032)
growth (1st lag)			–0.126**	–0.119**	–0.087	–0.114*	–0.125**	–0.126*
			(0.048)	(0.048)	(0.062)	(0.064)	(0.062)	(0.066)
growth (2nd lag)			–0.172***	–0.167***	–0.131*	–0.159**	–0.195***	–0.193***
			(0.057)	(0.059)	(0.067)	(0.070)	(0.065)	(0.070)
No. of obs.	540	540	540	540	480	480	540	540
R^2	0.527	0.524	0.550	0.545				
No of regions	60	60	60	60	60	60	60	60
No of instr.					68	68	93	93
Hansen test					51.065	53.963	45.163	48.266
					[0.550]	[0.437]	[0.999]	[0.996]
AR1					–4.901	–5.072	–4.490	–4.400
					[0.000]	[0.000]	[0.000]	[0.000]
AR2					–0.811	–0.533	–1.178	–1.281
					[0.418]	[0.594]	[0.239]	[0.200]

Note: FE – fixed effects, DFE – dynamic fixed effects, DGMM – difference GMM (collapsed instrument), SGMM – system GMM (1 lag used as instrument). AR1 – 1st order autocorrelation test. AR2 – 2nd order autocorrelation test. Robust standard errors in parentheses and p-values in brackets. Time effects are included but not reported. ***, **, and * denote significance at 1%, 5%, and 10% level, respectively.

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