RPTSS 2018
International Conference on Research Paradigms Transformation in Social Sciences

ECONOMETRIC ANALYSIS OF INFLUENCE OF BANK EFFICIENCY ON ECONOMIC GROWTH OF REGION

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Abstract

The genesis of economic thought makes it possible to single out the banking system as one of the important elements ensuring the economic growth of the territory in a market economy. The activities of many market participants are impossible without any particular banking services. This allows us to talk about life-sustaining role of the banking sector in the economic development of enterprises, industries, regions and the national economy as a whole (Brissimis, Delis, & Papanikolaou, 2012; Graff & Karmann 2015; Levine & Zervos, 1998). Competitive economy of the region in turn contributes to the growth of the banks themselves and their credit and investment activity. One of the aspects of the analysis of the Russian banking system is the study of the activities of banks in regions that differ not only in their economic potential, but also in their cultural, social, and behavioral characteristics. The uneven distribution of the assets of the banking system across the regions of the country creates a certain differentiation of the influence of banks on economic growth. Given there is a fairly high degree of transparency of the activities of Russian banks and the availability of much information, econometric studies in this area are relevant which predetermined the direction of this study.

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Keywords: Bank efficiency, growth of region, influence., analysis.

1. Introduction

Stable economic development of the regions has been an interesting topic of research throughout the entire existence of economic science. The development of a tool to counteract crises is an indispensable factor in the region's stable economic position. Economic growth plays a leading role in improving the welfare of the country. That is why it is very important to study the factors that determine the economic growth of regions, as well as to study the processes and patterns of this influence. Since the middle of the last century, the institutes of the financial system have become one of the factors of economic growth. At present, the banking sector and the stock market have the most significant role in the research. The banking sector is involved in practically all branches of the economy and social sphere in a market economy. This allows us to talk about the vital role of the banking sector in the economic development of enterprises, industries, regions and the national economy as a whole. Competitive economy of the region in turn contributes to the growth of the banks themselves and their crediting and investment activity (Guiso, Sapienza, & Zingales 2004; Rajan & Zingales 1998; Vu & Nahm 2013).

2. Problem Statement

Achieving this goal required solving a number of problems, the consistent solution of which allowed the authors to critically summarize the results of research in the field of economic growth models; to analyze the economic indicators pointed out by the authors in all models, and to assess their significance; to study the problems faced by the authors, to construct a system of factors for their own research taking into account the availability of data for the regions of the Russian Federation; to put forward some hypotheses concerning the influence of the factors on the explanatory variable based on previous studies and in economic terms. Furthermore, we conduct an econometric study and select the specification of the model that best describes the dependent variable, draw meaningful conclusions based on the model obtained and make recommendations for its application.

3. Research Questions

To assess the relationship between economic development of the region and banking sector activity, we selected a number of indicators taking into account the specifics of Russian Federation regions. It was considered that the strength of the relationship between the quality of the financial sector and economic growth depends on the level of development of the region (Belke, Haskamp & Setzer, 2015). The efficiency of the bank is measured by its relative ability to maintain a balance between the costs of resources and the profit obtained from their use at a level appropriate for maximizing profits or minimizing the costs. A bank is inefficient if it uses too many resources or uses them in the wrong proportions. An efficient bank should support economic growth through the implementation of its function as a mediator, that is, by choosing the optimal funding projects allocating the optimal costs (Brissimis, Delis & Papanikolaou, 2012). Despite the fact that the regulator - the Central Bank of the Russian Federation - develops uniform regulations for their activity, some banks differ from the other in the effectiveness of their funds allocation. For example, the loan amount, interest accrued for loans and the effectiveness of banks, according to some studies, differ significantly between the northern and southern regions. In order to

analyze the impact of banking efficiency and regional specifics on the economic growth of the region, we proposed a growth model formalized on the basis of panel data of the following type:

$$\Delta Y_{i,t} = \alpha + \beta_1 * lnBV_{i,t} + \beta_2 * lnBE_{i,t} + \beta_3 * lnX_{i,t} + \varepsilon_{i,t}, \qquad (1)$$

where $Y_{i,t}$ - GRP per capita in region i at time t ; BV - variable of the volume of the banking sector; BE - a vector of indicators of bank efficiency; X - a vector of control variables which characterize regional specificity; ε is the error vector; i - the region index; t is time. The standard and most adequate indicator, which is most often used in empirical studies to assess the region's economic growth, is the increase in the gross regional product (GRP) per capita in the region (*GDPC - Gross domestic product per capita*). Equation (1) cannot be estimated using the basic methods of estimating panel data, since the variable of per capita GRP growth correlates with the error. The explanatory variable of the banking volume and the dependent variable of economic growth may be subject to endogeneity. This problem occurs in cases when significant variables are omitted, there are errors in the measurement of regressors, self-selection, simultaneity. Indices of BV and per capita GRP growth are interdependent, because a growing economy can lead to an increase in demand for loans and growth in the banking sector. Potential endogeneity when assessing an endogenous model is taken into account through the variable of volume of the banking sector (BV), as being endogenous and thus, lags are included as tools in accordance with the approach used in previous studies. The main indices characterizing the banking sector will be:

- *Correlation between loans and GRP (LTGDP – loans to GDP)* will act as the main indicator of the volume of the banking sector.

- *The ratio of the volume of issued loans of regional banks to the volume of attracted deposits (LTD - loans to deposits)*, which characterizes the region as a donor or consumer of credit resources. A very low ratio indicates the bank's insufficient efficiency of using their resources, and if the ratio exceeds a certain level, it is a signal of high risk activity of the banking system.

- *The volume of deposits of physical persons (Deposits)* assesses the population's trust in the banks and the banking system as a whole. Also, the index is the main indicator of the volume of the banking sector in this study.

- *The volume of interbank loans (MBC)* has a significant impact on the state of the banking system. MVS is the most rapid source of funds to maintain the current payment level and liquidity of the bank.

- *The volume of assets of banks (Assets)* characterizes the overall performance of regional banks. The volume of assets of the banking system of the region is an important indicator of its ability to finance the economy. It is the availability of a sufficient volume of assets that the implementation of specific projects is often based on.

- *Return on assets of the regional banking sector (ROA - return on assets)* is a financial ratio characterizing the return on the use of all assets of regional banks and their branches. The ratio shows the quality of asset management and the effectiveness of their use to maintain the functioning of the banking system.

- *Aggregated profit of the banking sector* (*Profit*).

The proposed model takes into account the importance of such indicators as human capital, population growth. They have a fairly strong influence on the development of the region. X - vector of control variables includes indicators characterizing the development of the region in selected areas. Ignoring these differences which still exist between the various regions may lead to an assessment bias. In this regard, for the analysis we selected the following indicators characterizing individual regional characteristics:

- *Number of branches per capita (BC - branches per capita*) characterizes the coverage and availability of the banking system for the population and legal entities.

- *Investments in fixed capital (INV*) have a direct impact on the standard of living and the size of the national production, and hence the economic growth of the region.

- C*apital*-labour adequacy *(CapLab - capital - labor ratio*) - *the* growth of capital adequacy of labor must be accompanied by an increase in labor productivity. There is a direct correlation between the growth of C*apital*-labour ratio and the growth of GDP.

- *Consumer Price Index (CPI - consumer price index*) is *a* coefficient reflecting the dynamics of prices of consumer goods and services within the region for a certain period of time. It is an indicator of the economic security of the country.

- *Employment in the region (EMP - employment)*

- *The total increase in the permanent population (POP - population*) shows the reverse effect of the increase in the number of population in the region on the change in per capita GRP.

- *The growth of innovative enterprises registered in the region (INO - innovation*) characterizes in this model the scientific and technological progress that stimulates economic growth in the region.

- *Human capital (HC - human capital*) - the proportion of children enrolled in general education institutions (% of the total number of children of the corresponding age).

Along with the above-mentioned variables, specific for each country, the data obtained allow one to assess the relationship and the strength of the effect of banking efficiency on regional growth. As a result, a database of 1817 observations by sample over 11 years in 79 regions of Russia for the period of 2004-2015 was formed. Since the sample includes two crisis periods in Russia - these are the periods of 2008-2009 and 2014-2015, dummy variables of time are included, that is, variables for each of the sample years, which made it possible to determine whether the effect of the efficiency of the banking system on economic growth is changing during stable and crisis time periods. As a result of the calculations, it was planned to find adequate models on a sample of panel data of the obtained groups of homogeneous regions, and based on the results obtained, substantial economic conclusions and recommendations were made.

4. Purpose of the Study

The purpose of this study is to identify and systematize the factors of the effective operation of the regional banking system that affect the economic development of the region, using econometric analysis This work initiates the discussion among the scientific community engaged in such research. In this connection, the authors define a broader goal - to receive feedback in the process of scientific discussion of the problem and to move to a new level of research.

5. Research Methods

The theoretical basis of the study was the works of foreign authors in the field of economic growth research and its relationship with the financial sector and, in particular, with the banking system. The works of a number of authors are most significant for this study: Levine R., Zervos S., Kotter M., Vedou M., Rajan R., Zingales L. They consider some components of the mechanism of financial and banking sector influence on economic growth. In the domestic literature currently, there are not so many works devoted to this problem, it is worth noting the works of Selyanin S., Ivanter A., Vakulenko E. S., Kolesnikova E.N., Serdyuk M. Yu. These works do not fully consider the dependence of economic growth of regions on indicators of bank efficiency (Belke, Haskamp & Setzer 2015; Hakenes, Hasan & Molyneux, 2015). The following methods of data analysis were used in the work: correlation, statistical and regression analysis, econometric modeling. Software tools such as Microsoft Excel and Stata 14 were used in the study. The information and empirical base was made up of materials of periodic printed and electronic publications, scientific works, general and special literature of Russian and foreign authors, as well as statistical data presented in specialized databases in the Internet on specialized websites.

6. Findings

As a result of preliminary analysis, a number of basic models were constructed. Three main regressions are evaluated: through regression, regression with deterministic individual effects and regression with random individual effects. After carrying out comparative tests, it was found out that the model with fixed individual effects best describes the initial data. In our model of the effect of the banking sector's efficiency on economic growth, there is a variable that can be considered endogenous - a variable in the volume of the banking sector (lLTGDP). This means that the dependent variable can equally well be both a consequence and cause of the regressor. It means that not only an increase in the size of the banking sector leads to an increase in the GRP per capita, but the acceleration of the growth rate can cause a higher demand of economic agents for financial resources of banks. In a similar situation, the authors of previous studies included an additional variable (the lagging value of GRP growth per capita), which led to the analysis of the dynamic panel. To estimate the parameters of such a model, one can also use the Arellano-Bond method. For further accuracy, we use the GMM-estimator, which uses not only the variable lags as tools, but also includes the lags of the first differences in the dependent variable. This approach is most effective, based on previous work. The results of the estimation by Arellano-Bond method are presented in Table 1.

Table 01. Results of regression estimation by Arellano-Bond method

Variable	(1)	(2)
Lagged gGDPC	-0.150*** (0.0264)	-0.161*** (0.0169)
lLTGDP	0.0459** (0.017)	0.0444** (0.0142)
lLTD	-0.0436* (0.0186)	-0.0436** (0.0149)
lMBC	-0.00112	-

	(0.00103)	
lProfit	0.0014 (0.00115)	-
ROA	0.0807 (0.052)	-
lCapLab	0.0562*** (0.015)	0.0593*** (0.0133)
lHC	0.107*** (0.009)	0.116*** (0.059)
lINV	0.0221*** (0.00118)	0.0209 (0.00146)
POP	-0.000000444 (0.000000407)	-0.000000395 (0.000000435)
INO	0.0192***	0.00617***
	(0.000183)	(0.000223)
lBC	0.0153***	0.0129***
	(0.00993)	(0.00846)
Number of observations	1635	1752
Number of tools	46	41
Hansen statistics	67.83	69.56
Hansen p-value	0.069	0.05
AR(2): z	-3.88	-4.75
AR(2): Pr > z	0.000	0.000

Note. Standard errors are given in brackets.

***, **, * – significance at 1, 5 and 10%- level, respectively.

Insignificant impact on the growth rate of GRP per capita in the final model is made by indicators of efficiency and profitability of banking activities. Analysis of coefficients for dummy variables shows that, compared to 2004, with other things being equal, GRP per capita first increased during 2006-2007, then decreased in 2008, and still showed a sharp decline in 2009, after which it began to slowly increase, but never reached the average GRP per capita level in 2004. Finally, as a result of comparing different models and specifications, a model was selected with the most consistent and efficient estimates. The best method of estimation was the method of estimating Arellano-Bond using lag values and the first differences of the endogenous variable as tools.

7. Conclusion

The results of the study in comparison with the hypotheses put forward earlier can be summarized into the following points:

- Most hypotheses about the expected effect of the indicators of banking activity and control variables have been confirmed and are consistent with previous studies in this area;

- The volume of the banking sector, as expected, has a direct impact on the growth of GRP per capita. This explains the need not only to increase lending in the regions, but also to increase their accessibility to develop the regional economy.

- The hypothesis about the positive effect of the change in the ratio of loans to deposits was not confirmed: it turned out that an increase in this ratio leads to a decrease in the rates of economic growth. The analysis showed that, on average in Russia, this indicator is higher. It means banks mostly perform risky activities, allocating the substantial volume of resources for loans which can lead to negative results in the form of arrears increase, destabilizing the situation in the credit market, reducing the efficiency of banks and their role in the economic growth of the region.

- The volume of attracted deposits from the population does not have a significant impact on the growth rate of GRP per capita, but the sign of influence has been confirmed, and the positive effect of increasing deposits on economic growth in the region has been confirmed.

- The volume of interbank loans had a positive impact on the change in GRP per capita, but the significance of this factor varied depending on the method of assessment of the model.

- The impact of the number of branches per capita can be interpreted as an indicator of the availability of the banking system. At the same time, it is necessary to take into account the saturation of the market and the importance of the proper allocation of the bank's resources which require the maintenance of the functioning of the branches. As a result, it was determined that this indicator has a direct relationship to GRP per capita in the region.

- The indicator of investments in fixed capital is a significant factor in the models and confirms the positive impact on the change in the GRP per capita in the region. Therefore, for the economic growth of the region, it is advisable to fix available interest rates on loans and stimulate the investment of organizations in their development.

- Science and Technology progress defined as growth of innovative enterprises has a positive significant effect on economic growth in the region. Hence, with the emergence of new enterprises, they need the support of the authorities and creditors for business development, in view of their contribution to the regional economy.

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