
Influence of Social and Economic Development of the Region on the Functioning of the Regional Banking System

G.A. Batischeva¹, M.Y. Denisov¹, I.V. Rybchinskaya¹, M.B. Stryukov¹

Abstract:

The article is devoted to the analysis of the influence of the indicators of regional economic and social functioning on the results of the regional banking system's activity. The authors chose the indicators of social and economic development of the Rostov region and commercial banks operating in its financial market as objects for the study.

In the article the authors analyzed the methodologies that focus on assessing the impact of macroeconomic indicators on the banking system of the region. Besides, on the basis of econometric modeling quantitative and qualitative patterns of interrelations between the indicators of social and economic development of the regional economy and banking in the region are defined.

As a result of the study, the authors concluded that the determining socio-economic factors that have a significant positive impact on the development of the banking system in the region are: the number of advanced technologies used; per capita monetary income; the transport infrastructure development level; the level of human capital; internal expenditures on research and development; gross regional product; value of fixed assets; fixed capital investment; retail trade turnover.

Keywords: *Socio-economic indicators of the region, banking activities, profits, methods for assessing the impact of macroeconomic indicators on the banking system of the region*

JEL Classification Codes: *G21, G28, R10*

¹Batishcheva Galina Andreevna, ph.d., professor, Department of Fundamental and applied mathematics, Rostov State University of Economics, Rostov-on-Don, Russian Federation.

¹Denisov Mikhail Yurevich, ph.d., professor, Department of Fundamental and applied mathematics, Rostov State University of Economics, Rostov-on-Don, Russian Federation.

¹Rybchinskaya Irina Vladimirovna, ph.d., associate professor, Department of Banking, Rostov State University of Economics, Rostov-on-Don, Russian Federation, corresponding author I.V.Rybchinskaya@mail.ru

¹Stryukov Mikhail Borisovich, ph.d., professor, Department of Fundamental and applied mathematics, Rostov State University of Economics, Rostov-on-Don, Russian Federation.

Introduction

The need to improve the banking system of the region is constantly at the center of attention of regional authorities, banking and business communities, and this tendency is reinforced by unfavorable macroeconomic conditions. The purpose of this work is to analyze the impact of the region's socio-economic development on the functioning of the regional banking system, taking into account its efficiency parameters in order to achieve best agreed and effective solutions in this area. To reach the goal and solve the designated scientific problem, the authors are using econometric modeling (Valma, 2014; Sambrakos and Ramfou, 2014).

Most modern economic studies deal with a detailed analysis of macroeconomic indicators of formation, functioning and development of the national banking system as a whole, or focus on specific aspects of the activities of a bank. At the same time, there are only few methods for analyzing banking systems in the regional aspect, and it results in poor quality of the analysis, taking into account the significant differences between the regions of Russia in terms of economic potential, demographic situation, geographic conditions and the interrelation of these macroeconomic conditions with the indicators of banking activity. Moreover, specific features of the analysis of the banking systems of the region are to be highlighted in the face of increasing financial independence of regions, volatile situation and permanently arising banking crises, thus ultimately contributing to the effective monitoring of crisis phenomena and identifying crisis prevention measures.

Theoretical, Informational and Empirical, and Methodological Grounds of the Research

There is a wide range of methods that focus on assessing the impact of macroeconomic indicators on the banking system of the region. For example, Anisimova (2005) developed a methodology for a comprehensive analysis of the crisis phenomena development in the banking system of macro- and meso-levels. Mamonov (2011) introduced an approach for studying the crisis impact on the commercial banks system's profitability. In our opinion, presented in the thesis by Bondarenko (2015) methodological approach to correcting the banking system indicators by using the "dollar transmission", the level of inflation, the cost of the consumer basket, the correlation with the volume of money supply and GDP is the most comprehensive and valid. The application of this approach, based on structuring of macroeconomic factors affecting the parameters of the credit organizations system's activity (socio-economic, banking system globalization factors, image factors, etc.), reduces the degree of quantitative information distortion under the influence of macroeconomic conditions (Ivanova *et al.*, 2017; Liapis *et al.*, 2013; Anureev, 2017; Allegret *et al.*, 2016; Anikina *et al.*, 2016; Glavina, 2015).

The authors of many methods of assessing the impact of macroeconomic indicators

on the banking system of the region argue that unfavorable trends in macroeconomics become the main causes of the crisis phenomena in the banking system and (or) its separate units. Indeed, the study of the macroeconomic indicators impact on the activities of banks and the banking system as a whole is of great importance (Thalassinos *et al.*, 2013). However, it does not give full information about the state and development trends of the banking system in the region, therefore, it does not reveal all the factors determining its state, does not identify its sensitive issues and what caused them, and is unable on this basis to assess objectively the current situation in the economy and the banking system, to forecasts banking development, to identify the ways of increasing banks efficiency in the region and to provide justification for management decisions on the regional banking system improvement.

Materials and method

The authors drew up the following groups of models:

- 1) models of the influence of the factors of the region's social and economic development on the profit of credit institutions operating in the region;
- 2) models of the influence of the region's social and economic development indicators on the dynamics of bank lending and overdue debt on bank loans.

When studying the influence of the factors of the social and economic development of the region on the profit of credit institutions, which is the most important indicator of the effectiveness of the banking system, the indicators presented in Table 1 [2, 3] were considered.

Table 1. *The list of indicators characterizing the social and economic development of the region²*

Indicator	Definition
1	2
GDP	value of gross regional product, million rubles.
IF, IFH	volume of fixed capital investment in absolute terms, million rubles and volume of fixed capital investment per capita, million rubles
CAP	value of fixed assets, million rubles.
GDP/P	labor productivity in the economy (the ratio of the gross regional product to the number of the employed in the economy of the region), rubles
CAP/P	capital-labor ratio (the ratio of the value of fixed assets to the average annual number of the employed in the economy of the region), rubles
GDP/CAP	capital productivity ratio (ratio of gross domestic product to value of fixed assets)
INI	internal costs of research and development, million rubles.
INT	amount of advanced technologies used
INZ	costs of technological innovations, million rubles.

²*drawn by the authors*

CIN	per capita monetary income of the population, rubles per month
HR	the population with income below the subsistence level, % of the total population of the region
P	economically active population, million people
MH	mortality, people, per 100,000 of the population
HUC	number of students in higher education institutions per 1000 of the population
U	unemployment rate, %
TR	road density, km of road per 1000 sq. km.
FA	degree of depreciation of fixed assets,%
UB	specific weight of unprofitable enterprises

The proposed indicators characterize the economic potential of the region and the efficiency level of its use; innovative development of the region; standards of living; demographic factors; level of social development; indicators describing the situation in the regional labor market; indicators characterizing the transport infrastructure; economic risk. The following indicators characterizing the efficiency of credit institutions were considered:

PR - total profit volume of operating credit institutions, million rubles.

VK - accounts (deposits) of individuals and legal entities (in rubles and currency) attracted by credit institutions, million rubles.

ZD - the amount of debt on loans in rubles and foreign currency provided by credit institutions to legal entities and individuals, million rubles.

The initial information on the selected factors was given by Rosstat, the Bank of Russia for the Rostov region for 2000-2015 (Rybchinskaya and Kozlova, 2009). The calculations were made with the EVIEWS econometric package. Statistical analysis of the constructed models was carried out by using the F-test (the significance of the equation as a whole was estimated); Student's criterion (the significance of regression coefficients was estimated); the coefficient of determination R² (the measure of the quality of the regression equation was estimated), the Breusch-Godfrey test (the test for autocorrelation in the residues), the White's test (a check for heteroscedasticity) (Eliseeva, 2015). The elasticity coefficients were calculated for economic analysis.

Results

Statistical analysis of the obtained econometric equations (see Tables 2, 4) showed (Eliseeva, 2015) that they are significant: the F-test calculated values are greater than the tabulated values for the 5% significance level for each of the constructed regression equations. Testing by the t-criterion of regression coefficients showed that the parameters-factors included in the model have a significant effect on the

dependent variable: all regression coefficients are significant at the 5% significance level.

All the signs of the multiple regression coefficients correspond to the economic essence of the influence of the arguments on the function. The values of multiple correlation ratios show a fairly close relationship of the parameters-factors included in the model with the dependent variable. The obtained models are characterized by a sufficiently high degree of determination, the absence of autocorrelation in the residues, and the absence of heteroscedasticity.

The models of the influence of the indicators of the social and economic development of the region on the efficiency of banking activity are presented in Table 2.

Table 2. *Models of banking activity's profit (group of models 1)*³

	The regression equation	R ²	E
1	2	3	4
1.1	The model of profit dependence of the on the gross regional product: $\ln(PR) = -7,286 + 1,074 \cdot \ln(GDP) + \varepsilon$	0,746	1,074
1.2	The model of the dependence of the return on fixed capital investment: $\ln(PR) = -5,439 + 1,044 \cdot \ln(IF) + \varepsilon$	0,748	1,044
1.3	The model of the dependence of profit on the value of fixed assets: $\ln(PR) = -12,582 + 1,385 \cdot \ln(CAP) + \varepsilon$	0,713	1,385
1.4	The model of profit dependence on the transport infrastructure development level : $PROF = -690,598 + 11,494 \cdot TR + \varepsilon$	0,823	1,794
1.5	The model of profit dependence on per capita income: $\ln(PR) = -2,726 + 1,924 \cdot \ln(CIN) + \varepsilon$	0,754	1,924
1.6	The model of profit dependence on internal costs of research and development: $\ln(PR) = -3,097 + 1,140 \cdot \ln(INI) + \varepsilon$	0,802	1,140
1.7	The model of profit dependence on the number of advanced technologies used: $\ln(PR) = -15,367 + 2,856 \cdot \ln(INT) + \varepsilon$	0,714	2,85
1.8	Model of profit dependence on capital productivity ratio and development of transport infrastructure: $PR = -1785,29 + 4281,592 \cdot GDP/CAP + 6,799 \cdot TR + \varepsilon,$	0,795	E _{GDP/CAP} =1,549, E _{TR} =0,870
1.9	The model of profit dependence on the level of human capital and the cost of technological innovations: $PR = -1308,46 + 0,074 \cdot INZ + 42,739 \cdot HUC + \varepsilon$	0,801	E _{INZ} =0,153, E _{HUC}

³ drawn by the authors according to the research data

			=1,776
1.10	Model of profit dependence on the capital-labor ratio and the specific weight of unprofitable enterprises: $PR = 2008,35 - 74,344 \cdot UB + 1,870 \cdot CAP/P + \varepsilon$	0,782	$E_{UB} = -1,997$ $E_{CAP/P} = 0,669$
1.11	Model of profit dependence on the degree of depreciation of fixed assets and the development of transport infrastructure: $\ln(PR) = 9,758 - 4,197 \cdot \ln(FA) + 2,469 \cdot \ln(TR) + \varepsilon$	0,761	$E_{FA} = -4,197$ $E_{TR} = 2,469$
1.12	The model of profit dependence on the transport infrastructure development level, the specific weight of unprofitable enterprises and the unemployment rate: $PR = 2083,84 + 9,308 \cdot TR - 74,435 \cdot UB - 59,072 \cdot U + \varepsilon$	0,975	$E_{TR} = 1,191$ $E_{UB} = -1,999$ $E_U = -0,499$

The analysis of the models 1 - 12 shows that the factors included in these models have a significant effect on the profit of credit institutions. The role of factors characterizing the economic potential of the region and the level of its efficient usage is positive in terms of profit growth: the growth of GRP by 1% will lead to an increase in profits by 1,07% (model 1.1), and a 1% fixed capital investment increase will result in profit increase by 1.04% (model 1.2); an increase in the value of fixed assets by 1% will cause a profit growth of 1.39% (model 1.3). Profit growth is greatly influenced by the transport infrastructure development level: the growth in road density, km of road per 1000 sq. km contributes to the growth of profit by 1.79% (model 1.4).

The factors characterizing the standard of living of the population have significant impact on profit: the increase in per capita monetary income of the population by 1% contributes to the growth of profit by 1.92% (model 1.5). The factors of innovative development play an important role in the process of profit formation: the growth of the number of advanced technologies used by 1% leads to an increase in profit by 2.86% (model 1.7), and an increase of 1% in internal costs of research and development results in a profit growth of 1,4% (model 1.6).

The analysis of the multiple regression models (1.9-1.12) shows that in addition to the above discussed factors, the following factors have a positive effect on profit:

- GDP / CAP - capital productivity ratio: the growth of this indicator by 1% contributes to the growth of profits by 1.55% (model 1.8):

- HUC - number of students in higher education institutions per 1000 of the population: the growth of this indicator by 1% contributes to the growth of profit by 1.78% (model 1.9);

- CAP/ P - capital-labor ratio: the growth of this indicator by 1% leads to the growth of profit by 0.67% (model 1.10).

The negative impact on the growth of profits is determined by the following indicators:

- FA - the degree of depreciation of fixed assets: the growth of this indicator by 1% contributes to a decrease in profit by 4.9% (model 1.11);
- UB - specific weight of unprofitable enterprises: the growth of this indicator by 1% leads to a decrease in profit by 1.999% (model 1.12).

The introduced profit models can be used for the analysis and planning of economic activity of the region. Some financial sector indicators were considered while drawing up a group of models dealing with the impact of the regional social and economic development indicators (see Table 1) on the indicators of banking activity (loans and overdue loans). The list of the indicators is presented in Table 3.

Table 3. *The list of indicators characterizing the activity of credit institutions*

Indicator	Definition
1	2
X1	Assets of all credit institutions located and registered in the region, thousand rubles.
X2	Loans, deposits and other funds of all credit institutions located and registered in the region, thousand rubles
X3	Volume of loans extended to individuals and non-financial organizations by all credit institutions located and registered in the region, thousand rubles
X4	Overdue debts on loans extended by all credit institutions located and registered in the region, thousand rubles.
X5	Customer accounts at all credit institutions located and registered in the region, thousand rubles
X6	Funds of organizations at all credit institutions located and registered in the region, thousand rubles.
X7	Customers and organizations assets at all credit institutions located and registered in the region, thousand rubles.
X8	Deposits, customers and organizations funds at all credit institutions located and registered in the region, thousand rubles

The initial information on the selected indicators (Table 1, Table 3) was provided by Rosstat, Rostovstat, and the Bank of Russia for the regions of the Southern Federal District (only six regions) for 2012-2015. The information is the panel data.

Models of the impact of the social and economic development indicators of the region on loans and overdue loans are presented in Table 4.

Table 4. *Models of loans and overdue loans (model group 2)*

Model No.	Regression equation	R ²	E
1	2	3	4
2.1	The model of the influence of the population with incomes below the subsistence level on the loans provided to individuals and non-financial organizations by all credit institutions located	0,804	- 3,074

	and registered in the region $\ln X_3 = 19,268 - 3,074 \cdot \ln(HR) + \varepsilon$		
2.2	The model of the impact of the unemployment rate (U) on the loans extended to individuals and non-financial organizations by all credit institutions located and registered in the region $\ln(X_3) = 17,688 - 3,288 \cdot \ln(U) + \varepsilon$	0,874	- 3,288
2.3	The model of the influence of the population with incomes below the subsistence level on the overdue loans extended by all credit institutions located and registered in the region $\ln(X_4) = 16,895 - 3,321 \cdot \ln(HR) + \varepsilon$	0,778	- 3,321
2.4	The model of the impact of the unemployment rate on the overdue loans extended by all credit institutions located and registered in the region $\ln(X_4) = 19,518 - 5,610 \cdot \ln(U) + \varepsilon$	0,688	- 5,610
2.5	The model of the impact of mortality on overdue loans extended by all credit institutions located and registered in the region $\ln(X_4) = -39,992 + 6,893 \cdot \ln(MH) + \varepsilon$	0,921	6,893

The analysis of the models (2.1-2.5) shows that - the growth of the population with incomes below the subsistence level and the growth of the unemployment level contribute to a decrease in lending volumes and overdue credit payments, and the increase of mortality rate, on the contrary, causes an increase in overdue loans:

- the growth of the population with incomes below the subsistence level by 1% contributes to a decrease in loans granted to individuals and non-financial organizations by all credit institutions located and registered in the region by 3.07%;

- an increase of the unemployment rate by 1% contributes to a decrease in loans granted to individuals and non-financial organizations by all credit institutions located and registered in the region by 3.29%;

- the growth of the population with monetary incomes below the subsistence level helps to reduce the volume of loans (see model 2.1) and, consequently, cuts the amount of overdue loans (model 2.3), while the growth of population with monetary incomes below the subsistence level by 1% leads to reducing overdue loans by 3.321%;

- the growth of unemployment causes a decrease in the volume of loans (see model 2.2), and it leads to a decrease in overdue loans, while an increase of the unemployment rate by 1% contributes to a decrease of overdue loans by 5.61%;

- an increase of mortality rate by 1% causes an increase of overdue loans by 6.89%.

4. Conclusions and recommendations

Summing up the results of the econometric analysis of the influence of the social and economic development of the region on regional banking activity, a number of conclusions can be drawn:

1. The conducted econometric study on the influence of the indicators of the social and economic development of the region (on the example of the Rostov region) on the most important indicator of the effective activity of regional banking systems - the total volume of profit received by operating credit institutions, leads to the following conclusions:

- an important role for profitability of the credit organizations of the region is played by some factors of innovative development of the region, namely: the number of advanced technologies used and the internal costs of research and development;
- factors characterizing the standard of living: per capita monetary incomes - affect the growth of profit significantly;
- important indicators of social and economic development of the region, which have a positive impact on the growth of credit institutions' profit are: gross regional product; fixed capital investment; value of fixed assets; the transport infrastructure development level; the level of human capital; capital productivity ratio; capital-labor ratio;
- The following factors have a negative impact on the profitability of credit organizations of the region: the degree of depreciation of fixed assets; specific weight of unprofitable enterprises;

The presented models make it possible to compare the levels of changes of the above mentioned socio-economic indicators with the profit growth of credit institutions while carrying out the regional social and economic policy.

2. The analysis of the constructed models of the dependence of the banking sector's credit activity on the socio-economic development of the region (based on the example of the Southern Federal District) found that the population with incomes below the subsistence level and the unemployment rate has a significant negative impact on lending.

3. Econometric study of the dependence of overdue loans on the indicators of social and economic development of the region (based on the example of the SFD regions) revealed the following:

- a mortality rate increase contributes to the growth of overdue loans;
- an increase of the unemployment rate, as well as that of the number of people with monetary income below the subsistence level, leads to a decrease of overdue loans. It can be explained by the fact that the growth of this group of population causes a decrease in the volume of provided loans, and a decrease of the volume of loans leads to a reduction of overdue loans.

References

- Allegret, J.P., Raymond, H. and Rharrabti, H. 2016. The Impact of the Eurozone Crisis on European Banks Stocks, Contagion or Interdependence. *European Research Studies Journal*, 19(1), 129-147.

- Anikina, I.D., Gukova, V.A., Golodova, A.A. and Chekalkina, A.A. 2016. Methodological Aspects of Prioritization of Financial Tools for Stimulation of Innovative Activities. *European Research Studies Journal*, 19(2), 100 – 112.
- Anisimova, A.V. 2005. Perfection of the mechanism of anti-crisis banking system management: PhD in Economics theses. Stavropol.
- Anureev, V.S. 2017. Reconfiguration of Financial System Elements to Restore Economic Growth: The System Simplicity and Transformation towards State-Based and Corporate-Based Types. *European Research Studies Journal*, 20(2A), 281-307.
- Batishcheva, G.A., Batischeva, A.E., Lukyanova, V.G. 2015. Study on the influence of oil price dynamics on the main macroeconomic indicators in Russia. *RSEU (RIHE) Bulletin*, 4(52), 119-125.
- Batishcheva, G.A., Maslova, P.N., Batischeva, A.E. 2015. Statistical analysis and modeling of the interrelationships of investment and economic growth. *Accounting and statistics*, 4(40), 84-92.
- Bondarenko, V.A. 2015. Development of methodological approaches to assessing the impact of macroeconomic processes on the dynamics of the banking system: PhD in Economics theses. Stavropol.
- Bulletin of Banking Statistics. Regional Supplement. - Access mode: <http://www.cbr.ru/publ/BB.S/Bbsq0102r.pdf>
- Eliseeva, I.I. 2015. *Econometrics: a textbook for undergraduate and graduate students*. Moscow: Yurayt-Izdat, 449 p.
- Glavina, S. 2015. Influence of Globalization on the Regional Capital Markets and Consequences; Evidence from Warsaw Stock Exchange. *European Research Studies Journal*, 18(2), 117-134.
- Ivanova, A.E., Mackaev, M.M., Platonova, K.T., Elagina, V.N. 2017. Theoretical Basis for Composition of Economic Strategy for Industry Development. *European Research Studies Journal*, 20(1), 246-256.
- Mamonov, M.E. 2011. The impact of the crisis on the profitability of the Russian banking sector. *Banking*, 12, 15-27.
- Rybchinskaya, I.V., Kozlova, S. 2009. Influence of some financial market segments on the development of the real economy in the financial crisis. Influence of financial markets on the development of corporations in the real sector of the Russian economy: monogr. / ed. by V.Y. Nalivaitskiy. - Rostov –on - Don, Ch. 2.
- Rybchinskaya, I.V. 2012. Activation of bank lending as a basis for innovative development and modernization of the region's economy. *Economics of education*, 2.
- Statistical Yearbook of Russia. 2001-2015: collected papers/ Rosstat. - M., 2001-2015.
- Statistical bulletin of the Bank of Russia. - Access mode: <http://www.cbr.ru/publ/?PrtId=bbs>
- Thalassinos, I.E., Venediktova, B., Staneva-Petkova, D. 2013. Way of Banking Development Abroad: Branches or Subsidiaries. *International Journal of Economics and Business Administration*, 1(3), 69-78.
- Valma, E. 2014. Estimation of Interregional Trade Coefficients and Multipliers in the Context of an Interregional Model. *European Research Studies Journal*, 17(1), 101-118.
- Zolotarev, V.S., Basko, O.V., Rybchinskaya, I.V. 2013. Regional banking system and its role in the development of the economy of Rostov region. *Money and credit*, 3.
- Zolotaryov, S.V., Usenko, N.L., Rybchinskaya, V.I. 2015. Modernization of the banking system of the Russian Federation: trends and development tools: monograph, Moscow: Finance and Statistics.