Interaction of the Banking and Real Economy Sectors in the Regional Aspect

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ABSTRACT: The evolution of economic systems over the past decades indicates the emergence of new trends associated with increased external shocks, volatility in the commodity and financial markets, a slowdown in economic growth, weakening ties of material production with the financial sector, excessive reliance of monetary authorities on the high efficiency of the impact of regulatory measures on financial stability and economic growth, etc. Unfortunately, attempts to stimulate the business activity of regional economic agents have not been sufficient. In this regard, there is an increasing need to search for a new paradigm of relations between key sectors of the economic system based on a scientifically based concept, as well as to determine an indicator characterizing the process of interaction between the banking and real sectors of the economy.
The article presents the results of a study of the possibility and expediency of using impact index as an indicator for assessing the interaction process between the banking and real sectors of the economy in individual regions. During the study, this indicator was tested in 8 regions of the Volga region. The article also identifies problems that negatively affect the interaction of two sectors of the economy in the Volga region.

Keywords: banking sector of the economy, real sector of the economy, interaction of the banking and real sectors of the economy, credit activity, regional economy.

I. INTRODUCTION

The growth rate of the national economy is largely associated with the efficient functioning of the banking sector, with the ability of credit institutions to perform their basic functions of accumulation and allocation of funds. Given the acute need for the whole economy of the Russian Federation and its individual regions for investment support of the real sector, it is extremely important to establish close relations and balanced development of the real and banking sectors of the economy [1].

The analysis of the characteristics of the interaction between the banking and real sectors of the Volga region economy showed that the interaction of regional turnovers of financial and credit resources, means of production, and consumer goods is associated not only with financial security of demand and material security of supply but also with an assessment of the effectiveness of manufactured products. The movement of financial resources allows us to evaluate the usefulness of products, exclude unpopular goods from production, and thus regulate the level of efficiency of use of all resources. As a result, the development of new types of industries producing competitive products is stimulated, and the processes of structural adjustment of the regional economy are accelerated.

The need to enhance the participation of banks in the dynamic development of the region stems from the interdependence of the successful development of the banking system and the economy as a whole. On the one hand, commercial banks are interested in a stable economic environment, which is a necessary condition for their activities, and on the other hand, the stability of economic development largely depends on the degree of stability and elasticity of the banking system, its effective functioning. At the same time, since the interests of an individual bank, as a commercial entity, are focused on maximizing profit at an acceptable level of risk, banks participate in financing the economy only if there are favorable conditions [2].

Banks are the triggering mechanism for cash flows in the sectors with the greatest potential. Effective interaction of the banking and real sectors is an essential factor in the development of a market economy [3].

II. METHODS

To calculate the *impact index*, 4 groups of indicators were taken that affect the state of the interaction of the two sectors of the Volga economy (Table 1) [4].

The factors used have both positive and negative effects on impact index, for which different calculation formulas were used (Table 2) [5].

We also developed the magnitude and strength of impact index, presented in Table 3, for the subsequent assignment of the region to a specific group in order to identify patterns of development of the region that will be assigned to the same group [6].

Data for 8 Volga regions were calculated for 4 groups of indicators for two reporting dates (01.01.2017 and 01.01.2018), followed by the calculation of the normalized index. Further, the normalized indices for 4 groups were multiplied by the proposed relative shares on the basis of expert evaluation and displayed in the impact index for 2017 and 2018.

Table 1: Key Impact index indicators.

Economic growth indicators (rel. share - 0.3)	Credit and deposit activity (rel. share - 0.35)	Settlement and cash services (rel. share - 0.20)	Other mediation activities (rel. share - 0.15)
Gross regional product (million rubles)	Loan and deposit portfolios in rubles (thousand rubles)	Payments made (thousand units)	Brokerage activity
Inflation (%)	Loan and deposit portfolios in foreign currency (thousand rubles)	Customer accounts in rubles and foreign currency by credit organizations (thousand rubles)	Dealer activity
Average annual dollar exchange rate (rubles)	Total profit (+) / loss (-) received by existing credit organizations, (million rubles)		Consulting
The number of legal entities in this region (un.)	Overdue debts on loans and other placed funds provided to non-financial organizations (thousand rubles)		Consulting services
The number of open accounts (thousand units)	Overdue debts on loans and other placed funds provided to non-financial organizations in foreign currency (thousand rubles)		Underwriting
	Securities purchased by credit organizations registered in this region		Other

Table 2: Impact index calculation formulas,

For factors with a positive effect on the result	For factors with a negative effect on the result
(Factual value – Minimum) (Maximum – Minimum)	(Minimum – Factual value) (Maximum – Minimum)

Table 3: The magnitude and strength of the impact index coefficient.

Value	Interpretation
0-0.3	Very weak
0.3-0.5	Weak
0.5-0.7	Moderate
0.7-0.9	High
0.9-1	Very high

Table 4: Values of the calculated impact index based on the proposed specific gravities for each group.

Volga regions	2017	2018
Republic of Kalmykia	0.162396	0.162228
Astrakhan region	0.208396	0.212517
Volgograd region	0.279744	0.274097
Republic of Tatarstan	0.797438	0.851498
Penza region	0.215043	0.214685
Samara region	0.565665	0.462796
Saratov region	0.305448	0.298973
Ulyanovsk region	0.225115	0.220118

Table 5: Impact index-based ranking of the Volga regions by groups.

Volga regions	2017	2018	Impact index value
Republic of Tatarstan	0.8	0.9	High
Samara region	0.6	0.5	Moderate
Saratov region	0.3	0.3	Weak
Volgograd region	0.3	0.3	Weak
Ulyanovsk region	0.2	0.2	Very weak
Penza region	0.2	0.2	Very weak
Astrakhan region	0.2	0.2	Very weak
Republic of Kalmykia	0.2	0.2	Very weak

Table 6: Paired coefficient matrix.

	y	x1	x2	x3	x4	x5	x6	x7	x8	x9
y	1									
x1	0.19424	1								
x2	0,879989	0,387385	1							
x3	-0.96559	-0.24632	-0.89936	1						
x4	-0.47255	-0.19824	-0.51	0.488153	1					
x5	-0,55934	-0.31928	-0.62284	0.608283	0.906634	1				
x6	-0.50938	0.091165	-0.4413	0.451852	0.62462	0.398502	1			
x7	-0.0057	-0.20911	-0.18928	0.042893	0.230811	0.36472	-0.15011	1		
x8	0,711665	0.340805	0.778841	-0.77345	-0.3936	-0.57206	-0.23655	-0.19876	1	
x9	-0.24737	-0.21136	-0.33539	0.316086	0.602276	0.740034	0.042346	0.760227	-0.4006	1

III. RESULTS AND DISCUSSION

The data on the results of testing, as well as the ranking of the 8 Volga regions we studied by groups depending on the index value, as well as a graphical image, are presented in Tables 4-5 [7].

It is worth noting that none of the studied regions entered the "very high" category, which indicates the available growth areas even for the leader - Tatarstan, who was torn off from other regions by an average of 2.5 percentage points. Most likely, the results for Tatarstan turned out to be such because of the loss received by existing credit organizations in the amount of 10 billion rubles, as of January 1, 2017.

One region fell into the "medium" category - Samara, which is recommended not only to actively increase the number of open accounts (Samara region is the leader in this indicator) but also to increase its loan portfolio in rubles, which is more likely to lead to an increase in the gross regional product. It is worth noting that the Samara region is a leader in terms of the volume of loans and deposits in foreign currency with a very wide margin from other regions.

Two regions fell into the "weak" category - Saratov and Volgograd, which have an unreasonably high level of overdue debt compared to slightly large volumes of lending. This means that it is necessary to begin to apply effective methods for eliminating overdue debt, and also take measures to prevent its occurrence in such a significant amount.

In order to increase the efficiency of overdue debt management in banking practice, we use the method of constructing forecast series, the method of trending indicators for the future and other methods, this part of the study will use one of these research methods, namely, correlation and regression analysis.

Correlation and regression analysis is the main method in the study of the relationship of phenomena. This method combines two component parts - correlation and regression analysis. Correlation analysis is a quantitative method for determining the tightness and direction of the relationship between sampled variables. Regression analysis is a quantitative method for determining the type of mathematical function in a causal relationship between variables [8].

We have suggested a hypothesis about an increase in the share of overdue debt of the real sector of the Volga region by 10-15% by 2022 compared with the data at the beginning of 2019. Therefore, to determine the impact on the level of arrears of the real sector to the banks of the Volga region, we need to choose factors that affect the presence of arrears. In our opinion, such factors could be:

- the volume of lending to the real sector in the Volga region, million rubles;
- gross regional product of the Volga region, billion rubles;
- the number of credit organizations and bank branches in the Volga region, units;
- weighted average interest rates on loans to the real economy for working capital replenishment (up to 1 year), %;
- weighted average interest rates on loans to the real economy (investment loans - over 3 years), %;
-inflation rate in the country, %;
- key rate of Bank of Russia (refinancing rate), % per annum;
- average monthly nominal accrued wages of employees for a full range of organizations in the constituent entities of the Russian Federation, rubles;
- the number of registered organizations in the region, units.

These factors reflect the realities of the modern Russian economy. For enterprises in the real sector of the economy, an important factor in maintaining demand for credit resources at a constant level is the interest rate on loans from commercial banks offered to enterprises in the non-financial sector. It is known that lending rates are differentiated depending on the industry and the loan term, therefore, to present a complete picture, we analyze interest rates for up to or more than a year [9].

In turn, credit organizations, when assessing the creditworthiness of borrowers - legal entities, evaluate the credit history of enterprises in the real sector, including the level of borrowing of enterprises [10].

In order to study the relationship of the amount of loans extended to enterprises of the real Volga sector to a number of the above factors, we will construct a correlation-regression model of the relationship of the volumes of loans extended to Volga enterprises to the factors that we included in the sample. In order to make the model more visual, we decided to consider the monthly dynamics since 2014.

Calculation of the matrix of pair correlation coefficients gave the results presented in Table 6.

Based on the analysis of the matrix of pair correlation coefficients, several conclusions can be drawn.

According to the Chaddock scale, a weak correlation (from 0.1 to 0.3) is observed in the resulting indicator with the volumes of lending to the real sector in the Volga region, with the key rate of the Bank of Russia, and with the number of registered organizations in the region. A moderate correlation (from 0.3 to 0.5) is observed with average weighted interest rates on loans to the real economy for the replenishment of working capital (up to 1 year) and with inflation in the country. A strong correlation (from 0.7 to 0.9) is observed in the resulting feature with GRP of the Volga region and a very high relationship (from 0.9 to 1) in the resulting indicator with the number of credit organizations and bank branches in the Volga region.

To construct the regression, 3 factors were left - X_3, X_5, and X_6. Based on the obtained calculations, the regression equation is compiled, which has the following form:

$$Y = 9.961802 - 0.0151 * X_3 + 0.039528 * X_5 - 0.21789 * X_6 \tag{1}$$

According to this equation, we determine the direction of influence and the degree of connection between the effective attribute and the factors based on the signs (negative or positive) and regression coefficients (coefficient b).

The analysis of the constructed equation using the R-squared coefficient and the multiple correlation coefficient R showed that the R-squared value also called the measure of certainty, characterizes the quality of the obtained regression line. According to the results of the analysis, the value of the R-square is 0.9416, which allows us to conclude that the regression line is of high quality. This indicator shows the proportion of variance of the dependent variable, explained by the model of dependence under consideration.

Multiple R - multiple correlation coefficient R - expresses the degree of dependence of independent variables (X) and dependent variable (Y). According to the calculation results, the multiple R is equal to 0.9704, that is, the relationship between the variables is very close. The normalized R-square is the R-square adjusted for the number of degrees of freedom (df) equal to 27.

A significance F is equal to 1.64433360789699E-34 and shows that at any reliability levels (90%, 95%, and 99%), the equation as a whole is significant, as the inequality is observed: significance F <(1 - reliability

level/100). P-values, in turn, show us that the parameters of the equation are significant.

Evaluation of the quality of the model according to Student's t-test and Fisher test showed that in our case the significance level will be assumed to be 0.05 (reliability level, respectively, 95%), and the number of degrees of freedom (n-2) is 57, since the analysis used a sample of 60 measurements.

The critical value at α = 0.05 and ν = 57 is t_{cr} (0.05; 57) = 2.002. Let us compare the observed (to modulo) and critical values of Student's t-test to determine the significance of the coefficients of the equation.

Table 7 shows that the factors chosen to build the regression equation and model are significant, that is, the regression coefficients are statistically significant and non-zero.

Table 7: Checking the significance of the regression equation coefficients.

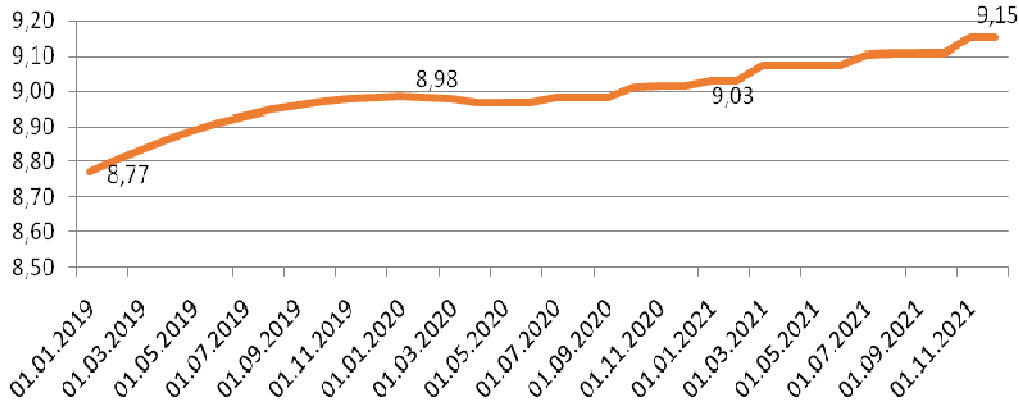| Factor	t_{obs}	t_{cr}	Significance
X_1	-22.57109094	2.002	Significant
X_2	2.68013848	2.002	Significant
X_5	-2.770397161	2.002	Significant
X_6	-22.57109094	2.002	Significant

Fig. 1. The share of overdue debt in loan debt in the Volga region loans to the real sector, %.

Let us check the significance of the determination coefficient using Fisher's test.

The mathematical model of the statistical distribution of F-statistics is the Fisher distribution with v_1 = m-1 = 3-1 =2 and v_2 = N-m = 60-2 = 58 degrees of freedom. The critical value of the F statistics at α = 0,05 and v_1 = 3 and v_2=58 degrees of freedom is F_{cr} (0.05; 2; 58) = 1.64433360789699E-34. F calculated for this statistic was 301.0288. The calculated F is much larger than the critical F, this suggests that the regression equation is statistically significant and the determination coefficient is non-zero, which indicates the adequacy of the model.

At the last stage of the analysis, we forecast the level of overdue debt in the context of the loan debt of the relational sector in the Volga region using the constructed regression equation.

Substituting the forecast data of the factors into the regression equation presented above, we obtain the forecast data on the share of overdue loans in the Volga region loans to the real sector over the next 3 years, which are graphically presented in Fig. 1.

Considering that in January 2019 the share of overdue loans amounted to 9.3%, then comparing the factual figure with that in Figure 1 in January 2019, we can see approximate accuracy (the difference between them is 5.6%), which, taking into account the obtained value according to the results of regression statistics, the R-square of 94.16% gives such an error. That is, in fact, we can say that the significance of the constructed model is accurate at 94.16% and these three factors affect such accuracy, and 5.84% of the changes in the share of overdue loans in Volga loans to the real sector may be caused by other factors not considered in the model.

IV. SUMMARY

Summing up the results of this analysis, we can conclude that the change in the share of overdue loans in real sector loans in the Volga region depends on a large number of banking and non-banking factors. Thanks to the analysis, it is possible to calculate how changes in each of the presented factors will affect the share of overdue loans in loan debt in the Volga region and to predict the value of the effective indicator for various values.

Thus, this part of the study applied methods of the mathematical apparatus, which would make it possible to control the share of overdue loans in loans from the real sector of the Volga region and determine the forecast values of this indicator. Similarly to this model, we can see the development of other economic zones of the real sector of the economy, with the addition of a model of other factors of a narrow-segment nature.

V. CONCLUSION

Thus, in modern conditions, to ensure the sustainable and harmonious development of the regions and the effective functioning of the regional banking capital market, we should consider regional differences in the structure of production and the investment attractiveness of the region. In addition, the formation of a set of macroeconomic conditions, including the normalization of monetary circulation, is extremely important; the formation of credit mechanisms for production and lower interest rates; deployment of a system of active development institutions, primarily banking; and optimization of taxation of production and investment activities.

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