

Assessing and predicting regional investment attractiveness

Posudzovanie a predvídanie záujmu o investície v regiónoch Ruska

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Abstrakt

Hospodársky rast v tomto regióne je sprevádzaný rozvojom v investičnej oblasti. Predvídanie investičného prostredia v regióne - je možnosťou regulovania jej rozvoja. Článok predstavuje metodiku pre hodnotenie a prognózu investičných ukazovateľov, ktoré dávajú možnosť riadenia investičného procesu v súčasnosti a v budúcnosti.

Kľúčové slová

investičné atraktivity, investičné potenciál, investičné riziko, hodnotenie, predikcia, dvoj-faktorový model

Abstract

Economic growth in the region must be accompanied by the development of investment sphere. Prediction of the investment climate of the region - is an opportunity to regulate its development. In the article presents a methodology to assess and forecast investment indicators, which gives the opportunity management of the investment process in the current time and in the future.

Key words

investment attractiveness, investment potential, investment risk, assessment, prediction, two-factor model.

Introduction

In our opinion, in aggregate the concepts forming a condition of investment sphere, or the investment environment of economy, a backbone category is investment attractiveness of the country as a whole, region, branch, the enterprise or corporation.

Investment attractiveness of the country, region etc. is a system or combination of various objective signs, means, the possibilities, causing potential demand for the investments into country, region, branch, enterprise (corporation).

Level of investment attractiveness of the country, region, branch, the enterprise consists of two components - level of investment potential and level of nonspecific (noncommercial) investment risks.

The investment potential which is formed by number of economic, social and geographical factors does not cause special questions. This is impossible to tell about investment risks. Sometimes such risks are unfairly treated broad, including all elements of investment potential.

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In a general view investment risks can be defined as possibility or probability of full or partial non achievement of results of investments realization planned by participants of the investment project.

It is obvious that the complex quantitative estimation of current investment attractiveness of regions can be conducted only by means of a summary, integrated indicator which is formed by set of the private factorial signs measured by corresponding indicators.

Material and methods

Relevance of research topic stems from the need to develop an investment policy in the region corresponding to the favorable investment environment and economic growth. Improving the methodology of the study is needed to develop recommendations to improve the investment environment and forecasts of its condition to determine the optimal interaction between the participants in the investment process.

The problem of formation of favorable investment environment is also acutely and for the reason that there is no optimal methodology for its study. In addition, during the crisis the economy of country, investment policy is a priority.

The methodological framework is the research by Russian and foreign specialists in managing the investment process, as well as the laws of the Russian Federation, the governing investment relations. We use the results of research and practical work of the author, as well as the official statistical material bodies, data on the dynamics of the investment process and the main economic indicators in Russia and abroad. In addition, the study contains materials of major domestic and foreign journals.

We suggest using a technique of an estimation of investment attractiveness of region which reflects both positive and negative characteristics of regions. The given technique is based on definition of a complex indicator of investment attractiveness, on the basis of calculation of potential investment level and level of regional investment risk. The offered technique is finished and improved. The given technique gives complex representation about a condition of an investment environment in region as a result on the basis of concrete values of an indicator of investment attractiveness.

We offer approximate structure of investment-significant indicators for definition of integrated level of Stavropol Territory investment potential (table 1).

As has shown the analysis, the most well-founded method of association of diverse private indicators of investment potential of regions in integrated indicators is the method with use of the formula multi-dimensional medium, widely applied in regional economic researches.

Diverse private indicators of investment potential should be comparable; procedure of preliminary standardization of their values therefore is used. This procedure is made with the aid of the reference of the numerical value of each private parameter of the given region to value of a standard deviation of the given number. As a result all regional indicators will be transformed to the standardized regional indicators, i.e. dimensionless relative sizes.

Table 1. Approximate structure of factors for an estimation of investment potential of region.

№	Indicator	Weight factor
1	Total regional product, million rbl.	10
2	Industrial production index, in % to previous year	9
3	Agriculture production, million rbl.	7

4	Density of highways with a hard covering, km on 1000 sq. km of territory	1
5	Density of telephone sets on 100 persons, units	1
6	Volume of executed works by the form activity "Building", million rbl.	6
7	Turn of retail trade, million rbl.	6
8	Volume of paid services to the population, million rbl.	6
10	Turn of small enterprises, million rbl.	5
11	Investments into a fixed capital, million rbl.	10
13	Monetary incomes of the population on the person, in a month, rubles	7
14	Population with incomes below a vital minimum, in % to all population	5
15	Mid-annual number of economically active population, thousand persons	3
16	Rate of unemployment (on the IOW), %	6
17	Emissions of polluting substances in atmosphere, thousand tons	3
18	Commissioning of apartment houses, thousand sq. m of a total area	5
19	Foreign investments, thousand US dollar	6
20	Number of the registered crimes, units on 100 thousand persons	4

Calculation of an integrated indicator of investment potential of regions is made under the formula of multi-dimensional medium (the formula 1).

$$X_{it}^{Pot} = \frac{\sum_{s=1}^n X_{sit}^{Pot} \times k_{st}^{Pot}}{\sum_{s=1}^n k_{st}^{Pot}}, \quad (1)$$

where X_{it}^{Pot} - integrated indicator of investment potential in t-th year of i-th region; k_{st}^{Pot} - weight factor of the importance of s-th private indicator of investment potential in t-th year; n - quantity of the standardized private indicators carried to factors of formation of integrated level of investment potential of regions; t - quantity of years of the studied period; s - quantity of private indicators; X_{sit}^{Pot} - value of s-th private standardized indicator of i-th region in t-th year.

For definition of weight factors (table 1), we range private indicators on importance degree, in view of that indicators of social and economic and ecological safety have a return orientation (we accept them with a sign "minus").

On the basis of the given technique we have calculated indicators of investment potential of Stavropol Territory for 2000 – 2009 years.

The technique offered by us is based on definition of investment attractiveness value of region on the basis of value of a potential investment indicator and the average index of investment risk.

Calculation of total indicator of regional investment attractiveness is made under the formula 2:

$$Y = X_1 * 1/X_2 \quad (2)$$

where Y – integrated indicator of investment attractiveness of region; X_1 - integrated indicator of investment potential; X_2 - average index of investment risk of region.

In this case we deal with correlation dependence.

At a following stage we have defined the weighted index of regional investment risk (according to rating agency «Expert RA»). Applying the received values of integrated

indicators of investment potential and the weighted average investment risk index, we have received integrated indicators of investment attractiveness of Stavropol Territory.

Obtained the results of the study values of the potential investment indicators, investment risk and investment attractiveness are presented in Table 2.

According to the table, we can conclude, that the investment attractiveness, as a result factor analysis, has a general tendency to increase. However, we can note the periods, when the value of investment attractiveness of the Stavropol Territory was reduced compared with the previous year: 2004 and 2009. In the first case this is connected with an increase in investment risk in this period compared to the previous, and in the second - with the decline in investment potential in 2009 compared with 2008 and an increase in investment risk in the region.

Table 2. The results of the estimation of the investment attractiveness of the Stavropol Territory (2000 - 2009 years)

years	Investment potential, X_1	Investment risk, X_2	Investment attractiveness, Y
2000	3,32	0,935	3,55
2001	3,45	0,920	3,75
2002	3,52	0,930	3,78
2003	3,85	0,950	4,05
2004	3,90	1,110	3,51
2005	4,29	1,037	4,14
2006	4,49	0,990	4,54
2007	5,07	0,936	5,42
2008	5,47	0,889	6,15
2009	5,34	0,914	5,84

Analyzing the results of the research can be noted, that the investment attractiveness is depend on the investment potential and risk of Stavropol Territory. Thus, we have reflected this dependence by the model, based on which possible forecasting of index of investment attractiveness.

The most acceptable for the analysis appears a two-factor model in the form of production function showing the dependence of the investment attractiveness of the Stavropol Territory on two factors: the investment potential and risk:

$$Y_t = X_{1t}^a \times X_{2t}^b, \text{ где} \quad (3)$$

где Y_t – investment attractiveness of the region in the period t ;

X_{1t}^a – investment potential of the region in the period t ;

X_{2t}^b – investment risk of the region in the period t .

a – characterizes the elasticity of investment attractiveness on the investment potential, or shows the gain of an indicator on unit of a gain of the factor;

b – characterizes the elasticity of investment attractiveness on the investment risk;

a and b – are estimates.

With the linearization of the nonlinear dependence based on the logarithmic differentiation of the production function can be expressed as follows.

$$Y_t = a * X_{1t} + b * X_{2t} \quad (4)$$

Depending on the value of the amount of parameters we can have three types of growth.

1. The expression $a + b > 1$ means that if the factors are increasing in n times, then the resultant indicator will be increase by more than n times.
2. The expression $a + b < 1$ means that the investment attractiveness increases more slowly compared with the growth of factors. This reduces their total efficiency and occurs decrease the growth.
3. The expression $a + b = 1$ means that the resultant indicator increases in proportionally factors.

Results and discussion

Using regression analysis, we identified the variables of the equation, which can be expressed as follows:

$$Y_t = 3,768 + 1,096 * X_{1t} - 4,138 * X_{2t} . \quad (5)$$

Since the coefficient of the investment risk factor is negative, then the original equation, too, should be corrected:

$$Y_t = X_{1t}^a \times \frac{1}{X_{2t}^b} \quad (6)$$

Two-factor regression model is characterized by very high coefficient of pair correlation - 0.999, indicating the close relationship between indicators of investment potential, risk and investment attractiveness of the region. The coefficient of determination of the pair shows that the indicators of the investment potential and risk allow explain for 99.8% variation by the resultant indicator investment attractiveness. In addition, we examined the F-test, which is equal to 2248, indicating the statistical significance of the equation. The significance of this criterion is maximum, because the probability of error is less than the critical value of 0,001.

In the case of a linear model we estimate the average error approximation, it is minimal - 0,63 %. Consequently, the obtained parameters of the equation are statistically significant.

The coefficient a of this equation shows that if the level of investment potential changes by 1 unit, the level of investment attractiveness increases for 1,096 units. The coefficient b of characterizes the feedback, that is, an increase in the value weighted index of investment risk by 1 unit, the indicator of investment attractiveness will decrease by 4.138 units.

Initially, the basis for forecasting investment growth, we used a production function, so we need to apply the calculated parameters of a linear equation to the original equation. However, due to linearization errors can occur in the estimation of parameters of the equation - the degrees of factors. To avoid this, we adjusted the calculated parameters of a linear equation on the coefficient of statistical linearization, which is calculated for each parameter as follows:

$$K_n = \pm (\sigma_Y / \sigma_X) , \quad (7)$$

where σ_Y - standard deviation of the resultant indicator (investment attractiveness); σ_X - standard deviation of factor (the investment potential or investment risk, depending on which parameter we adjust).

The coefficient of linearization for the first parameter of investment potential is equal to 0.813, respectively; the parameter for a given factor is equal to 0,891. The coefficient of linearization for the second parameter of the investment risk is equal to 0,068, respectively; the parameter for a given factor is equal to 0.282.

As a result, we obtain the following nonlinear model for predicting the investment environment of the region:

$$Y = X_1^{0.891} \times \frac{1}{X_2^{0.282}} \quad (8)$$

The average error of approximation in this equation acceptable - 16.88%.

Thus, we have two models to predict the investment environment in the Stavropol Territory.

Prediction of the investment status of the region is one of the main directions of state policy, oriented by economic growth. As a result of forecasting the investment environment in the region becomes possible to provide adjustments in the plans of the socio-economic development, as well as identify trends in the regional economy. As noted above, we research the indicator of investment attractiveness of the region, which characterizes the investment environment of the region, since it takes into account the influence of basic socio-economic indicators.

Table 3. Forecast major investment indicators of the Stavropol Territory in 2011 – 2012.

Indicator		2011	2012
Investment potential		4,98	5,20
Investment risk		0,9636	0,9633
<i>Investment attractiveness</i>	<i>linear model</i>	5,24	5,48
	<i>nonlinear model</i>	4,22	4,39

To predict the state of the investment environment of the Stavropol Territory is necessary to determine the forecast value of the investment potential and investment risk.

According to official data of the Ministry of Economic Development of the Stavropol Territory about the predictive values of basic socio-economic indicators of the region, we identified the forecast values of the investment potential of the region in 2011 – 2012, using the methodology described above (Table 3).

Predicted value of the weighted index of Stavropol Territory investment risk, we have calculated on the basis of a weighted moving average (Table 3).

In order to receive forecast indicators of investment attractiveness of the Stavropol Territory in 2011 - 2012 GG is necessary substitute in equation (5) and (8) calculated predicted value of the investment potential and investment risk (Table 3).

Conclusions

We can observe the decrease of forecasting value of the investment potential and the increase value of the investment risk of the region in 2011 - 2012 GG compared with their actual values in 2009. Accordingly, the results predict the investment attractiveness of the Stavropol Territory is also unsatisfactory in both cases. This trend is attributable to the reduction of forecast indicators of socio-economic development of the region according to the data of the Ministry of Economic Development, which form the level of investment potential. In addition, analyzing the levels of investment risk of the region for research period, it becomes clear that its decline in 2011 – 2012 years unlikely to happen.

The lack of dynamic economic growth in the long term also explained by the economic crisis, which accompanied by a decrease major positive socio-economic indicators, and in this regard and increases the investment risk for investors. It is therefore necessary to consider both options of development - according to the linear and nonlinear models. However,

preference is given to forecasting based on linear model, since the error of approximation in it is much lower.

Recommendations to create a favorable investment environment in the Stavropol Territory in the circumstances are the following directions:

1. Increased state regulation of major socio-economic indicators, aimed at improving their values;

2. Carrying out activities related to attracting investors to cooperate, then there is an increase of inflows to the region that will enhance its attractiveness;

3. Reducing investment risk in the region, which can be achieved provided reducing the political, economic and other risks, with the help of public policies aimed at economic growth in the region;

4. Attracting additional funding from the federal government for stabilize and strengthen the financial and economic situation in the region, aimed at the development of priority sectors of the regional economy.

Thus, the application of this approach makes it possible to predict the investment environment regions in the future. In addition, it allows you to track and adjust based on the calculated outcome integral indicators forecast initial parameters prediction. This opens up new opportunities for state regulation of the investment conditions in the region, relying on a perspective analysis. That is, prediction of the investment environment is not only a goal but a means to achieve goals.

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