

## Foreign Economic and Interregional Relations of the Russian Federation Subjects (The Case of the Tatarstan Republic): Analysis and Predictions

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**Abstract:** This article describes the role and place of the Russian Federation (The Tatarstan Republic) in the economic and interregional relations in the context of globalization of economic processes. The authors analyze the indicators pointing to an effective management of foreign economic and interregional relations of the Federation and offer a model of forecasting the development of interregional cooperation relations based on the regression method.

**Key words:** Region • Cooperation • Globalization • Foreign economic relations • Inter-regional cooperation • Regression forecasting method

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### INTRODUCTION

In modern conditions the subjects of the Russian Federation are increasingly enter the foreign goods and services markets. This leads to the positioning of the region as more significant categories of subjects of international economic relations, operating in the global market. This phenomenon is consistent with the overall global development, when the external economic relations of the regions are becoming increasingly important factors for sustainable development of the national economy. In this case the decisive role is played by the competitive ability of Russian market players, which determines the external economic potential of the national economy as a whole.

Overcoming of these negative effects, accelerating the process of modernization of the Russian economy and its subsequent gradual development are not possible without applying external economic activity at the regional level. In the post-Soviet period, with in-depth market reforms implementations all the Russian regions got direct access to foreign markets and the opportunity to develop foreign economic relations by themselves. The basic forms of these relations -the foreign trade and investment cooperation - were key factors in economic development of the country and its regions. Their role in the economy diversification increases, which brings to re-equipment and modernization of the industry, creating new industries, including high technology, the

implementation of competitive products and etc. Russian regions differently incorporated into the world economy. This is due to their transport and geographical location, the state of natural resources, the structure of the economy, the historical course of development and many other factors. The results of regions foreign trade contribute to improvement of the economy of the Russian regions and the country as a whole, the development of productive forces and improvement of internal farm proportions.

### RESULTS

In the aspect of these factors the Tatarstan Republic is one of the most dynamic regions of the Russian Federation, which have a strong export potential. The Tatarstan Republic produces about 7% of Russia's oil, more than 30% of trucks, over 40% of synthetic rubber, 52% polyethylene and 5% of total agricultural production of the country. Developed transport infrastructure, raw materials, qualified human resources give the country competitive advantage, prejudging participation in international and foreign economic relations to promote the growth of economy and trade, investment, information exchange and strengthening cultural relations and support of its compatriots. The analysis of the competitive advantages of the region is very important in terms of determining the place of Russia, its regions in the international division of labor.

Benefits of transport and geography position largely facilitate the active participation of Tatarstan in the transcontinental cooperation with other regions and countries. At the moment, the country is a crossroads of several corridors of international importance.

In 2011 foreign trade (WTO) of the Republic was 25.2 billion U.S. dollars, which is 28.8% higher than in 2010. The volume of national exports was 21.9 billion U.S. dollars, import - 3.3 billion U.S. dollars. Positive trade balance of Republic in 2011 was the \$ 18.6 billion U.S. dollars against 14.4 billion U.S. dollars in 2010. In the structure of the WTO on the basis of the total in 2011 the share of exports accounted for 86.9%, import - 13.1%.

Exports to major trading partners of the Tatarstan Republic is represented mainly by the supply of crude oil (65.9% of the value of exports in 2011.), Oil products (12.3%), chemical products (11.3%). Major consumers countries of republic exports in 2011.: Poland - 18.4%, Italy - 14.1%, Germany - 7.7%, the Netherlands - 7.6%, Hungary - 4.7%, Slovakia - 4.0%, Latvia - 3.9%, Croatia - 2.5%, Spain 1.8%.

There are large number of engineering products in the structure of import - in 2011 it accounted for 71.5% of total imports. At the end of 2011 on the share of five countries - the major importers of the Republic of Tatarstan - accounted for almost half the volume of imports to the Republic (Germany -20.7% of national import, Italy - 9.9%, Turkey - 7.0%, China - 6.6%, France - 5.1%). Export quota is just over 30%.

Tatarstan, developing the idea of a «Tatarstan model», seeks to fix in the public mind and in the international practice established between the federal center and the regions, the unique format of relations, including in promoting the interests of the region, the resolution of conflicts between the federal center and the regions, etc. There is Russia's largest special economic zone "Alabuga" in the republic, four industrial parks, a technopolis, 14 technoparks, etc.

On the base of abovementioned we can say that Tatarstan can be considered as a model of the Russian economy organization, inter-regional and foreign economic cooperation. Industrial structure with high raw material component (the main branches in Tatarstan are mainly chemical, petrochemical and engineering industries), with powerful raw material processing and developing engineering, transit transport location areas traditionally strong connected with the regions, with countries both of Europe and Asia - all this brings together the best Russia and Tatarstan processes of socio-economic development. So we have a basis for disseminating the findings based on the analysis of

Tatarstan, on the national situation and vice versa. In order to establish effectively the subjects of foreign economic relations and to form foreign policy of the country as a whole it's necessary to develop mutually beneficial inter-relationships within the country on the basis of cooperation. Only such form of cooperation is the most promising, it allows to strengthen economic and trade relations between the regions and to produce competitive products for export markets. On this basis, in order to achieve these objectives, the trade and economic cooperation of the regions must grow through its specialization.

Thus, it's important to analyze the degree of importance and impact of the specialization in the development of interregional cooperation ties of Tatarstan defining, in turn, the development of its export potential.

As one of the possible methodological approaches for this task and also to develop predictive models of interregional cooperation ties regression method of forecasting can be used. As the independent variables of the linear regression equation we will take the index of investment return (IIR) of the basic branches of Tatarstan - chemical - petrochemical and machine-building. This index is one of the key indicators pointing to an effective model of government intercooperation bonds management of region as a whole and in individual sectors. The index is based on the use of information on cash flows (investments) in fixed assets by economic activity and production of shipped goods, works and services on its own (without the VAT, excise duties and other similar payments) on «clean» activities in the Republic of Tatarstan for the period from 2000 to 2011. So, as to produce reliable and fairly accurate measures of correlation it's necessary to have a larger set of observations. Investment return is found by dividing total shipped goods of engineering- chemical - petrochemical companies' industries by the amount of investment in fixed capital of respective areas. The following independent variables of the linear regression equation are the investment returns of money to engineering, chemical and petrochemical industry of the Russian Federation over the same period.

The necessity of taking into account of this factor should be the evaluation of the role and place of the Republic competitors in the domestic market. The index of investment return on Russia is calculated on the same formula as in Tatarstan. In order to use the regression forecasting method and to set up its equation, we consider the data on inter-regional trade (IRT) of the Tatarstan Republic from 2000 to 2011.

Table 1: Indexes of multiple regression analysis

$x_1$	34,6	37,7	26,0	47,3	51,4	51,8	24,1	10,3	17,5	24,2	42,6	23,5
$x_2$	7,5	7,2	10,3	8,1	6,6	6,1	5,0	4,9	4,1	2,6	3,3	6,2
$x_3$	47,6	52,9	48,2	53,3	53,1	26,7	24,7	19,4	15,3	11,9	15,9	19,2
$x_4$	7,2	6,2	6,1	6,4	6,2	25,4	20,8	11,7	13,3	11,9	14,9	14,6
$Y$	63,4	82,3	72,3	94,4	98,1	124,8	63,7	238,6	299,4	233,9	312,8	385,5

To set up a linear regression equation let's reduce to a single table (Table 1) factors affecting the annual turnover of the Republic of Tatarstan with the Federation subjects. Where,  $x_1$ ,  $x_2$  - the investment return rate of investment in machinery and the investment rate of return of investments in the chemical and petrochemical industry of Tatarstan respectively  $x_3$ ,  $x_4$  - investment rate of return of investment in machinery and investment rate of return of investments in the chemical and petrochemical industry in the Russian Federation, respectively, for the period from 2000 to 2011,  $Y$  - the amount of inter-regional trade of the Republic of Tatarstan.

According to the table, the situation in Tatarstan is as follows: the value of the indexes of the investment returns of money in the engineering industry is significantly higher than the investment returns indexes of investments in the chemical and petrochemical industry. But if you look at the structure of investment by industry, investment in the engineering industry is about 2% and the share of investments directed to the development of the petrochemical industry, each year is about 30%. This dominance of investment return rate of engineering industry due to the fact that the market prices of products in this industry are quite high, because it is competitive and has a demand in the market. Therefore, we can say that this industry for Tatarstan is the most promising and cost-effective.

The trend of investment returns of money in the chemical and petrochemical industry is more stable and has a positive trend at the end of the research. While the trend rate of investment return in engineering is oscillatory with deep amplitude of instability that characterizes instability of the industry development. In our view it indicates a lack of strategic development plans, both of individual industries and interregional cooperation ties. Although this tool (planning) would solve the systemic problem of the industry and ensure the dynamic development of engineering (machinery, equipment and vehicles) in long term. The same picture is regarded with the investments in the relevant industry in Russia. However, it must be said that recent years the difference between the investment return indexes is low and, in general, decreases not only the level but also the growth rate of investment return of these two industries.

If you look at the indexes dynamic of investment returns, it is possible to compare and draw conclusions (Figure 1).

Firstly, this picture illustrates the reduction of the investment returns indexes in the structural industries of the Tatarstan Republic and the Russian Federation, respectively, relatively to the beginning of the research, except the petrochemical industry in Russia.

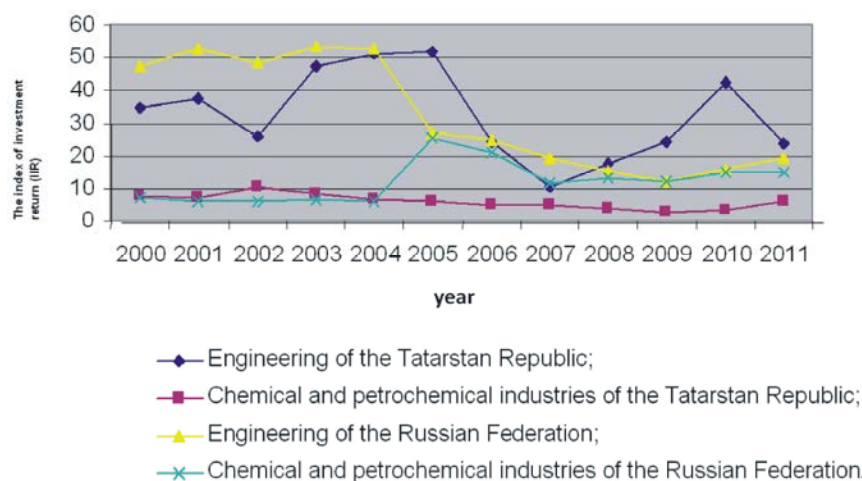


Fig. 1: The dynamic of the investment return indexes in the industries in the Russian Federation and the Tatarstan Republic for the period of 2000-2011 years.

Secondly, the competitor in the petrochemical industry significantly dominate Tatarstan manufacturers of similar industry, which could lead to an exclusion of their products from the market.

Thirdly, Tatarstan engineering production retains its leadership in the domestic market. Therefore Tatarstan public authorities should develop a strategic plan for development and create conditions for attracting domestic and foreign investment to the sector to stabilize it.

Thus, we have identified the internal and external factors of influence, which, in our opinion, to the greatest extent characterize the object of study.

Further, the functional dependence between and the factors  $Y$  and  $x_1, x_2, x_3, x_4$  can be described by a linear multiple regression model:

$$Y = a_0 + a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4 + u \quad (1)$$

where  $a_0, a_1, a_2, a_3, a_4$  indexes, independent of the time -  $u$  - the random error, dependent of time and independent explicitly on,  $x_1, x_2, x_3, x_4$ . It is supposed that the effect of the variable  $u$  is random and it is assumed that it has a normal law distribution. To determine the parameters of equation  $a_0, a_1, a_2, a_3, a_4$  (1), we use the observations of variables  $Y, x_1, x_2, x_3, x_4$  from Table 1. The required parameter values where received  $a_i$ ,

where  $i = 0, 1, 2, 3, 4$ .

$$a_0 = 471.9, a_1 = 4.2, a_2 = 29.1, a_3 = -13.5, a_4 = -14.3$$

Thus, the final interregional dependence of Tatarstan Republic trade from above mentioned factors in a linear multiple regression equation is:

$$\hat{Y}_t = 471.9 + 4.2x_1 + 29.1x_2 - 13.5x_3 - 14.3x_4 \quad (2)$$

The received econometric equation shows that with increasing of the investment index of return of investing in the chemical, petrochemical and engineering industries Tatarstan's total volume of trade increases and vice versa. The larger the value of the regression index, the greater the effect of the explanatory variable on the dependent variable. In this case, the magnitude of the regression index  $a_2$  is greater than the value of the index  $a_1$ , therefore, chemical and petrochemical industry of the republic has the great impact on the total volume of interregional trade volume, despite the high index rate of investment return for mechanical engineering. About the same degree

positively affects the competitors' position. The lower level of the selected industries in the region, the better it affects the amount of interregional trade in Tatarstan.

To quantify the specified output let's define private elasticity's indexes, which are defined as follows:

$$E_i = a_i \frac{\bar{x}_i}{\bar{y}}, \text{ где } i = 1, 2, 3, 4; n = 1, 2, 3, \dots, 12; \text{ Then}$$

$$E_1 = a_1 \frac{\bar{x}_1}{\bar{y}} = 4.2 \frac{32.58}{172.43} = 0.79\%; E_2 = a_2 \frac{\bar{x}_2}{\bar{y}} = 29.1 \frac{5.99}{172.43} = 1.01\% ;$$

$$E_3 = a_3 \frac{\bar{x}_3}{\bar{y}} = -13.5 \frac{32.35}{172.43} = -2.53\%; E_4 = a_4 \frac{\bar{x}_4}{\bar{y}} = -14.3 \frac{12.06}{172.43} = -1.00\%$$

Analysis of the received results confirms the abovementioned, that the greater impact on the total volume of interregional trade volume of investment returns has the petrochemical industry. Thus, in particular, increasing the investment index of return petrochemical to 1% of interregional trade volume is increased by 1.01%. At the same time, the growth of investment index of investing return in the engineering industry in the Russian Federation to the amount of 1% of interregional trade is reduced by 2.53%. Let's conduct a test of hypotheses relatively to regression equation indexes (checking relevant parameters of multiple regression equations):

- Assessment of the statistical significance of the regression equation indexes  $a_i$  for the Student's t-test. Thus, the significance  $a_1 = 4.2$  is 89.2%,  $a_2 = 29.1 - 83.1\%$ ,  $a_3 = 13.5 - 99.2\%$ ,  $a_4 = 14.3 - 97.1\%$ . This implies that the statistical significance of the indexes of the regression equation  $a_i$  is confirmed. In other words, all the parameters are statistically highly significant.
- The tightness of factors joint influence on the results evaluates the index of multiple correlation. In our case,  $R = 0.8985$ , therefore, the relationship between sign  $Y$  and factors  $X$  is strong enough. Determination index  $R^2 = 2.9^2 = 0.81$ . In other words, in 81% of cases, the changes  $X$  lead to a change in  $Y$ . That means that the accuracy of the regression equation selecting - is quite high.

Furthermore, the real process validation of the entire model using F-test Fisher. The calculation showed that the regression model is relevant and reliable on 93.5% and can be used to predict interregional cooperation relations of the Tatarstan Republic. Now form the correlation matrix and define tightness value of these factors connection.

	y	x <sub>1</sub>	x <sub>2</sub>	x <sub>3</sub>	x <sub>4</sub>
y	1	-0,4	-0,6	-0,8	0,3
x <sub>1</sub>		1	0,3	0,5	-0,01
x <sub>2</sub>			1	0,8	-0,5
x <sub>3</sub>				1	0,7
x <sub>4</sub>					1

Analysis of the first row of this matrix let us make a factor variables selection that can be included into a model of multiple correlation. Factor features which are  $|r_{x_j, x_k}| \leq 0.5$  excluded from the model. In our case, the element of the matrix is  $a_{14} \leq 0.5$ . For this case we can form a linear regression equation with  $x_1, x_2, x_3$  parameters.

It has the following form:  $\hat{Y}_t = 318.3 + 0.3x_1 + 6.5x_2 - 6.1x_3$

Analysis of the regression equation parameters shows that the statistical significance of the coefficients for the Student's t-test is too small, exactly:

$$a_1 - 9.6\%, a_2 - 21.5, a_3 - 89.1\%$$

Therefore, the statistical significance of regression coefficients  $a_1, a_2$  is not confirmed. Furthermore, the equation significance by Fisher is  $F = 79.4\%$ , which illustrates the unreliability of the model.

Determination coefficient  $R^2 = 0.8^2 = 0.64$ . Consequently, the factor coverage is only 64%, which reduces the accuracy of the model. In other words, the selection accuracy of the regression equation is quite low and it can not be used to predict the interregional cooperation ties of the subject.

Thus, using the regression forecasting method the regression model was created, depending on four factors  $x_1, x_2, x_3, x_4$ . Based on the correlation analysis the significance of the model was evaluated and determined the degree of tightness of the coefficients connection.

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