SOME MACROECONOMIC FEATURES OF RUSSIA AS AN EXTERNAL ENVIRONMENT FOR ACTIVITIES OF COMPANIES

Shanygin Sergey
St. Petersburg State University, 7/9 Universitetskaya nab., St. Petersburg, 199034 Russia

Zuga Ekaterina
St. Petersburg State University, 7/9 Universitetskaya nab., St. Petersburg, 199034 Russia

Abstract

The industry and regional features of the Russian Federation are considered from the point of view of strategic management of companies operating on its territory. Relationships between the macroeconomic indicators presented in wide access were statistically analyzed; models of the relationship between them were developed. Partial assumptions about the reasons for the current economic situation in the country were made.

Keywords: labor force, gross domestic product (GDP), wage, labor productivity

JEL code: J21, O11

Introduction

In the context of the globalization of the world economy, and the development of the cross-country division of labor and the corresponding transformation of many markets, the problems of assessing the actual properties of company's external environment, national characteristics and trends of change come to the fore in the strategic management of companies. This is especially true for large transnational corporations and interstate unions, whose economic mechanisms function with a significant structural heterogeneity and different directions of development of constituent parts. In order to form these estimates it is expedient to use the official statistical reporting of countries submitted to wide access as a part of international agreements.

A large number of scientific papers of Russian and foreign authors are devoted to the study of the external environment and the problems of managing companies. In particular, in the paper, written by Vertakova and Plotnikov (2016), relationship of innovative and industrial development of the countries in a post crisis (2008) period and state regulation of economy was considered. It was established that the developed innovative potential significantly contributes to the stability of the economy during the crisis; authors suggested ways to stimulate the development of industrial production in the post-crisis period. In articles on labor force (see Hipple, 2016; Aaronson and et al, 2014), the dynamics of the volume and structure of employees of companies was analyzed, it was concluded that in the last 15-16 years there was a decrease in the number of people working in the USA, to a greater extent - teenagers and persons without higher education; forecast of changes in the labor market situation was made. In the paper of E. Bartelsman, J. Haltiwanger, S. Scarpetta (2013) the problems of estimating labor productivity were investigated, a comparative analysis of country differences and industry features was conducted, an appropriate mathematical tool was proposed, and a conclusion was made about the existence of a relationship between the volume of industry production and labor productivity.

The problems of estimating the gross domestic product (GDP) of some countries and correlating its size with labor productivity were examined; the specifics of the taxation of individual

sections of the Russian economy and their impact on the GDP amount were analyzed (see Amaral, 2009; Desai, 2006; Feldstein, 2017). A statistical analysis of the results of BRICS cooperation in the energy sector was carried out by Bogdanova and et al (2017), the directions of its development were forecasted, and corresponding statistical indicators were proposed. In articles of A.V. Vorontsovsky, L.F. Vyunenko (2016) and B. Sokolov (2016), separate tools for studying the economy were proposed, in particular, taking into account the influence of uncertainties and risks on its development and formalized approaches to improving control over the dynamics of the structure of complex systems. However, the above-mentioned and other published scientific research do not cover all problems of assessing the parameters and the influence of the external environment of companies on their activities and determine the urgency of continuing the study of this field.

Vorontsovsky and Yefimova (2016) also investigates criteria of national economies reference to the standard types, analyses development of economically successful countries and mark out their particular qualities. They consider ratios between separate macroeconomic indicators and parameters of economy openness and characterize influence of the size of economy on its type. Lyakin's article (2018) analyzes the development scenarios of three economic crises in Russia in the last 18-20 years. Author reveals the uniformity of events sequences and the materiality of the oil prices. The research identifies the Russian "technological" specifics of crises, the scheme of interrelations and interference of events. In research by Gorbacheva (2018) issues on the organization of public-private partnership is considered in the framework of the emerging global trends. She analyzes the technology of the implementation of large projects of this type, highlighting the features of the interaction of their participants. A technique based on the Gini coefficient for formalized degree of unevenness of benefits assessment for the partnership participants could be found in mentioned research, as well as the results of its testing using the example of organizing a new production in the city of Novosibirsk.

The official macroeconomic data of the Federal State Statistics Service (Russian Federation) were used for this research (Federal State…). At the same time, data on the Republic of Crimea and the city of Sevastopol were not taken into account to ensure statistical homogeneity of information. Moscow and St. Petersburg - the anomalies for their federal districts - were not excluded from the analysis in order to identify the actual situation in the country. For grouping of economic sectors the All-Russian Classifier of Economic Activities (in Russian - *OKVED*) was used: Section A - Agriculture, hunting and forestry; Section B - Fishing; Section C - Mining and quarrying; Section D - Manufacturing; Section E - Electricity, gas and water supply; Section F - Construction; Section G - Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods; Section H - Hotels and restaurants; Section I - Transport and communications; Section K - Real estate, renting and business activities.

The impact of the labor force on the amount of gross domestic product

According to theoretical general economic laws, the mechanisms for production the GDP of the state determine its direct dependence on the volume, productivity and quality of labor of its population. So, it can be assumed that there should be correlation (regression) between the average annual number of labor force (AANLF) and GDP, possibly different for different regions of the country. Therefore a relatively significant change of the AANLF, as the equivalent of the potential total number of employees in companies in a given region, should lead to a similar change in its Gross Regional Product (GRP). We test this hypothesis whether it is true or false in relation to the Russian Federation, which is large and geographically extended country and consists of eight federal districts (FD) administratively. Figure 1 shows the scatter diagram for these variables, the

independent variable is AANLF, the dependent variable is the GDP of the Russian Federation at constant prices in 2003.

$$y = 5{,}826\mathrm{e}^{0{,}0001x}$$
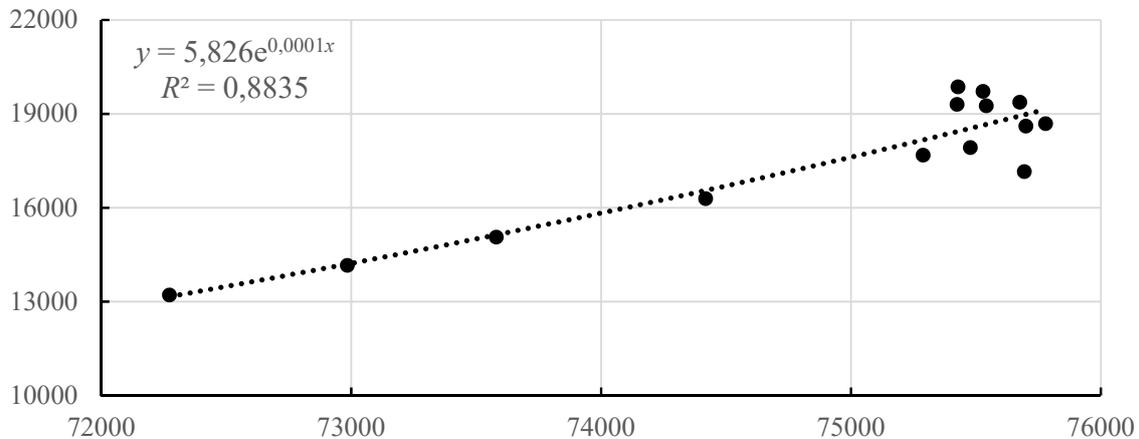$$R^2 = 0{,}8835$$

Figure 1. Scatter diagram: the average annual number of labor force (X axis, thousand people) against the GDP (Y-axis, billion rubles at constant 2003 prices)

The initial analysis of the diagram allows us to make a preliminary conclusion about the existence of such a relationship and the possibility of its description on the considered section by an exponential function ($R^2 = 0.88$). The choice of this function is due to the fact that for long periods of time, when describing global changes of macroeconomic indicators, it is usually applied linear trends that allow estimating the overall trend and obtaining a simple and convenient equation for research. When further analysis of the equation is not expected, it is possible to use an exponential function that more "gently" reflects the natural non-linearity of the actual relationship, but retains the clarity of describing the general trend as an "almost linear" trend.

A more detailed analysis of this relationship showed that there is a clear clustering of "points on the graph" in time. In other words, the first four "points" on the left in Fig. 1 correspond to the period from 2003 to 2006, and determine the form of the relationship, and starting from 2007 the correlation between the variables is almost absent (R^2 is close to zero). We can assume that in 2007 there was a "key event" in Russian economy; the event time coincides with the beginning of the global financial crisis. This conclusion is indirectly confirmed in the author's paper (Plotnikov, Shanygin, 2017), devoted to the analysis of the dynamics of the circulation velocity of the money supply in Russia. Relationship after 2007 may be conditioned either change in the economic mechanisms of the country or an increase in the level of unemployment (this is the issue for special research). Considering that the spread of "points" on the diagram after 2007 is extremely small, it is possible to assume that the correlation between the variables still exists for the period under review 2003-2016 (the coefficient of linear correlation is 0.92), and it can be described by the equation given in the diagram.

A similar study of the interrelationships of these variables was conducted for each federal district of Russia, and GRP in constant prices 2003 was applied instead of the country's GDP (data for 2016 are not available (Federal State…)). The main results are presented in Table 1. Analysis of the dynamics of changes in the shares of the GRP of the federal districts in the total volume of GRP, as well as shares of AANLF of the federal districts in the total amount of the AANLF showed that during the period under review they changed very insignificantly (the share of GRP - up to 4.31%, the share of AANLF - up to 1.40%), and it is possible to calculate their average for the

period for each federal district (see Table 1). The highest correlation between the AANLF and the GRP was in the Central and North Caucasus FD, but the share of GRP of North Caucasus FD in the total Russian GDP was insignificant.

Table 1.

Federal district	Coefficient of linear correlation (AANLF and GDP)	Average for the period share of GRP of FD in total GDP, %	Average for the period share of AANLF of FD in total AANLF, %
Central (CFD)	0,93	35,23	27,52
Northwest (NWFD)	0,62	10,26	10,15
South (SFD)	0,78	6,01	9,25
North Caucasus (NCFD)	0,93	2,28	5,58
Volga (VFD)	0,11	15,68	20,94
Ural (UFD)	0,33	14,73	8,68
Siberia (SFD)	–0,41	10,70	13,27
Far East (FEFD)	–0,71	5,11	4,61

An analysis of the variation of the AANLF and GRP by regions (territories, provinces, republics) within each federal district showed that the constituent regions in all federal districts are significantly different, in addition, the levels of these variations have changed uniformly over time (see Table 2). The most heterogeneous federal district for both variables during the period under review was the Central district, and the least - the Volga district. The only federal district was the Northwest, where regions annually "removed" from each other during the entire period, the only region, where on the contrary regions "moved closer" to each other for both variables (although insignificantly) was the North Caucasus. In the first one, this can be explained by the fact that St. Petersburg is closer to the Moscow Region (CFD) than to the Leningrad Region and other regions of the Northwest FD, and these differences increase over time. In contrast, the regions of the North Caucasus FD historically were less heterogeneous due to the similarity of the lifestyles of the population, and for the same period continued to "move closer" for the same reason.

Table 2.

	CFD	NWFD	SFD	NCFD	VFD	UFD	SFD	FEFD
The average growth rate of the coefficient of variation of AANLF per annum, %	1,1	1,57	0,3	–0,79	0,39	0,25	–0,23	0,2
The average growth rate of the coefficient of variation of GRP per annum, %	–0,16	1,77	0,7	–0,23	–0,11	–0,34	0,66	0,3

It should be noted that according to expert estimates presented in the media, some of the companies of the middle and eastern parts of the Russian Federation are officially registered in the central and western parts of it. This circumstance leads to a slight distortion of statistics. For example, the reporting indicators of the CFD can be close to the data on Russia as a whole, because many companies are registered in Moscow, while they operate in other regions of the country. In addition, companies of some regions from the eastern part of Russia practice work on a rotational basis for staff permanently residing in western parts, and direct calculating of the economic results obtained in this way slightly distorts the statistical reporting. In general it can be concluded that the

conditionality of the gross domestic product (gross regional product) by the average annual number of labor force as the characteristic of the total potential number of employees in companies in different regions of the country is different and declining in recent years.

Comparison of growth rates of labor productivity and wages

Let's move from regional features of Russia as an external environment of companies to the analysis of its economic activities. For a normal strategic development of the economy, the growth rates of labor productivity in the long run should outpace the growth rates of wages. Let's compare the dynamics of indices of the annual labor productivity (LP) and the accrued average monthly nominal wages of employees of organizations (AAMNW) for the main economic activities in Russia during the period under review 2003-2016. The rate of change of these indicators in Russia calculated by the chain method in constant prices and in percent is represented in Fig. 2. The choice of the exponential trend is due to the above mentioned reasons.
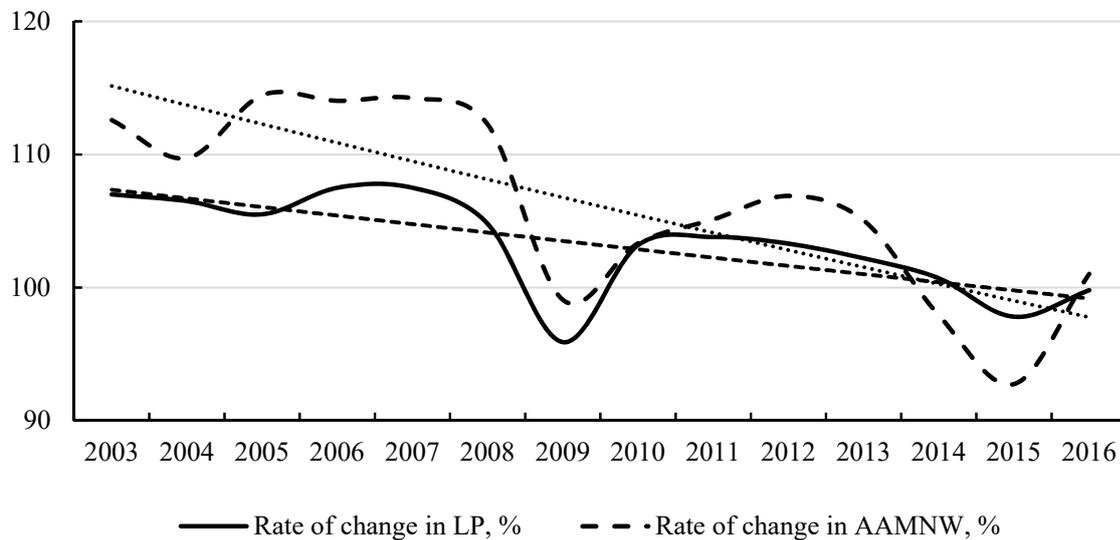

Fig. 2. Dynamics of labor productivity and accrued average monthly nominal wages of employees of organizations indices in Russia (in constant prices),%.

There was a rather negative situation in Russia until 2014 (according to the trend), when the AAMNW indices were ahead of the LP indices. However, during the period under review, there was a general positive trend of convergence of these indices with subsequent excess of LP-indices. But simultaneously there was a negative trend of decreasing both indices, and since 2014 it became less than 100%. Almost the same situation was typical for most sectors of the Russian economy (Sections A-K of *OKVED*), in all of them the growth rates of AAMNW on the average exceeded growth rates of LP. The worst (greatest) difference between the AAMNW and LP indices was typical for the sections B and G, the best (smallest) – for sections D and C. In this case, for the sections C, D, F, and I, this difference was better on the average than national, for the rest sections - worse. Starting from the indicated years (according to the trend) there is a favorable ratio (only the ratio) of AAMNW and LP indices in the sections: since 2011 - section C, since 2012 - section D, since 2013 - sections A, I , K, since 2014 - sections E, F, since 2016 - sections B, H. In the section G, before the end of the period under review, exceeding the LP indices over the AAMNW indices did not occur, but the absolute difference between them decreased.

The analysis of the coefficients of the excess of AAMNW indices over the LP indices, calculated as the ratio of these indices, led to the similar conclusions. The general trends in the dynamics of these coefficients can be described by the equations given in the Table 3. In 2016, actual (not according to the trend) LP indices exceeded the AAMNW indices only in the sections B, A, D, E (in the order of deterioration), in others - these indices were not correlated in the best way. For Russia as a whole, the value of the above-mentioned excess ratio in the same year was 1.012, and the maximum (1.104) - in the section F. At the same time, in 2016 LP indices were more than 100% only in the sections A, D, E, K, in the rest - less than 100%.

Table 3.

Section of *"OKVED"*	Equation		Section of *"OKVED"*	Equation
A	$y = -0,0134t + 1,1419$		F	$y = -0,0030t + 1,0371$
B	$y = -0,0102t + 1,1413$		G	$y = -0,0047t + 1,0796$
C	$y = -0,0029t + 1,0273$		H	$y = -0,0060t + 1,0854$
D	$y = -0,0045t + 1,0455$		I	$y = -0,0053t + 1,0554$
E	$y = -0,0089t + 1,1056$		K	$y = -0,0102t + 1,1078$

Thus, it can be stated that during 2003 – 2016 in the above mentioned sections of the economy and in Russia as a whole, there was a fairly positive trend of gradual formation of excess of growth rates of LP over growth rates of AAMNW, which is a good fact in the long term. However, both these indicators decreased below 100% by the end of the period in a number of industries and for the country on the average that may indicate a slowdown in economic development.

Conclusion

Correlation between absolute values of the Gross Regional Product and average annual number of labor force as the equivalent of the potential total number of employees in companies rather regularly decreases in the direction from west to east of the country: positive strong - in the Central, North Caucasus and South FD; positive medium - in the Northwest FD, practically "zero" in the Volga, Ural and Siberia FD, negative medium - in the Far East FD. This relationship can be explained by approximately a co-directional decrease of the average population density, an increase in the specific number of companies with a high share of state orders in their portfolio and city-forming companies in the middle part of Russia, and the impact of unemployment.

All regions (territories, provinces, republics) within each federal district vary significantly in terms of AANLF and GRP, and it can be assumed that they are also heterogeneous for many other economic indicators. In such a situation, it is advisable to prefigure research of the external environment of companies with a preparatory stage, in which group the "primary" regions into relatively homogeneous (in economic sense) population (clusters) with multidimensional clustering methods, and do further research on these clusters instead of federal districts formed according to the administrative-territorial principle. At the same time, the analysis of the structure of the clusters, the differences between them and the distribution of the characteristics of clusters (for example, using isolines) across the country can become an additional source of information about the similarity or dissimilarity of the external environment of the activities of particular companies or sectors of the economy, given data on the geographical distribution of the clusters.

For a long time in all the sectors of the Russian economy, there was an excess of the growth rates of wages over the growth rates of labor productivity, which allegedly have a negative impact on the strategic development of the economy. These rates as a whole have regularly decreased

throughout the period and the growth rates of AAMNW - significantly faster than the growth rates of LP. And these tendencies led to a relatively favorable ratio. In this case, the introduction of economic sanctions for Russia by other countries did not significantly affect the dynamics of the indicators in question, and it can be assumed that the current economic situation in the country is largely due to internal reasons. However, the reduction of AAMNW and LP indices in many sectors in recent years up to values less than 100% may indicate a partial economic isolation of the country, which makes significantly worse the characteristics of the external environment of companies, creates additional difficulties for them, leads to an increase in costs.

References

Aaronson, S., Cajner, T., Fallick, B., Galbisreig, F., Smith, Ch, Wascher, W. (2014) "Labor Force Participation: Recent Developments and Future Prospects", Brookings Papers on Economic Activity, Brookings Papers on Economic Activity, Fall 2014. 197-255.

Amaral, L. (2009) "New series of Portuguese population and employment, 1950-2007: implications for GDP per capita and labor productivity", Análise Social, vol. 44, no 193. 767-791.

Bartelsman, E., Haltiwanger, J., Scarpetta S. (2013) "Cross-Country Differences in Productivity: The Role of Allocation and Selection", American Economic Review, vol. 103, no 1. 305-334.

Bogdanova, E.L., Maximova, T.G., Popova, I.N., Klimenko, E.A. (2017) "The State and Prospects of Cooperation between the BRICS Countries in the Energy Sector", 29th International-Business-Information-Management-Association Conference. Vienna. May 03-04, 2017. 910-917.

Desai, P. (2006) "Why Is Russian GDP Growth Slowing?", The American Economic Review, vol. 96, no 2. 342-347.

Federal State Statistics Service www.gks.ru (accessed: 20.11.17).

Feldstein, M. (2017) "Underestimating the Real Growth of GDP, Personal Income, and Productivity", The Journal of Economic Perspectives, vol. 31, no 2. 145-163.

Gorbachev, N.V. (2018) "Assessment of economic inequality in public-private partnerships in the industry",St Petersburg University Journal of Economic Studies, vol. 34, no. 2, 317-342.

Hipple, S.F. (2016) "Labor Force Participation: What Has Happened Since the Peak?", Monthly Labor Review, September 2016.

Lyakin, A.N. (2018) "Three crises according to one scenario", St Petersburg University Journal of Economic Studies. vol. 34. no 1, 004-025.

Plotnikov, V.A., Shanygin, S.I. (2017) "The influence of the macroeconomic environment on the management of the organization taking into account the import substitution factor", Management consulting, no 9 (105). 44-56.

Sokolov, B., Yusupov, R., Verzilin, D., Sokolova, I., Ignatjev, M. (2016) "Methodological Basis of Socio-Cyber-Physical Systems Structure-Dynamics Control and Management", 1st International Conference on Digital Transformation and Global Society (DTGS). St Petersburg, ITMO Univ. Jun. 22-24, 2016, vol. 674. 610-617.

Vertakova, Y., Plotnikov, V. (2016) "Innovative and industrial development: specifics of interrelation", Economic Annals-XXI, no 1-2 (156), 37-40.

Vorontsovsky, A.V., Vyunenko, L.F. (2016) "Forecasting the development of the economy on the basis of a stochastic model of economic growth with regard to the turning point", St Petersburg University Journal of Economic Studies, no 4. 4-32.

Vorontsovsky, A.V., Yefimova, E.G. (2016) "Large open economies: tipologization and problems of the analysis",St Petersburg University Journal of Economic Studies, no. 2, 027-051.