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WHERE THE ECONOMIC CENTER OF NORTHERN CAUCASUS IS LOCATED AND SHIFTING?

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Abstract

Despite the fact that over the last years the center of administrative, technological and economic interests of state and business community has shifted to the Far East, the Caucasus is still on the agenda of political authorities of the state, because it remains the most important political, cultural and economic region of Russia. The main trends are studied in various areas. Economists are less active in this area, and they are mainly concerned with the current issues of the development of individual territories of the Caucasus. One of the aspects of this task is the definition of the economic center of the Caucasus and the identification of its spatial movement and change. However, the determination of the economic center of national economy due to its peculiarities, which are non-static and largely intangible (especially since the share of services in the economy is growing) in nature, is a task requiring not only theoretical but also methodological innovations. In the article, the coordinates of the location of the economic center of the North Caucasus were calculated using the centrographic method. The assessment of its behavior over the period from 2005 to 2015 was made. The gradient of movement of the economic center is defined. The relation between the economic center and other centers of the macro-region were studied. The authors made the assumptions on the effect of the displacements of the economic center of the Caucasus on the dynamics of GRP. The quantification of shifts was performed. Their interpretation was proposed.

Keywords: North Caucasus, economic center, centrography, gradient of movement, shift.

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1. Introduction

Recently, the foreign studies on the definition of an economic center have intensified. For example Grether and Mathys (2009) and Quah, (2012), who present the relevant studies for the global economy (Aboufadel & Austin, 2006; Xiao, Yuan, Rencai, Hongbing, & Gang, 2016) at the regional and subregional levels. National researchers also express their interest on this problem (Rakhaev, Shakhmurzova, & Toguzayev, 2018). The authors study the behavior of economic center in terms of the influence various factors: from political to technological and institutional. Simultaneously the influence of the economic center on some of the most important parameters of global, regional and subregional development is studied. It turns out that the economic center has an impact on the dynamics of social, political, demographic, technological, and other processes. At the same time, the mechanism of this influence is not completely clarified.

2. Problem Statement

The presence of the economic center in the form of a peculiar point (region) of national economy, in which the economic mass of different regions balances each other, affects the overall economic dynamics of national economy, keeping its development in certain spatial coordinates and the displacement of this center ensures, in one case, the acceleration of economic dynamics, and the deceleration in another case. (The phenomenon of acceleration / deceleration itself is determined by the gradient of the South-Western and North-Eastern directions of displacement of the economic center and is related to the physical nature of changes in the mass and time of the object as it moves to the West and East). These changes in the coordinates of the economic center (peculiar South-West and North-East drift) affect local and global fluctuations of the economic space, causing an increase / decrease in economic activity, the use of new technologies, the dynamics of poverty / wealth, growth / decline in GDP, the formation of new and modernization of existing enterprises and other macroeconomic indicators.

3. Research Questions

According to the axiomatic provisions of “the principle of comparative advantage” of D. Ricardo and the theorem of Heckscher–Ohlin -Samuelson, it should be noted that countries with spatially heterogeneous territories can change the cost per unit of increase in production from less favorable conditions to more favorable ones. As a result, it turns out that the growth dynamics of national economy product (GDP, etc.) is proportional to the gradient of the displacement of the mass space of national economy (GDP, etc.). Under conditions when the gradient of displacement occurs towards favorable conditions, the growth rate of national economy (GDP) is higher per unit of cost than when the last one shifts towards less favorable conditions. Apparently, the shift of the economy towards favorable conditions can be determined with the help of the economic center.

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4. Purpose of the Study

The purpose of the research is the calculation of the geographical location of the economic center of the North Caucasus, the assessment of the influence of other centers on its behavior, as well as the influence of the economic center on the behavior of other centers.

5. Research Methods

In the research the centrographic method was used. In Russia, it was first used by D.I. Mendeleev (Mendeleev, 2002; Centrographic method in economic geography, 1989). Geographers actively use it to solve problems to a certain extent related to geography (Weinberg, 1915; Hagget, 1968; Polyan & Treivish, 1989; Tarkhov, 1989). In recent years, it is also used by economists, both foreign and domestic (Grether & Mathys, 2009; Quah, 2012; Aboufadel & Austin, 2006; Xiao et al., 2016; Rakhaev et al., 2018). The centrographic method focuses on the way to find the geographical point, relative to which the total moment of gravity acting on the system within a territorial unit is zero. With the help of this provision it is possible to determine the economic center of Russian Caucasus.

In order to assess the location of the economic center the several methodological provisions are proposed. The first one is to accept GRP as the "economic mass of the territory" (Kosarev, 1996; Sedum, Kalabekova, & Sabanchiev, 2014; Granberg & Zaitseva, 2003). The gravity of the economy of a territory is a conditional vector quantity, the scalar value of which is equal to GRP. The second is the vector of gravity of the economy of the territory directed to the center of the Earth from a conditional point - the center of the territory, which is calculated as the center of gravity of a flat geometric figure expressing the geometry of the region. Moreover, in contrast to the definition of other centers (for example, population centers, etc.), during the calculation of which the territory of water bodies, swamps, mountains, etc., places not suitable for human habitation, is eliminated, the entire territory is taken into account in the task of determining flawless economic center. Thirdly, the authors use the administrative center of the subject. In this case, it is assumed that the entire volume of the GRP is created in the administrative center of the territory, and the territory of the subject itself is evenly and economically developed.

To calculate the longitudinal (x) and latitude (y) coordinates, it is proposed to use the following equation. To calculate east longitude:

$$x_0 = \frac{\sum_{i-1}^{11} Q_i x_i}{\sum_{i=1}^{11} Q_i}, \quad (1)$$

where x_0 –is the coordinates of the East longitude, degree (0), x_i - coordinates of East longitude of the i-territory (subject), the degree (0); Qi - GRP of the i-subject; million rubles; i = 1 - 11 is the number of independent territories of the North Caucasus.

To calculate the coordinates of latitude of the North, the following equation is used:

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$$y_0 = \frac{\sum_{i-1}^{11} Q_i y_i}{\sum_{i=1}^{11} Q_i}, \quad (2)$$

where y_0 – is the coordinates of the North latitude, the degree (^{0}), y_i – the coordinates of the North latitude of the i-territory (subject), the degree (^{0}); Q_i - GRP of the i-subject; million rubles; i = 1 - 11 is the number of independent territories of the North Caucasus.

6. Findings

For the period from 2005 to 2015 the GRP of the subjects in the geographical boundaries of the North Caucasus grew by almost 4.9 times, while the GRP of Russia grew only by 3.6 times. The average annual growth rate of the GRP of the Caucasus over this period was 117.2%, while in Russia as a whole it was only 113.8%. Thus, it can be argued that in the new century the North Caucasus is developing more rapidly in the economic context than Russia as a whole.

From 2005 to 2015 the economic center of the North Caucasus had average coordinates of 45.1810 N.L. and 41.0620 E.L. and was located in the North-West of the Stavropol Territory. There is a rather high correlation between the latitudinal and longitudinal correlation parameters in GRP (-0.682), but with a negative value. The calculations show that for the period from 2005 to 2015 the GRP of the North Caucasus has shifted from the original point to the South by more than 10.1 km and more than 10.3 km to the East. With the general movement for 2005-2015 by 2'27 ”to the South, for the period from 2005 to 2008 the center shifted to the North by 08”, and in the next period (2008-2010) there was an accelerated shift to the South (+ 4'47 ”), which continued also in the period from 2010 to 2012 (+ 4’37”). Then (2012-2015) this acceleration to the South slightly slowed down (+ 1’15”). The general Eastern drift of the economic center for the period from 2005 to 2015 amounted to 12’28”. However in the period from 2005 to 2008 the movement to the East of the economic center was 4’28”, and in the period from 2008 to 2010 had a 05” shift to the West, which increased in the period from 2010 to 2012 up to 18”. However, in in the period from 2012 to 2015 the Eastern drift of the economic center recovered and was 8’23”. As a result, the shift of the economic center for the period from 2005 to 2015 had a dominant South-East drift.

If we compare the geographic shifts of the economic center with the increase / decrease in GRP growth rates, it turns out that the North-Eastern direction gave a greater increase in GRP, while shifting to the South-West slowed down the growth rates, which leveled (accelerated) when the wing of shift took the Eastern direction. This feature can be explained with the help of the hypothesis to which any movement to the East leads to the increase in mass, while movement to the West eliminates the mass, i.e. the same time interval to the East gives a greater mass increase than to the West. Another reading of this hypothesis (in a time variant) is that any movement to the East will be slower than to the West.

Talking about the investments, over the same period, the investments shifted for 6.5 km to the South and for 16.8 km to the East. Thus, if we compare both parameters, it turns out that for GRP, the shift to the South is more preferable than for investment, and the shift to the East is more preferable for investment

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than for GRP. It is specific that the correlation between GRP and investment was 0.677 and was the lowest among the correlation of GRP with other parameters (Table 01).

The correlation between GRP and fixed assets for the period from 2005 to 2015 in the North Caucasus amounted to 0,802. At the same time, fixed assets shifted to 16.8 km to the South and 8.6 km to the East from the previous location, i.e. on this basis, they had, firstly, a greater preference for the South than for the East, and secondly, the shift to the South surpasses both a similar shift of GRP and investment. As for the displacement to the East, it was inferior to a similar displacement both in terms of GRP and investment.

The GRP was highly correlated with the number of employees - 0.856. Nevertheless at the same time, the very center of employment in the economy shifted over the period from 2005 to 2015 for 20.4 km to the South and 27.4 km to the East. It is necessary to note that these are the most significant deviations of the average both in the Southern and in the Eastern directions. It exceeds many times the similar indicator in GRP and investment, TFP, as well as population and number of enterprises.

Moreover, the progressive movement to the South with an average speed of 56” per year turned out to be uneven. It accelerates in the period from 2005to 2010 for 65”, and then in the period from 2010 to 2015 slowed down to 37”. As for the Eastern direction, it changes with an average speed of 82”, (i.e., there is an incline to the Eastern direction). However as in the South, this dynamic is uneven; it accelerates in the period from 2005to 2008 by 1’05”, and then (2008–2015) decreases to 60”. Thus, although the population is changing in the general trend of other parameters, it also demonstrates its parametric peculiarities.

The only parameter of the studied ones - the number of enterprises - showed a different dynamic. If relatively to the North-South it developed in the same channel - the center shifts for 7.5 km to the South, then with the longitudinal parameter the center of enterprises shifts for 1.4 km to the West, thereby not fitting into the existing trends. Meanwhile, the correlation of the economic center with the center of enterprises (or production communications) was 0.917, i.e. it has a second-largest correlation.

7. Conclusion

1) The economic center of the North Caucasus for the period from 2005 to 2015 located in a quadrant with coordinates 450 N.L. and 410 E.L. At the same time, for more than a decade, the economic center of the North Caucasus has shifted to the South-East direction. The economic center strongly correlated with other centers, which indicates their strong mutual influence. It is particularly remarkable that most of the centers are located in the Stavropol Region. Thus, it can be said that the Stavropol region is a peculiar territory of concentration of the centers of the North Caucasus and in this context it is the center of the North Caucasus. Apparently, such a concentration of centers in the territory of the Stavropol region is not accidental. It is often explained by the fact that one parameter derives from another and all of them influence the economic center or the latter is a peculiar synthesis of all the other centers and parameters (Rakhaev & Eneeva, 2010). It seems to the authors that such an explanation is of vulgar determinism nature. The authors believe that even between the “closest” parameters, for example, the TFP and investments or the number of people employed in the economy and the population number, the correlation remains rather than linear determination. It means that there remains a kind of “corridor” of “independence”. The authors suppose that this “independence” etc., is determined by the economic center. Its displacements (migration) in the

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South / North directions as well as in Western /Eastern have different acceleration speed of the economic dynamics of the macro-regional (and regional) economy.

2) The movement of the economic center of the Caucasus to the Southeast is of discrete nature, which allows distinguishing three periods. Secondly, the same time intervals gave a different length of the route. So in the period from 2005 to 2008 there was a shift to the North-West, which was 0.1 km to the North and 3.6 km to the East. (By the way, the growth rate of GRP over this period grew only by 106.3%). However already in the period from 2008 to 2010 the North-Eastern direction was replaced by the South-Western. And for the period from 2008 to 2010 the center shifted for 5.0 km to the South and for 0.4 km to the West (And the growth rate of GRP was 237.5%, i.e., it grew by more than 2.3 times). In the period from 2010 to 2012 the length of the shift to the South was 4.4 km (and the growth rate of the GRP was 156.6%), whereas in the period from 2012 to 2015 it was 0.8 km, (GRP growth rate was 143.3%). As for the Western incline, in the period from 2010 to 2012 it amounted to -0.2 km, which were eliminated in the next period from 2012 to 2015 by the displacement to the east for 7.3 km. Thus, if the displacement to the South is progressive (but slowing down), then the displacement to the East is discrete (and uneven), in which the displacement to the West is replaced by the displacement to the East, which ultimately exceeds the first one.

3) Nowadays one of the most important applied tasks is the design of basic (primarily, industrial, transport, logistics, etc.) communications. The authors believe that in order to solve this problem, it is necessary to use the motion gradients of the main centers of economic development, i.e. production, transport, logistics and so on. The economic communications should be laid along the lines (trajectories) of the calculated gradients of movement of the main centers of national economy. This idea is implicitly reflected in the works of outstanding economists-geographers from Thunen, Weber to Losch and present days.

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