Evaluation of Cultural Impact on Regional Economic Development in Russia

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Abstract: Paper is devoted to Dependence of economic development of the Russian regions on their cultural level indicators. It determines and analyzes the influence degree of cultural components of the region development on its economic factors. The investigated statistical base consists of selected cultural and economic indices taken in the period of 2000-2015 years. The hypothesis of significant influence degree of the visits to museums and in particular, theatres number, on the amount of implemented innovational technologies was confirmed. A hypothesis about the close relationship between the volumes of expenditures of the Russian budget for culture and the level of research and development work, as well as directly the number of innovative industrial technologies introduced was confirmed. Hypotheses about the close interaction of cultural indices and such macroeconomic parameters as GDP growth, the volume of the capital investments have not been confirmed. A weak correlation between library holdings volume and the studied economic indicators was noted. The research can be used in design of the regional development programs, in forming budget priorities of budgets projects, or in taking other management decisions programming the basis for effective social and economic policy of the regions.

Keywords: Budget expenditures on culture, cultural development index, implemented innovative technologies.

Economic development predictably influences the culture and social life. Such authors like R. Inglehart and W. Baker [2000] have devoted a large number of studies to this phenomenon. There is also a reverse effect, which we consider in this article. The collected evidence presented in previous international and regional studies [D. Acemoglu, S. Johnson and J. Robinson (2001), G. Tabellini (2005)] indicate the strong influence of cultural history on current economic performance. For example, A. Greif [1994] emphasizes the interaction between culture and the necessity of economic institutions creation. In particular, the author shows how economic interacting among different cultures: Maghribi clans and Genoese traders, in the late Middle Ages prompted them to develop various economic institutions, and what this meant for the subsequent ways of mutual trade developing.

E. Banfield [1958] and R. Putnam [1993] argued that pronounced differences in five civic, social and economic behavioral characteristics between North and South Italy representatives could be traced from their long-standing cultural heritage and traditions. According to their research, these differences, expressed as the formation of different "social capital", in turn, contribute to explanation of Southern Italy economic backwardness. In this article, the authors detailed the cultural differences between not only Northern and Southern Italy. Their attention was also paid to other European countries. S. Beugelsdijk, T. van Schaik [2001], S. Knack and P. Keefer [1997] conducted the similar analysis for European regions, studying the interrelationship between cultural capital and production per capita. A. Licht, C. Goldschmidt and S. Schwarz [2004] studied the relationship between culture and provisions on the economic entities protection (such as the rule of law and the fight against corruption) in the sample of countries. Despite the different methodologies and sources of data, the empirical results of these studies were consistent. R. Barro and R. McCleary [2003] showed correlation between cultural aspects of religious beliefs and economic growth in the sample of European countries. L. Guiso, P.Sapienza and L. Zingales [2004] studied the influence of cultural capital on individual financial habits. E. Spolaore and R. Wacziarg [2005] showed - income differences between countries positively correlated with genetic and geographical distances and interpreted these data as thought-provoking cultural barriers to the spread of innovation in different countries. Plato [ed. 2000] cited data on the regional volume of industrial output, education, and showed a significant correlation between them. A set of studies revealed the leading role of cultural characteristics as the decisive factors determining changes in the organization of women's labor or in the sphere of

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Table 1: Different Authors' Indicators Assessing the Cultural Level of the Region

Indicators \ Authors	Fernandez, Fogli, Olivetti 2004	Inglehart and Baker 2000		Hall and Jones 1999	Acemoglu, Johnson and Robinsion 2002	(Barro and McCleary, 2003)
Literacy rate	+	+		+		
Urbanization rate					+	
Cultural peculiarity of region	+	+			+	
Religious factor	+	+			+	+
MEDIA		+				
Other indicators				+		

Source: Elsevier.

education and fertility [R. Fernandez, A. Fogli and C. Olivetti, 2002] or in the international trade growth [L. Guiso, P. Sapienza and L. Zingales, 2004]. A. Ichino, F. Bornhorst, K. Schlag and E. Winter [2004] proved the relationship between culture and production per capita.

The choice of various researchers' indicators is given in Table **1**.

Several studies [B. De Long and A. Shleifer (1993), Acemoglu, Johnson and Robinsion (2002)] relied on the city size as indicator of economic development. Initially, we also wanted to include urbanization indicators in the measurements of our study. We refused this idea later. We were doubtful about its effectiveness in post-Soviet historical conditions with cities and their city-forming enterprises functioning.

Culture is passed on from generation to generation and through social interactions in the local community. Regions that were poorly educated a few decades ago are likely to have different cultural characteristics in comparison with regions with a longer tradition of hard and widespread education. Although there are other evidences. For example, the data given by G. Tabellini [2005] showed that Germany by the end of the 19th century pursued a purposeful policy of broad education and had the highest literacy rate, but its income per capita was lower than in France, and much below (less than 2/3) than in the UK, Belgium and the Netherlands. Thus, the data of cultural and economic correlations were not always strictly comparable. Similar studies have also been conducted in Russia. E.A. Fedorova, LI Chernikova, O.I. Rogov, [2017] estimated the educational level as an indicator of the human capital of Russian regions. E.A. Fedorova, LI Chernikov, [2017] evaluated the economic effect of public health level.

THE IMPACT OF CULTURAL DEVELOPMENT ON THE ECONOMY AND ITS ASSESSMENT

The proposed work emphasizes the importance of culture as an indicator of regional economic development. This article offers a basic statistical analysis that assesses their relationship in federal districts across Russia, the strength and direction of their mutual influence. This work considers budgetary expenditures for culture, visits to theatres for 1000 people (theatre index), visits to museums per 1000 people (museum index), a library fund in the number of books per 1000 people (library index) as the macro-cultural indicators. Three indexes are chosen as economic indicators for comparison: gross added value in basic prices, percentage to the previous year (gross GDP), index of physical volume of investments in capital assets in comparable prices, percentage to the previous year (index of investments), and the number of developed advanced manufacturing technologies (innovation index).

Eight Russian federal districts: Central (CFD), North-Western (NWFD), Southern (SFD), North-Caucasus (NCFD), Povolzhsky (PFD), Ural (UFD), Siberian (SIFD), Far-Eastern (FEFD) federal districts are the objects of this study. We have aggregated smaller regions into larger ones in order to have a sufficiently large set of individual cultural measures in each region and a more significant sample. The period of our study is 16 years. Annual figures are taken for each of chosen parameters. Statistical sources are the Rosstat database, the statistical database of the Organization for Economic Cooperation and Development, and the information-analytical system Bloomberg Professional.

Absolute approach to assessing the relationship between cultural and economic components would be

Table 2: Gradation Matrix of Russian Regions in Accordance with the Development of their Cultural Indices for 14 Years of Observation (2002-2015).

Index \ District	CFD	NWFD	SFD	NCFD	PFD	UFD	SIFD	FEFD
Theatre index	2	**1**	7	8	4	5	3	6
Museum index	2	**1**	4	8	6	7	5	3
Library index	2	**1**	6	8	3	5	5	4
Total position	2	**1**	7	8	4-5	6	3	4-5

Source: Author's calculations based on Rosstat data.

incorrect because of the heterogeneity of the measurement units, but this is not so in our case. We use the graphical analytical tools of the information-analytical system Bloomberg Professional, whose multiscale options for comparing different values allow us to abstract from the measurement units and focus on comparing the dynamics of their historical samples.

First, we constructed the cultural indices matrix of Russian federal districts. It was calculated and formed by authors based on Rosstat data for 14 years of cultural indices observation in Russian regions. Notice that the Crimean Federal District (CrFD) has not been included in matrix. Because Russian statistics has been collecting data on CrFD only since 2014. The results for the North Caucasus Federal District have been counted, starting from 2010, after its formation by the President of the Russian Federation decree of 19.01.2010. The matrix is presented in Table **2**.

Instead of R & D expenditure index (R & D) accepted in the European statistics, the Rosstat measures index of implemented technological innovations. Therefore, we took this innovations index for the domestic researches of cultural and economic relationship. The correlation between the budget culture expenditures and innovations index is 0.83 (Figure **1**).

One component of culture expenditures stands out among others in the costs of culture in the whole of the Russian Federation. It most closely correlates with innovations index for a long time (correlation coefficient 0.95). This is the number of visits to theatres. The following Figure **2** focuses on such details of research as lag size (2 years) and a growth turning point (2005).

We proceed to consider the districts. Due to the large number of analytical graphs in the study, we decided to limit its representation in this article by graphical analysis of four federal districts: two "cultural" leaders (CFD and NWFD) and two districts (SFD and NCFD) occupying the last places in the mentioned above table of cultural achievements.

CENTRAL FEDERAL DISTRICT (CFD)

In general, the statistics of cultural and economic historical samples for the period 2000-2015 looks as shown in Figure **3**. We have not found any significant correlation between museum and library indices on the side of cultural macroparmeters and three indices on other macroeconomic indices side. Nevertheless, clearly marked correlation exists between theatre visiting and implemented innovations. The correlation is taken with no lag.

Omitting the details of choosing lag between researched objects and splitting up the period of observation, the theatre index and the innovations index show the most significant correlation with a correspondent coefficient of 0.87. The closest connection strength is observed with a lag in two years (Figure **4**).

NORTH-WESTERN FEDERAL DISTRICT (NWFD)

Analysis of cultural and economic indices correlations in NWFD showed the strongest link of the innovation index, not with theatre index, but with another cultural one – amount of museums visits (correlation coefficient of 0.8, correlation is given with lag of three years) (Figure **5**). It is worth to remind we have chosen three economic indices for our study: gross value added at basic prices as a percentage of the previous year (gross GDP index), physical volume of investments in fixed assets in comparable prices as a percentage of the previous year (investment index), and the number of implemented innovational technologies (innovation index). As for cultural indices, NWFD traditionally occupies the first place in developing any indices of cultural matrix among Russian regions.

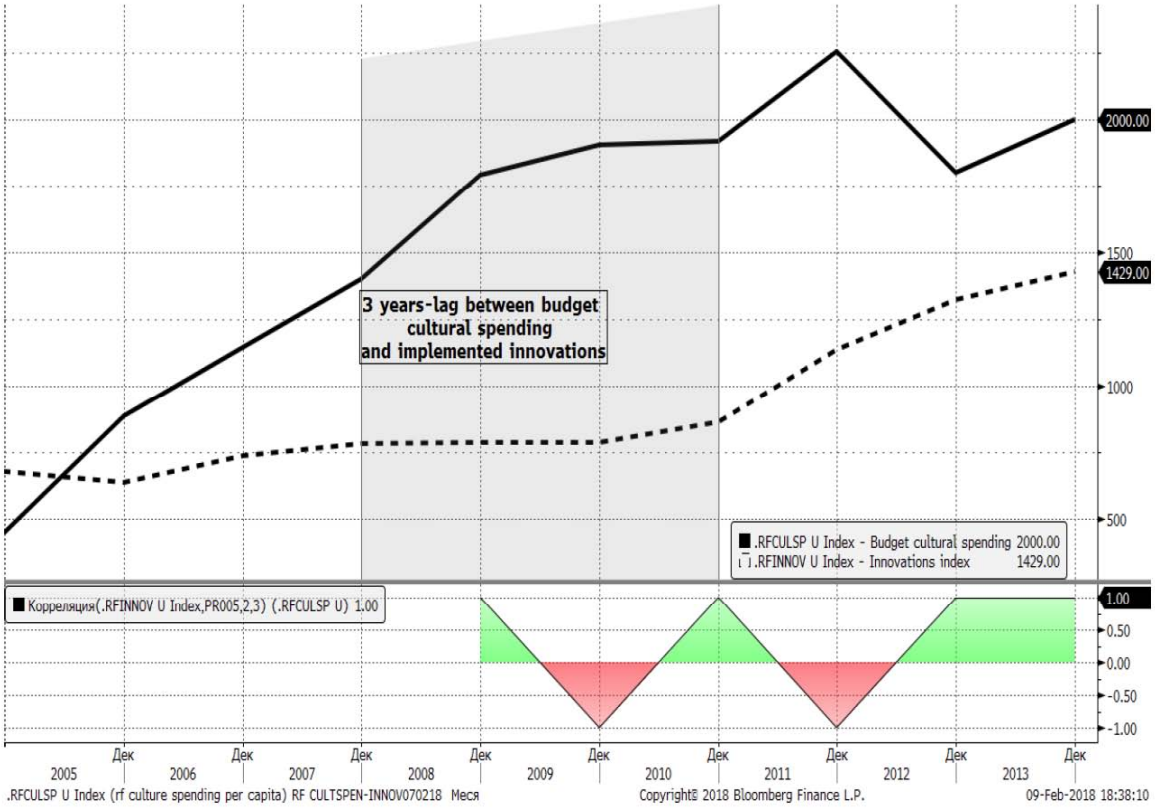

Figure 1: Comparison of Russian cultural spending and the implemented innovations amounts.

Source: Author's calculations based on Rosstat and i/a system Bloomberg Professional data.

Method of calculating the correlation coefficient on the lower screen on this and the following graphs:

Corr = Sum ((X [i] - Avg (X)) * (Y [i] - Avg (Y))) / ((n-1) * StdDev (X) * StdDev (Y)

where: X [i] = index value X, Y [i] = index value Y, n = correlation period, i = index of summation; i = 0 to n-1, Avg (X) = mean value of the index X for n data points, Avg (Y) = average value of the index Y per n data points, StdDev (X) = standard deviation of the index X value for n data points , StdDev (Y) = standard deviation of the value of the index Y for n data points.

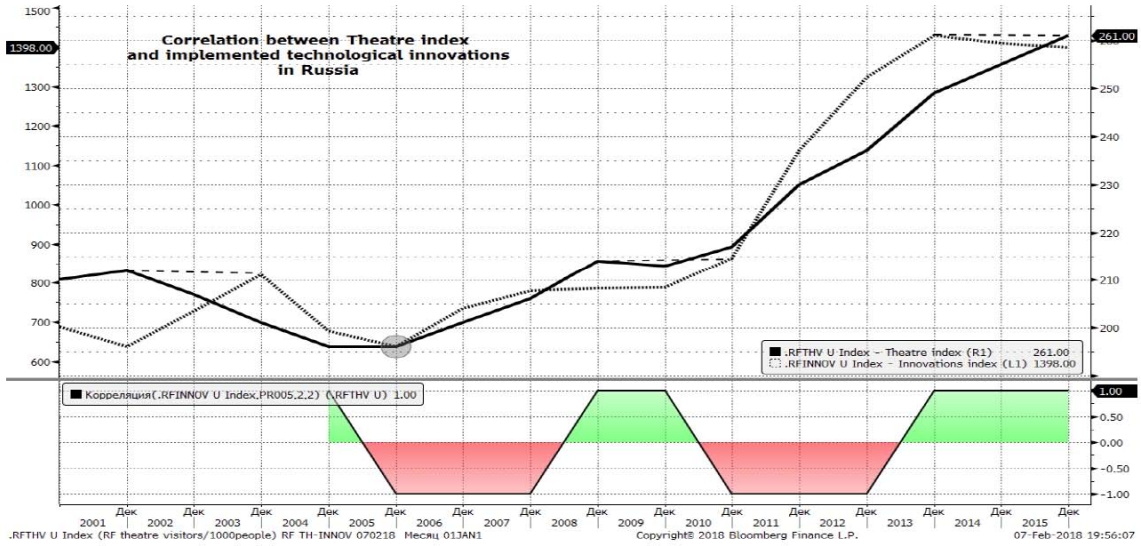

Figure 2: Comparison of theatre visits and the innovations implemented amount in Russia.

Source: Author's calculations based on Rosstat and i/a system Bloomberg Professional data.

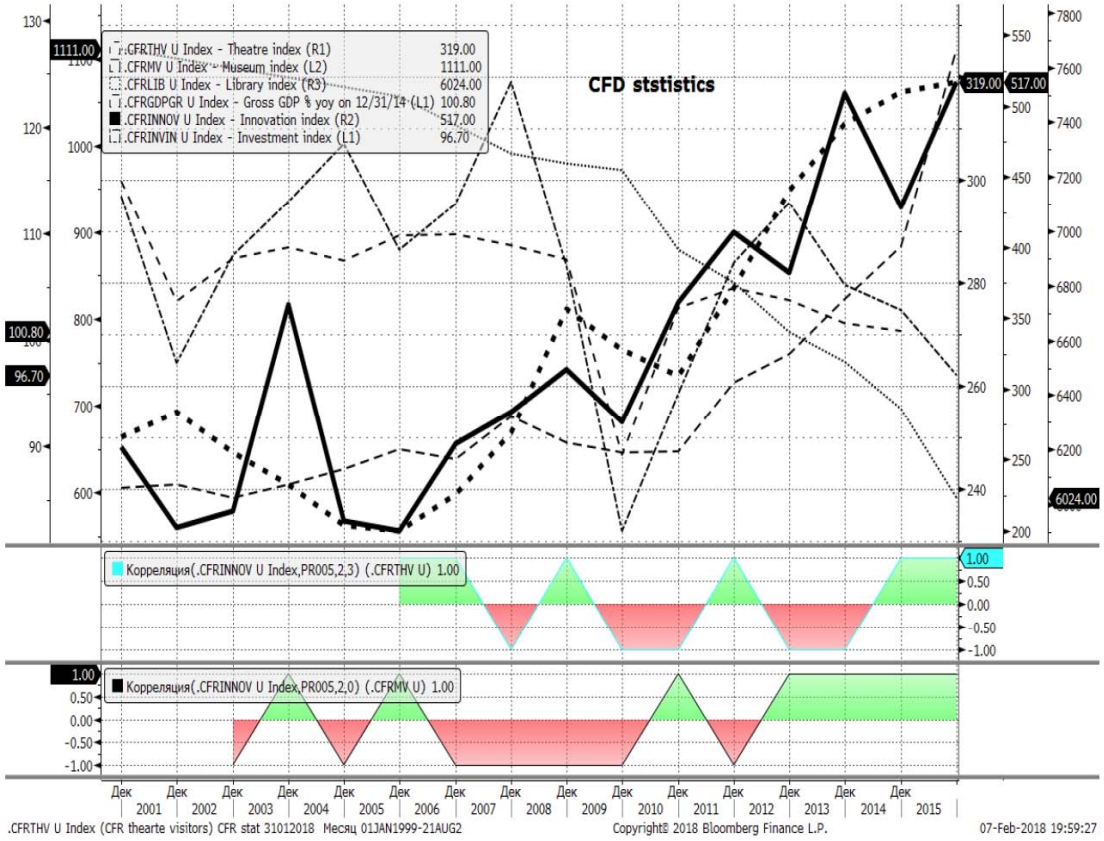

Figure 3: The comparison of macroeconomic and cultural indices dynamics in the Central Federal District.
Source: Author's calculations based on Rosstat and i/a system Bloomberg Professional data.

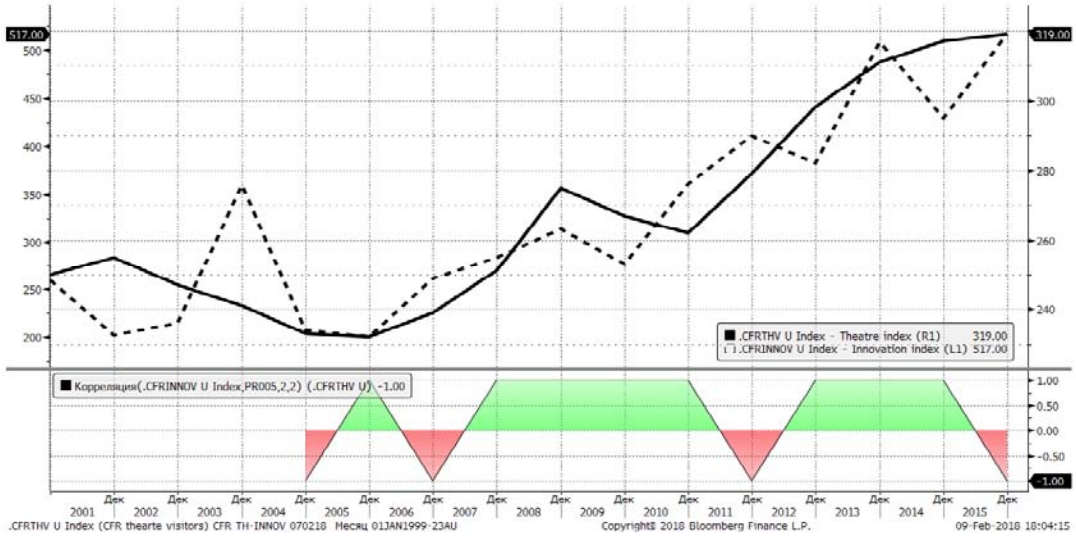

Figure 4: Comparison of theatre visits and the innovations implemented amounts in Central Federal District.
Source: Author's calculations based on Rosstat and i/a system Bloomberg Professional data.

The index of theatres in the NWFD, in comparison with the CFD, revealed a weaker relationship with economic indicators, in particular, with the innovation index (correlation coefficient 0.35, lag is two years) (Figure **6**).

SOUTHERN FEDERAL DISTRICT (SFD)

The interaction between the indices of theatres and innovations prevails in Southern Federal District, as well as in Central Federal District. Its level can be estimated on the subsequent graph.

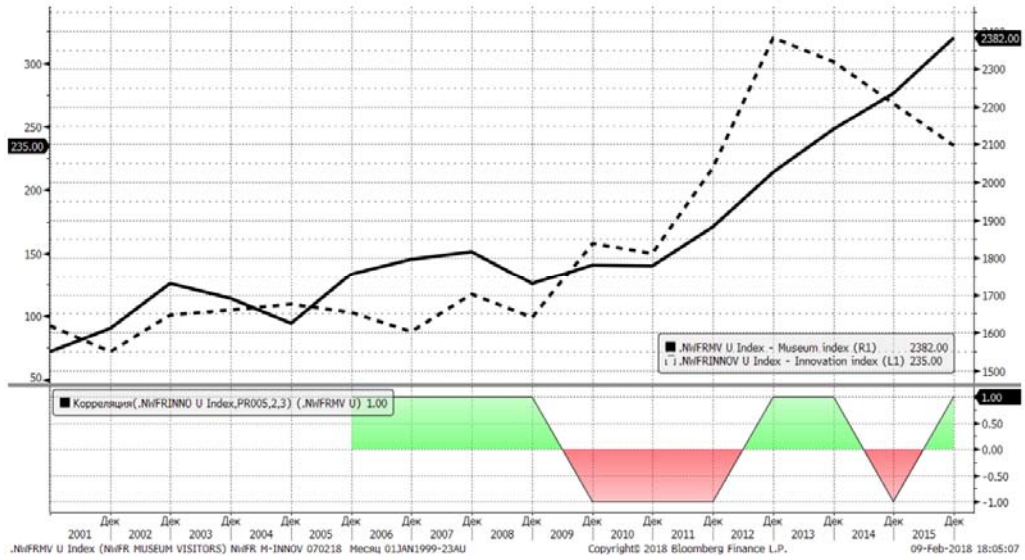

Figure 5: Comparison of museums visits and the implemented innovations amounts in North-Western Federal District.

Source: Author's calculations based on Rosstat and i/a system Bloomberg Professional data.

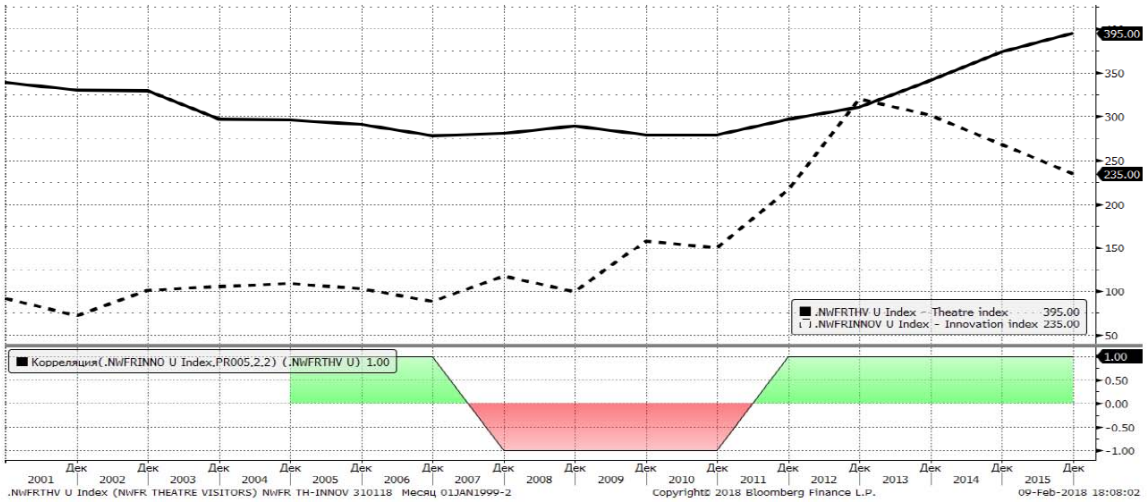

Figure 6: Comparison of theatre visits and the implemented innovations amounts in North-Western Federal District.

Source: Author's calculations based on Rosstat and i/a system Bloomberg Professional data.

The strength of the interaction between the theatre index and the innovation index in the SFD significantly exceeds the connection between the museum index and the index of innovations. These cultural indices correlation coefficients with the innovation index are 0.78 and 0.49 respectively without any lags. Due to its smallness, we do not give data for the strength of correlation between innovation indicator and the library funds.

NORTH-CAUCASUS FEDERAL DISTRICT (NCFD)

This is one of two districts that occupy the last places in mentioned above matrix of cultural indices gradations. Moreover, if Southern Federal District has slightly higher than the average (the 4th place) museum index level of development and slightly lower than the average (6th place) state of affairs in the library funds (library index), NCFD is stably the eighth in list of all three cultural indicators. Correlation analysis, applied to determine the interaction and trends of cultural and economic indicators.

The NCFD is characterized by an almost identical strength of the link between the economical innovation index and cultural indices: theatre and museum ones. Their correlation coefficients with the innovative index are kept around the value of 0.5. Slightly higher, this figure (0.55) belongs to museum index, slightly lower (0.49) – to theatre index as it is illustrated in

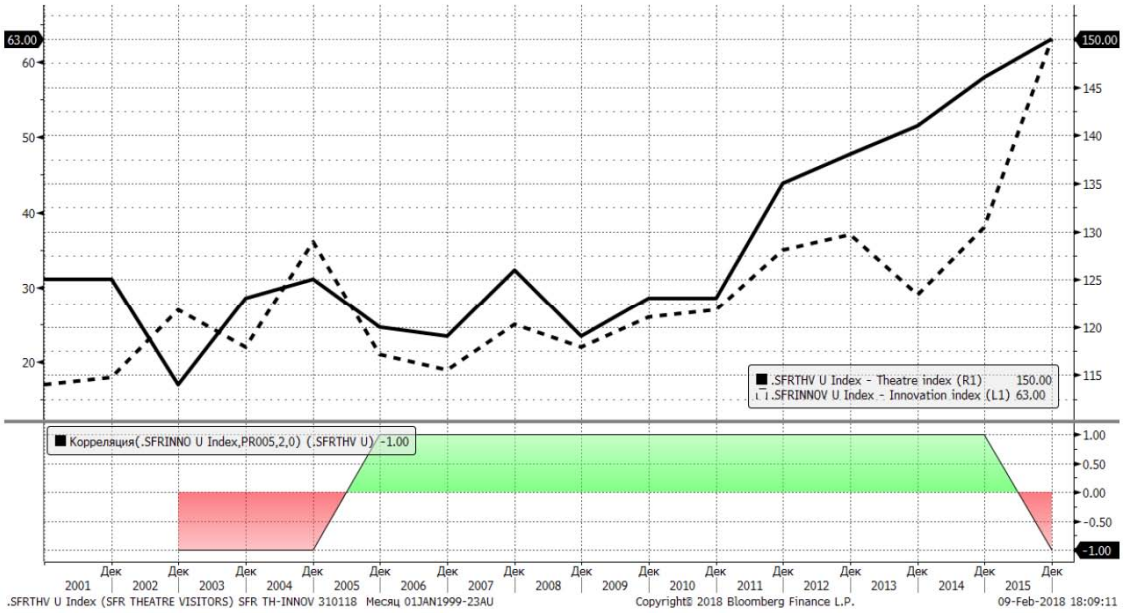

Figure 7: Comparison of visits to theatres and implemented innovations amounts in the Southern Federal District.

Source: Author's calculations based on Rosstat and i/a system Bloomberg Professional data.

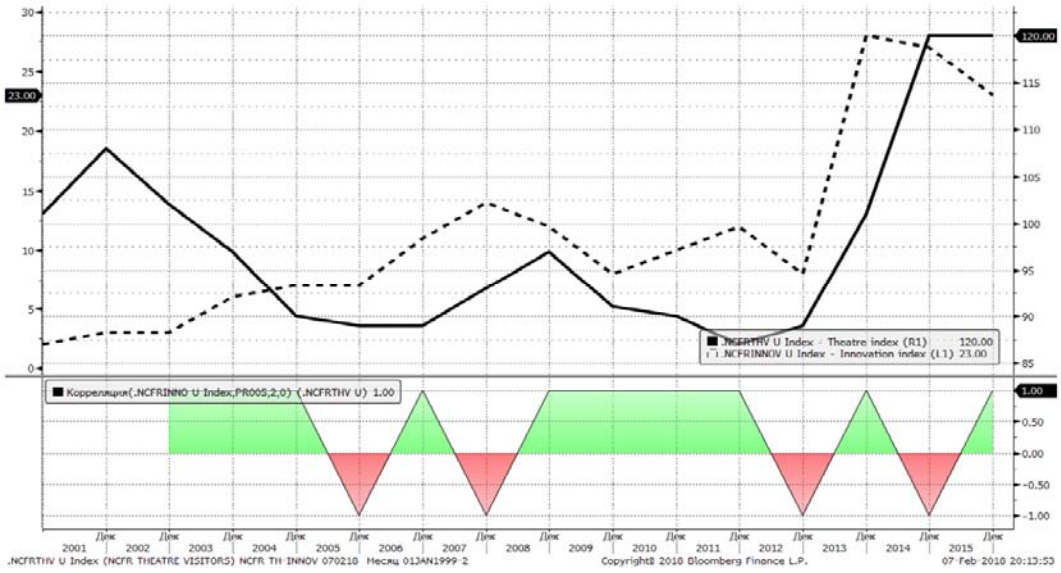

Figure 8: Comparison of visits to theatres and implemented innovations amounts in North- Caucasus Federal District.

Source: Author's calculations based on Rosstat and i/a system Bloomberg Professional data.

Figures **8-9**. With regard to library index, the correlation coefficient is negative (-0.57).

The results of cultural and economic relationships study are presented in Table **3**.

We should explain the implied designations in the Table **3**:

- the entire observation period from 2000 to 2015 is divided into two periods 2000-2008 and 2009-2015, since observations for several districts highlighted 2008 as a turning point in the strength of the indices correlation under study;
- very strong (0.9-0.99), strong (0.7-0.9) average (0.5-0.7) indicators from the entire interaction force scale (from -1 to +1) were chosen among other correlations levels
- sign + indicates the correlation period;
- sign → shows the influence direction of one index on another.

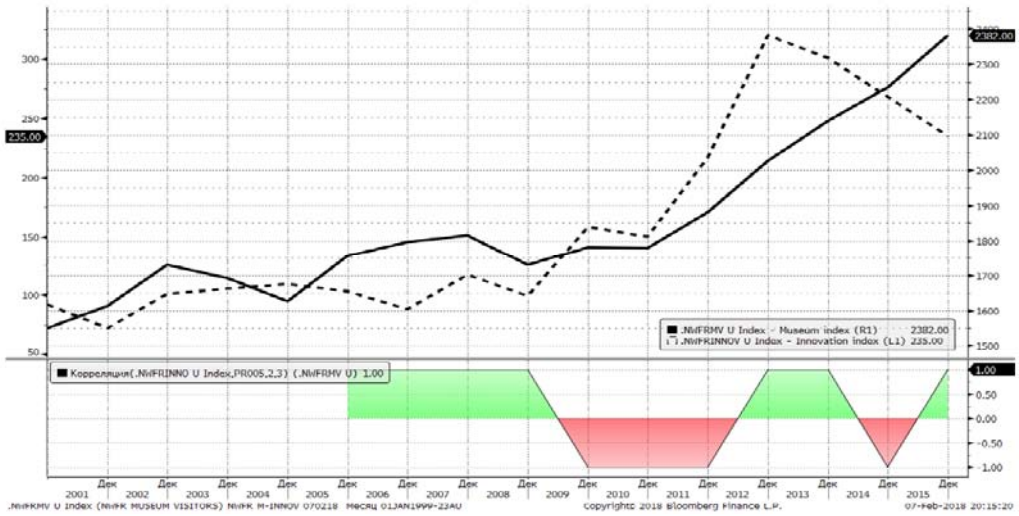

Figure 9: Comparison of the visits to museums and implemented innovations amounts in North- Caucasus Federal District. Source: Author's calculations based on Rosstat and i/a system Bloomberg Professional data.

Table 3: The Magnitude and Direction of Cultural and Economic Indices Mutual Influence

District	The most correlated indices		Measurement period (years) (+) and influence trend(→)			Correlation coefficient		
	Cultural index	Economic index	2000-2015	2000-2008	2009-2015	0,9-0,99	0,7-0,9	0,4-0,7
RF	Budget expenditures for culture	Innovations index	+ →				0,78	
	Theatre index	Innovations index	+ →				0,83	
CFD	Theatre index	Innovations index	+ →				0,84	
NWFD	Museum index	Innovations index	+	→	←		0,80	
SFD	Theatre index	Innovations index	+ →					0,63
	Museum index	Innovations iIndex	+ →					0,57
NCFD	Museum index	Innovations index	+	→	←			0,4
PFD	Theatre index	Innovations index	+ →					0,6
	Museum index	Innovations index	+ →					0,7

(Table 3). Continued.

District	The most correlated indices		Measurement period (years) (+) and influence trend(→)			Correlation coefficient		
	Cultural index	Economic index	2000-2015	2000-2008	2009-2015	0,9-0,99	0,7-0,9	0,4-0,7
UFD	Theatre index	Innovations index	+					0,4
			→					
					+	0,94		
					→			
	Museum index	Innovations index	+					0,4
			←					
					+	0,95		
					←			
SIFD	Theatre index	Innovations index	+				0,72	
			→					
FEFD	Theatre index	Innovations index	+					0,62
			→					

Source: Calculations by Spearman's rank correlation method based on Rosstat and i/a system Bloomberg Professional data.

CONCLUSIONS

The very strong (with spending on R & D) and strong (with technological innovation) correlation of cultural sphere indices was received for the Russian Federation as a whole. The clear impact of the cultural component was reflected in the implemented technological innovations. A special force among three considered cultural indices: visits to theatres, visits to museums and library funds, theatre index has. Such status of affairs found confirmation for Central, Southern, Ural federal districts. As for UFD, this was true for the period 2009-2015. The influence of the museum index on investments was prevailing in North-West Federal District. Approximately the same influence of theatres visiting and museums visiting on innovation was revealed in North Caucasus (middle level) and the Povolzhsky, Siberian, Far Eastern (strong level) federal districts. Moreover, NCFD revealed the opposite effect: the economic index has a greater impact on the cultural index. It may be interpreted as the necessity of additional cultural recharge for innovative processes. In Far Eastern Federal District, the museum index influenced on investment index dynamics. Nevertheless, the power of this influence was not very great. Unfortunately, the library index purely correlated with the development of the economic indices under study: gross regional product, investment growth, introduction of innovative technologies. We assume that this was due to the development of the Internet and electronic book circulation. It seems that electronic library collections should be taken into account in further statistical reports to evaluate their impact on economic indicators more objectively.

The significant influence of the cultural index on the innovation index speaks of the strategic influence of culture on the economy and its prospects. Since they are the innovative technologies that will make it possible to solve the most vital issues of the Russian economy. We mean increasing labor productivity, competitiveness of domestic products, and, consequently, Russia's economic viability, its economic sovereignty.

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CONFLICT-OF-INTEREST NOTIFICATION

We, the authors of this article, bindingly and explicitly declare of the partial and total lack of actual or potential conflict of interest with any other third party whatsoever, which may arise because of the publication of this article. This statement relates to the study, data collection and interpretation, writing and preparation of the article, and the decision to submit the manuscript for publication.

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