

Russian regions in growth and crisis: equalization or stratification?*

Evgeny Shiltsin

*Institute of Economics and Industrial Engineering, Novosibirsk
Novosibirsk state university, Economic Department*

Draft: Please, do not cite without author's permission
e-mail: sheval@yandex.ru

Abstract

The questions of regional economic development in Russia and its interaction to economic growth during the last decade are considered in the paper. It is shown, that intense increase of regional income differentiation for the last years of economic growth is going hand by hand with strong evidence of regional convergence for the most part of economic space. This specific case of disparities – Quasi-divergence – is provided thanking with few leader regions. Most part of Russian regional space converges with the rate of around 2% per year.

On the base of distribution dynamic approach of D.Quah we build ergodic distribution of regional GRP per capita, and show that most part of regional space tends to concentrate to the interval from 1/4 to the average.

We also find some evidence of a trade-off between economic growth and regional variation in the Russian macroregions. During the general convergence tendency the short time regional inequality increases are found. These inequality shocks – short time (1-2 years) increases are produced by very high growth rates (accelerations). During next years such risings of differences then follow back to the decrease tendency.

On the base of macroeconomic forecasts it was estimated that modern crisis affect for Russian regional economic disparities to increase way. The potential policy implications of this analysis are also discussed in the paper.

Keywords: regional inequality, convergence, distribution dynamics, economic growth, Russian regions

JEL code: R12, O18

1. Introduction

Covering around $\frac{1}{9}$ of the Land Russian Federation has very big differences in geographical, climate, demographical, infrastructural features between regions, that are predetermine very big regional variation in the level of economic development. Regional inequality has increased also in the transition from plan to market during 1990-s in conditions of deep structural crisis. This problem was in the focus of political discussions at that time because

* The author is grateful to the Russian Foundation for Basic Research (Grant No. 09-06-00036-a) and the Council on Grants of the President of Russian Federation (Grant No. MK-6124.2010.6) for their financial support.

of real danger of collapse of Federation. But the motivation of this research is considering to another point. After 1998 in the background of high growth rates the tendency of increasing of regional differences in Russia was not inverted. It seems the regional disparities rise as in decline as in growth. The coefficient of a variation of GRP (Gross Regional Product) per capita demonstrates a nearly constant growth after 1998. In 1998-2005 a average growth of the coefficient of the variation was 1,9 percentage points per year. The range of variation (maximum GRP per capita divided to minimum) increased more then twice: from 17,1 in 1998 to 43,6 in 2005. And only during two last years the variation decreased for some points. Such dynamics of the variation in the conditions of an economical growth leads to a call to search also the structure of this process.

2. Theoretical positions

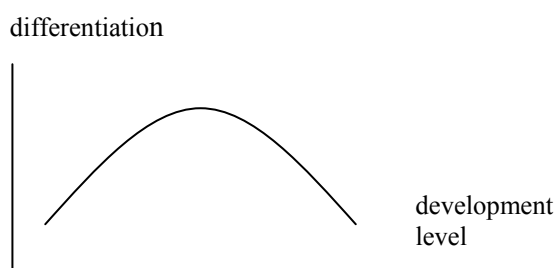
The discussions about the interrelations between a macroeconomic growth and regional differentiation have been lead since the middle of the XX century. And the range of points is quite various. However we can set aside the most crucial and renowned conceptions.

One of them is based on the neo-classical paradigm. It is considered that there are no any serious barriers for market forces, which lead to the general regional convergence in the integrated national expanse. In accordance with the market laws and in the conditions of the most important production resources mobility the prices of production factors (labour and capital) have are going to equalize in different regions, and that predetermines conditions for the regional convergence of the production. The main mover of that tendency is a decreasing marginal productivity of the capital. Among the earliest works, described this point, we can pay attention to the classical research of the regional development in the USA, made by Borts and Shtein (1964).

Another point of view is that there are no any crucial causes (conditions, factors) for the forming of the convergence of regional growth and regional receipts even for the long term perspectives. Regional economics should have the tendency to the divergence (a spatial layering), because market forces in case of working by themselves are spatially disequilibrating. The main causes of strengthening of one territory and abatement of the other are the results of economies of scale and agglomeration, that lead cumulative concentration of the capital, labour and accordingly output in one region during the scarcity of the other.

An erratical regional development is more self-produced then self-corrected. According to this theory the vector of an economical growth is channelled exactly to the side of layering. The bases of such regional development models were worked out by Perroux (1950), Myrdal (1957), Kaldor (1970, 1981).

One of the first scientists who theoretically explained the possibility of changing of the regional differentiation tendency was J. Williamson. In his analysis of the regional development evolution (Williamson 1965) he showed that a growth of regional differentiation is possible on the early development stages. That is connected with the fact that a great growth and activity usually starts in a limited number of more developed and full of resources regions, that can realize advantage of the capital concentration and qualified labor. But in the future the tendency of the differentiation is going to be pulled through. Backward regions on their turn will receive a push to an economical growth, showing (demonstrating) primary growth rates in the time when new technologies adopted in the leading regions gradually extend and the infrastructure is being developed. At the same time in the leading regions a capital return is decreasing, negative results from the agglomeration appeared and so on, all that leads to moving of the capital to the backward regions with the higher returns. So, the differences are flattened out in the furthest future, and the dependence of the interregional differentiation from the national growth has the form of the inverted letter “U” as a famous S. Kuznets’s curve.



Picture №1 Williamson’s curve of the trade-off between interregional differentiation and economic growth

Appearing of the accessible statistical data about economical growth of the most countries during a long enough period of time (for example the famous Heston-Summers’s Penn World Table¹) and also of regions, in particular the three-tier regional net NUTS, allowed the possibility of making an empirical analysis of the regional differentiation, checking of theories and corresponding to them models of an economic growth. All that gave rise to literal works, which was given a special name “convergence literature”. There are more or less detailed descriptions of such researches in works by Durlauf and Quah (1999), and Heshmati (2006) and others.

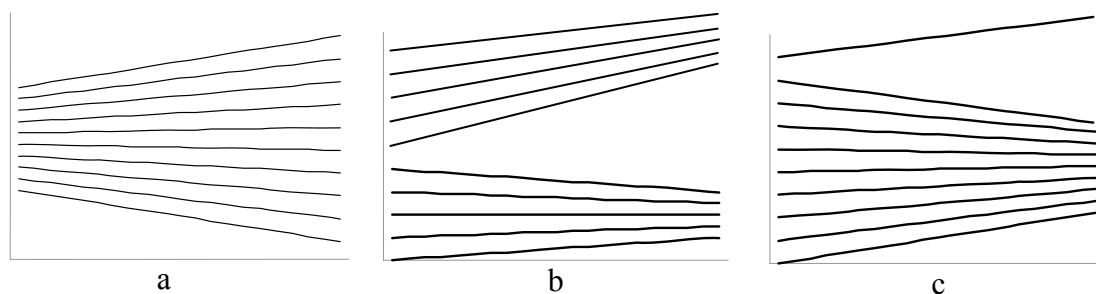
It turned out that the results of the empirical analysis does not also prefer any of those theories and we can find out a great range of variants of the regional development. Various models and theoretical positions can find a confirmation in different conditions and on different examples. An economical mechanism, which is baked in the models, can work not only for decreasing of the differentiation, but also for its increasing.

¹ See: www.pwt.econ.upenn.edu

So, different theories and models of the growth lead to different results concerning the processes of the layering or the equalization. Causes are not discussed in this paper, that is a separate and not very easy task.

Before we try to answer to the provoke and very popular question about a correlation of working tendencies of the regional development in Russia to these or those theoretical conceptions, we should set forth several preliminaries. In the literature all the possible variants of a cohesion, a divergence are analyzed in details, and their classification is proposed.

Without pretending to a finished description, concerning this case we put forth to set aside three crucially different, as we consider, forms of the development of interregional differentiation (Picture 2)



Picture №2 Divergence types: a – system-based, b – cluster-based, c – quasi-divergence

The character of the regional development can be called in the following types:

- a system-based (absolute) divergence, when all the economies (every pair) become more different from each other during the process of their development (Picture №2a);
- a cluster-based divergence, when the clusters (groups) come closer to each other or delaminate from each other so that the general differentiation of the system grows (Picture №2b);
- a quasi-divergence, when the most regions converge, insignificant quantity of leading regions goes far from the main group because of special causes so that many indicators of variation check out strengthening of the differentiation of the multitude (Picture №2c).

3. Data and methodology

Among the economical measures the GRP per capita is the most general (synthetic), it characterizes the leading projection of the economical and social development of a region. That is why we make the research of an interregional balance of the economical space on the base of only this principle. We would like to add that the counting is made for the whole territory of

Russia in the context of 79 regions - members of Federation. We do not analyze separately the districts that are included in the territory of another regions and also Chechen Republic, which has not the complete data series. The data of Gross Regional Product by 79 regions are from Russian Federal State Statistics Service database², data on 1992-1993 are from Mikheeva (1999).

There is the problem of measure differences. Most complete characteristic is might be the density function. For empirically approximation we use a histogram. To analyze dynamic and make forecast we use the distribution dynamic approach by Quah (1993) in the discrete form based on the transition matrix. But this type of estimation didn't give any aggregate numerical characteristic, that is very desirable to have for political implications.

So, as a measure of differentiation we take the coefficient of variation, which is the standard deviation of GRP per capita levels within a region, divided by the country's average GRP per capita level:

$$v = \left(\frac{1}{N} \sum_{i=1}^N \left(\frac{x_i}{\bar{x}} - 1 \right)^2 \right)^{\frac{1}{2}}, \quad (1)$$

where x_i is a GPR per capita in a region i ; \bar{x} is a middle in Russia GRP per capita, N is a quantity of regions.

Consistency of this measure and its adequate inequality capturing is provided by the fact that it satisfies all five basic properties of inequality measure (Silber 1999; Shorrocks and Wan 2004).

It is very important role of the structure of differentiation. It may affect on the result of measuring in very impressive way. One case is when differences grow between each pair of regions, when the growth of the differentiation is widespread on the whole territory and has features of a systematic one. And crucially another case is when the growth is assured by the exclusive dynamics of a few special regions, in which these or those special conditions were formed in the period of the antinomic conditions of an economic growth. To have possibility to divide different cases structure dynamic we suppose to pick out the role of each region in the aggregate measure of variation.

One of the possible approaches to the evaluation of a region contribution in an integral indicator of the differentiation of a GRP per capita can be defined in the following way:

$$d_i = \frac{1}{N} \left(\frac{x_i}{\bar{x}} - 1 \right)^2 : v^2, \quad (2)$$

² www.gks.ru

where d_i is an evaluation of a region investment i ; v is a variation coefficient (1). Accordingly, $\sum_i d_i = 1$.

It is also obviously that a contribution of this or that region in the integral evaluation of a dispersion is defined by a measure of an individual divergence of its GRP per capita from the middle measure in Russia as less and so more.

4. Divergence and Convergence

On the base of approach described above we analyze the dynamic of Russian region inequality. It turned out that a numerical account of the variation coefficient (in 2000 for example) is in broad measure explained by the contribution of two regions: Tumen region - 37,7% and Moscow - 11,6%. The sum of quads of divergences of other 77 regions is just about a half of the whole range.

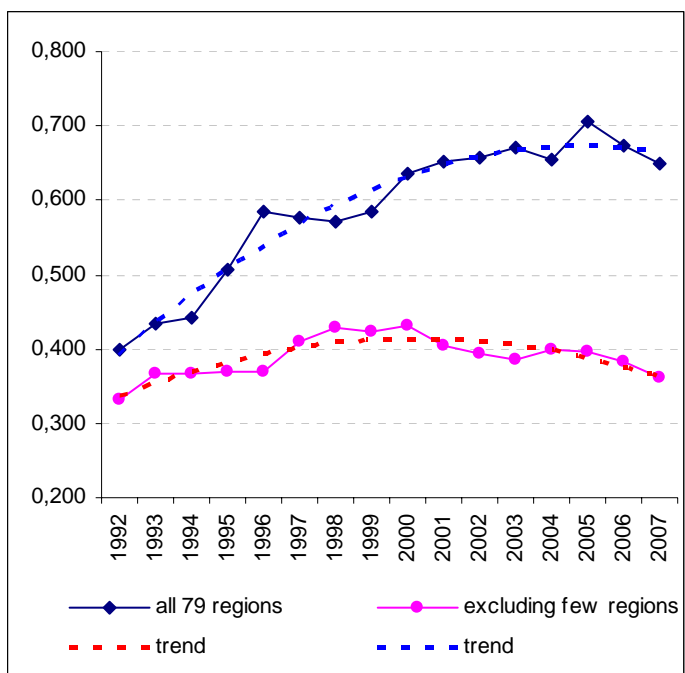
In a different way it is inquired that specifically in 2000 the main source of divergency from the absolute equality (unity) of the personal regional products and the factor of a territorial misbalance is specified by the situation in two leading regions. Outsiders do not seriously influence on a complex evaluation of the differentiation. We can see the same situation with an anomaly high measures of two or three leading regions' investments during all the next years.

During this time it is obviously that an intensification or slackening of the regional polarization in time can not be explained only by these facts relating to the statistics. It is connected with dynamical factors and with changing of a role of the separated regions in a combined index dispersion index. And it really turned out that from 2000 to 2007 the investments in differentiation (more then for 5 p.p.) have been essentially changed by only three regions: Moscow, Tumen region and Chukotskiy district. Their common contribuyion to a variation coefficient increased from 51% in 2000 to 62% in 2003 (but by 2007 it decreased till 49%, but mainly because of Tumen region). In the last year of the examined period Sahalin region joined this group abruptly extending its investment from 2,8% to 9,4%.

As for all the other regions here we see that the changings are insignificant. Each region's investment, except Yakutiya, into the integral indicator of the differentiation in 2007 is comparatively low on the one hand and is comparable with others, on the other hand, and as a rule it is less then the corresponding investment in 2000.

So, in connection with familiar special objective and subjective circumstances during the examined period several leading regions – Moscow, Tumen region and Chukotskiy district, Sahalin and Yakutiya – went far from the middle Russian level by the level of GRP per capita, leading to a misbalance and being in a good sense of the word “disturbers of a tranquility”. As all

the other parts of the country do not accord to these special circumstances and develop on the base of inherent to them regularities, there is a sense to compare regional differentiation dynamics with these regions and without them (Picture №3).



Picture №3. Dynamics of a coefficient of the GRP per capita

As we see rising of the differentiation in the period after 1998 is provided by only three regions. In the most part of the country (76 regions), where about 90% of the population live and 65% of the gross domestic product of the country are produced (by data of 2007), there is no any stratification in any case. And excluding of Yakutiya and Sahalin gives really definit trend of decreasing of the interregional variation. So we can see that differentiation dynamic of huge part of Russian region space is more related to the Williamson law.

We can affirm that during the period 1998-2007 the phenomena of the quasidivergence is supervised. Confirmation of this conclusion can be received in the frame of Quah's approach.

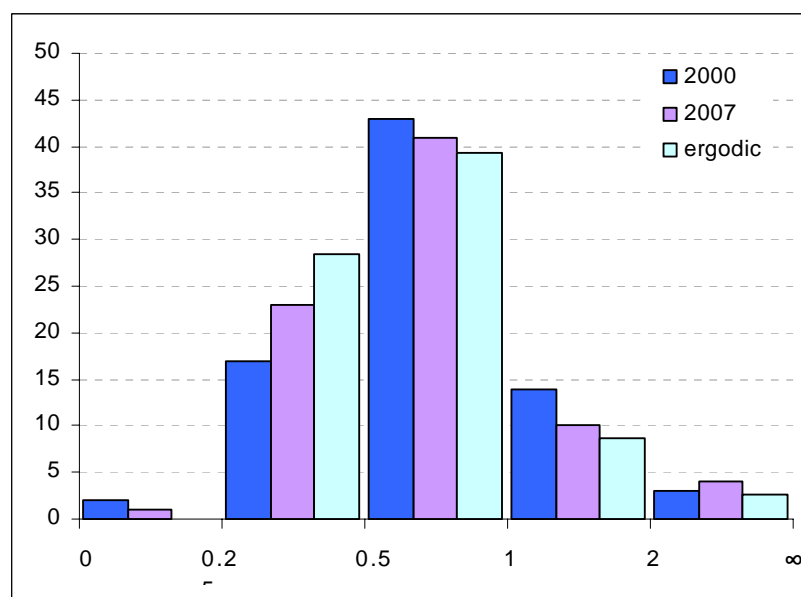
5. Distribution dynamics

More deployed presentation of the structure in perspectives and a concrete interval of the convergence gives the evaluation of distribution dynamics by D. Quah's method (Quah 1993, Durlauf and Quah 1999). Empirical evaluation of test distribution of the GRP per capita is based on a segregation of five intervals of accounts of an indicator. As scopes of the intervals according to Quah's offerings we take $\frac{1}{4}$, $\frac{1}{2}$, 1, 2 concerning an country average value.

In every analysed year we will divide the whole group of 79 regions to five parts according to its GRP per capita value: the regions with GRP per capita not over $\frac{1}{4}$ from a middle

value are put in the first interval, the regions with GRP per capita from $\frac{1}{4}$ to $\frac{1}{2}$ are put in the second interval, the regions with GRP per capita from $\frac{1}{2}$ to 1 are put in the third interval, the regions with GRP per a person from 1 to 2 are put in the forth interval, and all the other regions are in the fifth level. So, the empirical distribution of the GRP per capita in every year is expressed by the vector of relative rates.

During the period of 2000-2007 the empirical distribution has quite changed. Formalization of relocations of the regions between the segregated intervals with a use of transition matrix gives a possibility to compare examined intervals (2000-2007) and a perspective (ergodic) structure of a distribution of the regional GRP per capita (picture №4).



Picture №4. Distribution of the GRP per capita in 2000, 2007 and ergodic distribution (the scopes of the intervals were used according to the middle account).

We can consider as the specialties of the distribution of regional accounts of the GRP per capita in the perspectives the following:

1. It not agrees in one interval, and such situation could accord to the tendencies of the convergence to a common to all the regions account of the productivity;
2. There is no culmination of a density on the sides of the distribution, it means that there is no apparent segregation of considerable groups of rich and poor regions. The poorest regions move the group of more productive and run over $\frac{1}{4}$ from the middle scope; so the first interval becomes futile, and so only 3,3% of the richest are left here. Thereby an apparent clusterization is not overseen in Russian dynamics (Durlauf and Quah 1999)³.
3. The character and dynamics of the distribution demonstrate a definite tendency to a moving to the density from high accounts to less then middle accounts. In the interval

³ The results, received by this methodic in other country's regions, are different.

from ¼ to a middle account in a terminal distribution 85,7 % of regions accumulate. It means that an improvement of the balance is achieved by the advantage by moving of weak regions closer to the centre, strong regions do not have tendencies of this process.

4. The distribution becomes more high-summed and compressed in the point which is a bit lower than a middle point.

All these observations argue about the made conclusion of a tendency to decreasing of the differences between regional productivities, at least for the most regions in case when leading regions are not very far behind and are accorded with the results of evaluations received by variation coefficient's analyses.

6. Regional inequality and national growth

An economic growth in Russia in 2000-s was liked to pass the tendency to the convergence at least on the main territory of the country. At the same time fluctuations of the differentiation have a definite connection with macroeconomical growth's rates. This connection can be analyzed at the point of federal districts of Russia.

A regressive equation of an evaluation of the connection between a growth and a yearly changing in federal districts from 1998 to 2007 has the following form:

$$\Delta v_{it} = a \cdot I_{it} + b + e_{it}, \quad i=1, \dots, 7, \quad t=1999, \dots, 2007,$$

where Δv_{it} – yearly changing of the a variation coefficient of the GRP per capita in a district i from a year $t-1$ to a year t , I_{it} is an index of a growth of the GRP per capita in a district i in a year t , a is a coefficient, b is a free member of a regression, e_{it} is a mistake of the regression.

The results of an evaluation of this regression⁴ according to data of the period from 1998 to 2007 for different groups of regions (without counting of several regions-exclusions) are presented in a table №1.

Table 1

The results of an evaluation of a dependence of variation changing on the rates of a growth in Federal districts from 1998 to 2007

The groups of regions	b	a	F-statistics	P-value	R^2
without accounting of 3 regions*	-0,36	0,0034	2,7	0,10	0,04
without accounting of 4 regions**	-0,33	0,0031	4,2	0,04	0,06
without accounting of 5 regions***	-0,41	0,0038	5,0	0,03	0,08

* Moscow, Tumen region and Chukotskiy AO;

** Moscow, Tumen region and Chukotskiy AO; Sahalin region;

*** Moscow, Tumen region and Chukotskiy AO; Sahalin region; Yakutiya Republic.

⁴ The regression was evaluated by OLS method. Cointegration analysis do not have any sense because of short length of the time series.

This table shows us that the connection of a growth and changing of the differentiation without accounting of 3 regions-excludings is positive and statistically significant at the level of 10%. At moving of two more regions-excludings the evaluations (in case of insignificant changings) receive much more durable level of a statistical value. A positive value of a coefficient a shows that a differentiation growth accords to high rates of a growth and slackening accords to low rates of a growth. Saving of a parity rate (zero accretion of a differentiation) is achieved in case of 5,5% of yearly rates of growth in federal districts.⁵

So, «shocks» of an economical growth are connected with a short-term strengthening of a differentiation, because growth's impulses are mainly realized by more economically developed, more productive regions, which are able to receive an effect from their advantages. At that time a system and long-term growth includes in its work also backward regions widespreading on the territory and assuring decreasing of interregional differences at least on the main territory of the country.⁶

7. Regional disparities in modern crisis

The base of modeling of a regional space development forecast in the conditions of the continuing crisis is formed by a forecast of growth's rate of a national economy firstly. And secondly a survey made in Institute of Economic Transition⁷, which tells that the regions that had high growth rates loose more.

The main parameters of the forecast are follows.

We assumed as a basis of a real GDP dynamics in Russia the growth rate accounted by Rosstat in 2008 and the forecast for 2009 and 2010, published by the World Bank in 2009, June (World Bank Report 2009).

We make the following assumptions:

1. The correlation of growth rates of summed GRP of all 79 regions and a growth rate GDP in Russia is saved at the level of 2007: growth rate of a summed GRP is over growth rate of GDP for 0,185 p.p. (Table 2)

Table 2

Growth rates of GDP and summed GRP in Russia, %

	2005	2006	2007	2008	2009	2010
GDP in Russia	106.4	107.7	108.1	105.6*	92.1*	102.5*
Summed GRP	107.6	108.3	108.3	105.8*	92.3*	102.7*

* a forecast

⁵ This evaluation was received for the group without three regions-excludings at the request $\Delta v = 0$.

⁶ The same result is received by C.R.Azzoni the regions of Brazil (Azzoni 2001), by B. Szörfi in the regions of EU (Szörfi 2006).

⁷ www.iet.ru.

2. The growth rates of every GRP (in the forecasted 2009 and 2010) is accounted as some equal for all regions part φ of a growth rate of the previous year. A growth rate of the GRP in 2008 was accounted on a base of an average growth rate from 2005 to 2007. So, $\varphi=0$ means that GRP of every region (and so a summed GRP) is left on the last year level (the differentiation does not changed in this case); $\varphi=1$ means, that the regions grow with the same rate as earlier, and then the differentiation tendency does not change.

3. Forecasting values of the GRP are accounted with prices of 2007.

At the formation of a forecast a parameter φ of every year is chosen so that a summed GRP counted with this parameter's help rises with a rate showed in the table 2. This limitation assures accordings of a regional dynamics forecast to national economy growth (or contraction) forecast. The parameter φ accounted by this methodic for 2008 was 0,666, that is that every region growth rate in 2008 was only 66,6% from the average growth rate of this region for the period from 2005 to 2007; in 2009 this parameter was -1,320, that is that a growth rate of all regions (except Magadan region⁸) in 2009 was unfavorable, and decreasing was as stronger as higher growth rates were. In 2010 the situation according to World Bank forecast flattened out for some points and φ was -0,351, so growth rates of regions become again positive.

Using this approach we calculate forecast GRD for 79 Russian regions on the period 2008-2010. Empirical density (histogram) has not big changes. Coefficient of variation shows a little increase of regional differentiation during modern crisis.

8. Conclusion

The processes of a regional differentiation in Russia in the period of an economical growth from 1998 to 2007 are characterized not by differentiation strengthening (as it was in the period of 1990-s), but by some special type of a regional development, existing of two contrary tendencies. At level of the hole country the divergence processes are overseen at the time when in a subspace, covering 87% of a territory, 90% of population and 65% of a gross product we see a regional convergence, whose rates are comparable with the world tendencies and is around 2% per a year.

To assure the challenge of a visible convergence over the whole regional space is inefficient, because the differences between unique leaders and the main mass of regions are very high. To meet the goals of decreasing such big differences is seems to be unrealistic. But definitely another deal is a task of a convergence in the main and very vast part of regional space of the country. A purpose of decline differentiation level in limited period of time in this subspace is may be really archived.

⁸ Magadan region is a single region in Russia, that had negative growth rates in 2007.

References

- Azzoni C.R. (2001), Economic growth and regional income inequality in Brazil // *The Annals of Regional Science*, Vol. 35, P. 133–152.
- Borts, G.H., and Stein, J.L. (1964), *Economic growth in a free market*. New York: Columbia University Press.
- Durlauf S.N., Quah D.T. (1999), *The New Empirics of Economic Growth* // *Handbook of Macroeconomics*, Volume 1, Edited by J.B. Taylor and M. Woodford. Elsevier. P. 235-308.
- Heshmati A. (2004), *Regional Income Inequality in Selected Large Countries* // IZA DP No. 1307.
- Heshmati A. (2006), *The world Distribution of Income and Income Inequality: A Review of the Economics Literature* // *Journal of world-systems research*. V. XXI. No. I (July). pp. 61-107.
- Kaldor, N. (1970), *The case for regional policies* // *Scottish Journal of Political Economy*, November: 337-48;
- Kaldor, N. (1981), *The role of increasing returns, technical progress and cumulative causation in the theory of international trade and economic growth* // *Economie Appliquee*, 34.
- Mikheeva N. (1999), *Differentiation of Social and Economic Situation in Russia and Problems of Regional Policy*. EERC DP 99/09.
- Myrdal, G. (1957), *Economic theory and underdevelopment regions*. London: Duckworth.
- Perroux, F. (1950), *Economic space: Theory and applications* // *Quarterly Journal of Economics*. 64: 89-104:
- Quah, D. (1993), *Empirical cross-section dynamics in economic growth*. *European Economic Review*, N 37 (2/3). P. 426-434;
- Shorrocks A., and Wan G. (2004), *Spatial Decomposition of Inequality* // Discussion Paper No. 2004/01.
- Silber, J. (ed.) (1999), *Handbook of income inequality measurement*. Boston; Dordrecht and London: Kluwer Academic.
- Szörfi B. (2006), *Regional inequalities the European Union* // *Central European University Economics Department Working Paper*. November. <http://europeum.org.hu/wp-files/MicrosoftWordRegionalInequalities.pdf>.
- Williamson, J.G. (1965), *Regional inequalities and the process of national development* // *Economic Development and Cultural Change*, 13:1-84.
- World Bank' Report (2009) *About Economy in Russia*, №19, June / *The World Bank in Russia*. – 2009. [<http://www.worldbank.org.ru>; date 29.08.2009].