

Malkina, Marina

Working Paper

Decomposition of inter-regional inequality in average personal incomes by income sources: the Russia case study

Institute of Economic Research Working Papers, No. 67/2017

Provided in Cooperation with:

Institute of Economic Research (IER), Toruń (Poland)

Suggested Citation: Malkina, Marina (2017) : Decomposition of inter-regional inequality in average personal incomes by income sources: the Russia case study, Institute of Economic Research Working Papers, No. 67/2017, Institute of Economic Research (IER), Toruń

This Version is available at:

<https://hdl.handle.net/10419/219890>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/3.0/>



Institute of Economic Research Working Papers

No. 67/2017

Decomposition of inter-regional inequality in average personal incomes by income sources: the Russia case study

Marina Malkina

Article prepared and submitted for:

9th International Conference on Applied Economics Contemporary Issues in Economy, Institute of Economic Research, Polish Economic Society Branch in Toruń, Faculty of Economic Sciences and Management, Nicolaus Copernicus University, Toruń, Poland, 22-23 June 2017

Toruń, Poland 2017

© Copyright: Creative Commons Attribution 3.0 License

Marina Malkina

mmuri@yandex.ru

Lobachevsky State University of Nizhni Novgorod (Russia),
37 Bolshaya Pokrovskaya, 603000 Nizhni Novgorod, Russia

Decomposition of inter-regional inequality in average personal incomes by income sources: the Russia case study

JEL Classification: *D31; I31; R13*

Keywords: *personal income, sources, inter-regional inequality, decomposition*

Abstract

Research background: This paper is dedicated to inter-regional disparities in personal incomes and their composing by sources. We suggest that income sources contribute differently to overall inequality. Some of them, e.g. property incomes, amplify inequality, while others, e.g. social transfers, should mitigate it.

Purpose of the article: The aim of this article is to determine the character, direction and strength of influence of different sources, i.e. wages and salaries, property incomes, social transfers, entrepreneurship incomes and revenues from informal activities on inter-regional differences in overall incomes per capita and their dynamics based on Russian regional statistics in 2001-2014.

Methodology/methods: We used the method of relative deflating of regional incomes based on the fixed consumer basket cost, the population-weighted Theil index to measure inequality and technique of its decomposition to evaluate the contribution of various sources to regions' convergence in real incomes per capita.

Findings: For Russian regions in 2001-2014 we revealed different paths of inter-regional inequality for various sources of incomes. Decomposition of inter-regional income inequality demonstrated the largest and growing contribution made to it by wages and salaries. Informal incomes demonstrated declining influence on inequality and provided more than half of total inter-regional convergence. The contribution of entrepreneurship incomes to inter-regional disparities occurred the third and slightly decreasing, but their share in total incomes has declined. Social transfers per capita demonstrated the largest smoothing effect, but their contribution to convergence is mostly depleted. The property incomes proved to have the greatest enhancing impact on inequality especially in the period of economic growth, albeit not large by value because of small share in total income. Ultimately we revealed the substituting role of informal incomes in respect of formal incomes and existence of self-perpetuating mechanisms of reducing inequality in Russian economy.

Introduction

Earlier researchers dedicated their studies to assessment and analysis of inter-regional inequality in personal incomes in Russian economy. In general, they found growing regional disparities in average personal incomes in Russia during the transition period of 1990-2000 (Yemtsov, 2005, pp. 348–408). This tendency changed to opposite, i.e. convergence in regional personal incomes per capita, in the first decade of the 21st century (Guriev & Vakulenko, 2012, pp. 1-81). In this period, especially during 2005-2008, favorable market conditions in the oil and gas industry allowed to accumulate and redistribute mining rent, to increase pensions and other social benefits, salaries and wages in the public sector (Zubarevich, 2013, p. 52-56).

Researchers of Russian regional convergence revealed some particular features attributed to it. Firstly, they discovered its gravity effects, i.e. influence of the geographic proximity of regions on the speed of convergence (Ivanova, 2014, pp. 100-119). Secondly, they revealed impact of the development similarities on convergence, the most evident in the group of reach regions (Kholodilin *et al.*, 2009, pp. 5-27). In addition, (Lehmann & Silvagni, 2013, pp. 1-46) established high sensitivity of the level of incomes' inequality in Russia to performance of Moscow city and Tyumen Oblast and mining industry.

Decomposition of inter-regional inequality may shed light on formation and change in regional disparities in personal incomes. Modern scholars apply a range of methods of inequality decomposition: the covariance method (Shorrocks, 1982, pp. 193-212), the Gini coefficient additive decomposition (Lerman & Yitzhaki, 1989, pp. 43-47), the L. Shapley value method (Shorrocks, 2013, pp. 99-126), the Theil index decomposition (Chongvilaivan & Kim, 2016, pp. 79-98), etc. Now these techniques are employed for one, two and multi-dimensional decomposition of inequality in various spheres (Jedrzejczak, 2010, pp. 109-123; García-Peñalosa & Orgiazzi, 2013, pp. 689-727).

Unfortunately, these techniques are rarely used for incomes inequality decomposition in Russian economy. Thus, (Guriev & Vakulenko, 2012, pp. 1-81) applying the A. Shorrocks technique to the Gini coefficient disaggregated personal incomes inequality in 1995-2010 into those originated from wages, transfers and other incomes. Other researchers (Ovcharova *et al.*, 2016, pp. 170-185) applying the entropy indices and the regression technique by Morduch and Sicular found that the educational factor made the largest contribution to income inequality in Russia.

Our current study is aimed at detailed decomposition of interregional inequality in average personal incomes by sources based on more recent data of Russian regions in 2001-2014. According to our research hypothesis,

different sources make different relative contributions to regional disparities in total incomes, and impact of some of them is due to state management actions, while others are induced by adaptive practices of population within the specific institutional environment.

Research Methodology

Our study is based on the official data on 80 Russian regions in 2001-2014 provided by the Federal State Statistics Service of Russian Federation (FSSS) embracing personal incomes per capita, the structure of total incomes of population, number of population and the cost of the minimum fixed consumer basket. The personal incomes are grouped by sources, including: 1) business activities (entrepreneurship) incomes; 2) wages and salaries of employees reduced by arrears; 3) social transfers (pensions, benefits, scholarships, insurance compensations, etc.); 4) property incomes (interest on deposits, securities, dividends, etc.); 5) other incomes (proceeds from the sale of foreign currency, remittances, informal incomes).

First of all, we eliminate influence of regional inflation on nominal incomes through dividing them by indices of relative cost of living in the regions. These indices are calculated as the ratio of the cost of minimum consumer basket in the regions to the average cost of the same basket nation-wide (Malkina, 2015, pp. 99-100).

Secondly, we use the population-weighted Theil index for assessment of inequality, which is one of the measures of generalized entropy. Based on the logarithmic scale, it embeds the principle of diminishing marginal utility of relative incomes.

$$Th = \sum_{i=1}^m \rho_i \cdot \left(y_i / \bar{y} \right) \cdot \ln \left(y_i / \bar{y} \right). \quad (1)$$

where $i = \overrightarrow{1, m}$ - serial number of the region; ρ_i - share of the i-th region in total population of country; y_i - average personal income in the i-th region; $\bar{y} = \sum_{i=1}^n \rho_i \cdot y_i$ - average personal income in the country.

Thirdly, we apply relevant technique of the Theil index decomposition by K sources:

$$Th = \sum_{k=1}^K Th_k, \quad (2)$$

$$Th_k = \sum_{i=1}^m \rho_i \cdot \left(y_{ki} / \bar{y} \right) \cdot \ln \left(y_i / \bar{y} \right), \quad (3)$$

where y_{ik} – average personal income coming from the k-th source in the i-th region.

Next, we compare the shares of various sources in inequality with their shares in overall personal incomes to reveal which income sources are relatively enhancing and which are rather smoothing inequality.

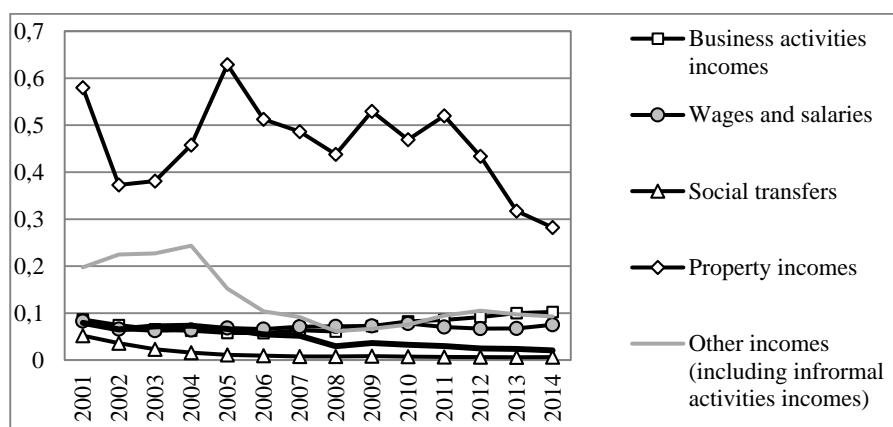
Finally, we employ the proportional method of factor analysis to evaluate contributions of various sources to total convergence/divergence of Russian regions in personal incomes across the years in connection with changing economic conditions.

The results of assessment of inter-regional inequality in average personal incomes and their components

The figure 1 demonstrates the level of inter-regional inequality in personal incomes and their components calculated by formula 1.

The property incomes appeared the most unevenly distributed component of personal incomes among Russian regions. Besides, their inequality shows large fluctuations across time, however, finally reduces by more than half.

Figure 1. Dynamics of the inter-regional Theil coefficient for average personal incomes and their components in Russian Federation in years 2001-2014



Source: own calculations based on FSSS of RF (2017).

The social transfers, on the contrary, demonstrate the lowest level of inter-regional inequality. This is quite reasonable, because social payments are designed as automatic stabilizers in economy aimed at smoothing the differences in personal incomes. Moreover, they demonstrate the most intensive regional convergence amounting to 87.6%.

Inter-regional inequality in wages and salaries is observed in the medium zone of our figures and outline cyclical waves over time embedded in narrow hallway. The Theil index indicates decrease in regional disparities in average wages by only 9.6% over the period considered.

Inter-regional inequality in business activities incomes as well appears medium among other types of income and demonstrates upward tendency after the crisis of 2009. Eventually, regional differences in this type of income enlarged by 18.7% over 2001-2014.

Unlike the formal business incomes, inequality in informal incomes decreased noticeably, more than 2 times over the period considered. It was permanently decreasing in the period of economic recovery of 2004-2008 and showed opposite ascending tendency in the following crisis likewise business activities incomes.

Meanwhile, separate evaluation of inequality of various income sources does not specify their interaction with overall inequality. Apparently, some sources of inequality may reinforce the general inequality (when act in the same direction with it), while others may weaken it (when act in the opposite direction). This necessitates the analysis of their cointegrated influence on overall inequality in personal incomes.

The results of decomposition of inter-regional inequality in personal incomes by sources

Contributions of various sources to total income inequality assessed by formulas 2-3 in comparison with their contributions to total personal income are represented in the table 1.

The obtained results evidence that the structure of inter-regional inequality in personal incomes has changed significantly over 14 years. The share of wages and salaries in total inequality has increased more than 4 times, while their share in total personal income was persistently about 39-41%.

The property incomes had the greatest relative impact on inter-regional inequality. Their share in regional disparities surpassed their share in personal incomes 3.3-7 times in different years. These shares ratio was sharply

growing during 2003-2011. After that we can observe a small drop in the property incomes relative contribution to inequality, which is probably caused by the recession in economy, primarily deteriorating the condition of affluent regions.

Table 1. The results of decomposition of the inter-regional personal incomes inequality by sources based on the Theil coefficient (share, %)*

	Business activities incomes		Wages and salaries		Social transfers		Property incomes		Other incomes		Total incomes	
	S_{Thk}	S_{Yk}	S_{Thk}	S_{Yk}	S_{Thk}	S_{Yk}	S_{Thk}	S_{Yk}	S_{Thk}	S_{Yk}	S_{Thk}	S_{Yk}
2001	4.7	13.0	19.3	39.5	3.2	15.6	21.4	5.0	51.4	26.9	100	100
2002	4.0	12.2	18.7	41.8	1.0	15.7	16.1	4.8	60.2	25.4	100	100
2003	2.4	12.4	17.4	40.1	-3.0	14.7	23.9	7.2	59.3	25.6	100	100
2004	0.7	12.2	16.8	41.1	-5.3	13.5	29.0	7.5	58.8	25.7	100	100
2005	0.6	11.8	25.3	39.8	-9.1	13.4	44.9	9.0	38.3	26.0	100	100
2006	0.7	11.5	31.8	39.5	-9.6	12.7	42.6	8.8	34.5	27.6	100	100
2007	-1.6	10.5	40.7	41.1	-10.4	12.2	39.0	7.9	32.3	28.3	100	100
2008	0.1	10.6	71.8	43.5	-9.2	13.6	31.8	5.5	5.5	26.9	100	100
2009	-0.5	9.9	54.9	40.3	-9.1	15.4	36.1	5.8	18.6	28.7	100	100
2010	-3.2	9.2	60.9	39.4	-15.2	18.3	34.3	5.6	23.2	27.7	100	100
2011	-4.0	9.3	53.3	39.2	-17.0	18.8	32.4	4.6	35.3	28.1	100	100
2012	-3.0	9.7	57.6	40.3	-17.5	18.8	30.2	4.6	32.7	26.5	100	100
2013	-2.2	8.9	63.1	40.4	-19.3	19.1	27.9	5.0	30.5	26.5	100	100
2014	-1.2	8.6	77.4	40.4	-16.5	18.4	27.5	5.4	12.8	27.2	100	100

* Note: S_{Thk} - share of the k -th type of income in total inequality (by the Theil index); S_{Yk} - share of the k -th type of income in total income

Source: own calculations based on data provided by (Russian Federation Federal State Statistics Service, 2017)

Social transfers proved to have the greatest leveling effect on inter-regional inequality only enhancing over time. At the same time, the share of social transfers in personal incomes in Russia has increased from 15.6% to 18.4%, which indicates the growing paternalism in Russian economy.

Generally we can ascertain the positive influence of business activities incomes on reduction in regional disparities in personal incomes in Russia, although their smoothing impact on inequality reduced during the 2011-2014 recession. However, permanent decrease in the share of business activities incomes in total incomes of Russian population did not allow their equalizing effect to manifest.

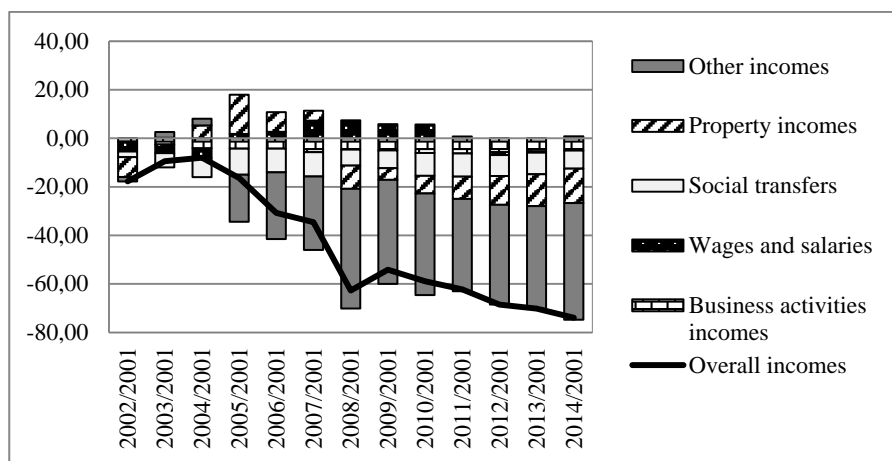
Informal incomes used to be the greatest source of spatial inequality in Russia in the first half of the 2000s. After that their impact on inter-regional inequality in personal incomes dropped, while their contribution to personal

incomes almost did not change. This process was accompanied by relocation of informal activity towards the less affluent southern regions. Noticeable reduction in relative impact of informal incomes on inequality observed in 2008-2010 and 2014 is probably caused by launch of self-perpetuating mechanisms of population adaptation to deteriorating environment during the crisis.

Contribution of income sources to the regional convergence in personal incomes per capita

The figure 2 illustrates cumulative contributions of various sources to Russian regions convergence in personal incomes assessed by means of the proportional method of factor analysis.

Figure 2. The contribution of different sources to the Russian regions convergence in personal incomes per capita presented on an accrual basis since 2001 (according to the Thei decomposition)



Source: own calculations based on data of FSSS of RF (2017).

According to our calculations, about 65% of regional convergence in personal incomes was attained due to smoothing effect of the informal incomes, whose influence was only amplifying in course of time. This really surprising result cannot be estimated unconditionally positive because most part of this revenue is involved in tax evasion.

Property incomes contributed to growth in inequality until 2008, and then demonstrated moderate contribution to regions convergence in personal incomes (finally providing 19.2% of it). Social transfers and business activities incomes altogether provided additionally 16.9% of total convergence. The ultimate contribution of wages and salaries to regional convergence proved to be almost nil. Moreover, it was not steady, altering by direction and even more provoking divergence in 2007-2008 and in 2014.

Conclusions

In this research we employed the Theil index and technique of its decomposition for assessment of contribution of various income sources to inter-regional inequality in average personal incomes in Russia. It allowed us to explain the earlier revealed phenomenon of reducing regional disparities in the level of personal incomes in Russian economy in 2001-2014 and to disclose its qualitative nature.

We found that contribution of various types of incomes to spatial inequality in overall personal incomes depends not only on their own inequality but also on their correlation with over incomes. Thus, social transfers proved to be the most mitigating type of incomes, which inter-regional differences dropped most of all. But their contribution to regional convergence in total incomes appeared moderate. The property incomes are mostly enhancing source of inequality, reacting to crisis, but their share in incomes is small. They tend to contribute to convergence during crisis.

Business activities incomes appeared the second ranked equalizing component of regional incomes inequality, after social transfers, but their share in personal incomes dropped. The main correcting role in spatial inequality was conveyed to informal incomes. Their contribution to inter-regional convergence in personal incomes occurred the largest mostly because of their permanently significant share in total personal incomes and spatial relocation in favor of less advantaged regions. This result corresponds to the study by (Amarante, 2016, pp. S4–S21) observed the same phenomenon in Latin America.

Finally, wages and salaries have gradually turned from the source mitigating spatial inequality to one enhancing it. They did not really have any perceptible relation to the regions convergence in terms of personal incomes.

We confirm the existence of self-perpetuating forces in economy preventing growth in inequality and ensuring catching-up effect. Except for social transfers specifically constructed as automatic stabilizers, we can mention legal and illegal business activities' incomes which may partially

compensate for differences in income in periods of ups and down, respectively.

Finally, we have to make a reservation for the national statistical peculiarities not explaining in details the origin of 26% of household incomes called “other incomes”. This problem is also emphasized by (Zubarevich, 2013, p. 49) who points out the shortcomings of the Russian household statistics, such as a rough estimate of shadow incomes, inadequate sample household survey, the complexity of the measurement of natural receipts, etc., hindering a meaningful analysis. Finding ways to overcome these obstacles would allow more precise analysis of participation of various personal income sources in formation of inter-regional disparities in Russia. It may be the subject of further analysis and future discussions.

Acknowledgments

The research was supported by the Russian Foundation for Basic Research, as a part of the project № 15-02-00638, “The relationship between income inequality and economic development in the regions of the Russian Federation”.

References

- Amarante, V. (2016). Income Inequality in Latin America: A Factor Component Analysis. *Review of Income and Wealth*, 62. DOI: <http://dx.doi.org/10.1111/roiw.12236>.
- Chongvilaivan, A. & Kim, J. (2016). Individual Income Inequality and Its Drivers in Indonesia: A Theil Decomposition Reassessment. *Social Indicators Research*, 126. DOI: <http://dx.doi.org/10.1007/s11205-015-0890-0>.
- García-Peñalosa, C., & Orgiazzi, E. (2013). Factor Components of Inequality: A Cross-Country Study. *Review of Income and Wealth*. 59(4). DOI: <http://dx.doi.org/10.1111/roiw.12054>.
- Guriev, S., & Vakulenko, E. (2012). Convergence between Russian regions. *CEFIR / NES Working Paper series*, 180 (October).
- Guriev S., & Vakulenko E. (2015). Breaking out of poverty traps: Internal migration and interregional convergence in Russia. *Journal of Comparative Economics*, 43. DOI: <http://dx.doi.org/10.1016/j.jce.2015.02.002>.
- Ivanova, V. (2014). Regional convergence of income: spatial analysis. *Spatial Economics*, 4. DOI: 10.14530/se.2014.4.100-119. (In Russian).
- Jedrzejczak, A. (2010). Decomposition analysis of income inequality in Poland by subpopulations and factor components. *Argumenta Oeconomica*, 24(1).

- Kholodilin K., Siliverstovs B., & Oshchepkov A. (2012). The Russian regional convergence process: Where does it go? *Eastern European Economics*, 50 (3). DOI: <http://dx.doi.org/10.2753/EEE0012-8775500301>.
- Lehmann H., & Silvagni M. G. (2013). Is There Convergence of Russia's Regions? Exploring the empirical evidence: 1995–2010. *OECD Economics Department Working Papers*, 1083. Retrieved from: <https://www.econstor.eu/bitstream/10419/90130/1/dp7603.pdf>.
- Lerman, R.I., & Yitzhaki, S. (1989). Improving the accuracy of estimates of Gini coefficients. *Journal of Econometrics*, 42. DOI: [http://dx.doi.org/10.1016/0304-4076\(89\)90074-2](http://dx.doi.org/10.1016/0304-4076(89)90074-2).
- Malkina, M.Yu. (2015). Evaluation of the Factors of Intra-Regional Income Differentiation of the Russian Population. *Spatial Economics*, 3. DOI: <http://dx.doi.org/10.14530/se.2015.3.097-119>. (In Russian).
- Ovcharova, L.N., Popova, D.O., & Rudberg, A.M. (2016). Decomposition of Income Inequality in Contemporary Russia. *Journal of the New Economic Association*, 3. (In Russian).
- Russian Federation Federal State Statistics Service, 2017. [online]. Retrieved from http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/en/main/.
- Shorrocks, A.F. (1982). Inequality decomposition by Factor Components. *Econometrica*, 50(1). DOI: <http://dx.doi.org/10.2307/1912537>.
- Shorrocks, Anthony F. (2013). Decomposition procedures for distributional analysis: a unified framework based on the Shapley value. *Journal of Economic Inequality*, 11(1). DOI: <http://dx.doi.org/10.1007/s10888-011-9214-z>.
- Yemtsov, R. (2005). Quo vadis? Inequality and poverty dynamics across Russian regions. In Kanbur, Ravi & Venables, Anthony J. (Eds.). *Spatial Inequality and Development*. Oxford: Oxford University Press.
- Zubarevich, N.V. (2013). Inequality in population incomes: a projection in space. *Pro et Contra*, 6. (In Russian).