

**2019**

## **IARIW-HSE**

Special IARIW-HSE Conference “Experiences and Future Challenges in Measuring Income and Wealth in CIS Countries and Eastern Europe” Moscow, Russia, September 17-18, 2019

### **Understanding Inequality and Poverty Trends in Russia**

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Paper Prepared for the IARIW-HSE Conference  
Moscow, Russia, September 17-18, 2019  
Session 6B: Poverty  
Time: 10:15 – 12:15, September 18

# UNDERSTANDING INEQUALITY AND POVERTY TRENDS IN RUSSIA

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This version: 29 August 2019

**Abstract.** The distribution of income in Russia changed significantly over the past 20 years. We observe an overall decrease of inequality, poverty and increase in levels of income. In this paper, we address the question of what factors were responsible for the fall in inequality and poverty during the last decade in the Russian Federation. We observe that the evolution of socio-demographic characteristics together with labour market employment had no impact on inequality and poverty. Changes in earnings from public and private sectors and pensions are the main drivers of changes in income distribution. Falling inequality and poverty is the result of decrease in dispersion of private earnings and increase in levels of pensions and public sector earnings.

**Keywords:** earnings, inequality, poverty, counterfactual analysis, Russian Federation.

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## 1. INTRODUCTION

The distribution of income has changed globally over the past decade. There has been a clear trend of rising income inequality in most industrialized countries (OECD, 2019). This trend and its determinants have been studied extensively (Biewen, Ungerer, & Löffler, 2017; DiNardo, Fortin, & Lemieux, 1995; Ferreira, Firpo, & Messina, 2017; Hyslop & Maré, 2005; Murphy & Welch, 1992). Controversially to this, some emerging economies experienced a fall in income inequality (Balestra, Llana-Nozal, Murtin, Toso, & Arnaud, 2018). This was the case of Russia. In this paper, we provide a comprehensive analysis of decline in income inequality and poverty in Russia.

Russia has typically been subject to macroeconomic volatility, accompanied by periods of high and very high inflation, sovereign default, periods of economic recovery and geo-political instability. This has attracted the attention of researchers around the world. Early studies focused on the level of inequality and poverty during the transition from a planned to a market economy (Comander, Tolstopiatenko, & Yemtsov, 1999; Denisova, 2007; Flemming & Micklewright, 2000; Jovanovic, 2001; Milanovic, 1999). Later studies on inequality in Russia focused on the period of economic growth from 2000 to 2008 (Gorodnichenko, Sabirianova Peter, & Stolyarov, 2010; Lukiyanova & Oshchepkov, 2012). These studies found that Russia experienced a dramatic rise in income inequality in the 1990s, which reversed in the 2000s. The top and bottom tail of income distribution gained, while the middle-income class lost (the so-called hollowing out of the middle effect). Economic growth from 2000-2008 had a pro-poor nature.

The latest studies on income inequality in Russia cover such issues as documenting the top income shares (Novokmet, Piketty, & Zucman, 2018) and understanding factors behind wage inequality (Calvo, López-Calva, & Posadas, 2015) and mobility trends (Dang, Lokshin, Abanokova, & Bussolo, 2018). Calvo et al. (2015) find that employment type and returns to employment are the most relevant factors for explaining wage inequality. While understanding changes in wage structure is important, we still lack understanding of changes in income inequality and poverty in Russia.

In this study we examine determinants for the observed changes in income inequality and poverty in Russia over the period 1994-2015. The study is based on the data from the Russia Longitudinal Monitoring Survey - Higher School of Economics. This survey data offers a wide range of socio-demographic characteristics of household and individuals together with detailed information on income sources over a long period of time. This feature allows us to come as close as possible to the answer of the question about determinants of changes.

When thinking about possible determinants of income inequality and poverty, three groups of factors are defined: socio-demographic characteristics, labour market participation and labour market returns. We only consider those household characteristics that changed the most over the examined period of time.

Aiming to understand mechanisms behind trends in income inequality and poverty, we follow a semi-parametric decomposition method introduced by DiNardo, Fortin and Lemieux (1996) (DiNardo et al., 1995). This technique allows to construct a counterfactual income distribution of the world by keeping possible determinants fixed in time, while changing others. Afterwards, the actual and counterfactual states are compared and the effects of the determinants are defined. We believe that the counterfactual analysis can convey the main information about the main drivers of changes in inequality, poverty and income levels.

Our findings suggest that changes in socio-demographic characteristics and labor market outcomes did not have any impact on income inequality and poverty in Russia. Falling inequality and poverty is the result of changes in earnings from public and private sectors and pensions. Neither other income sources nor other benefits had affected dynamics of income inequality and poverty. Increase in earnings from private sector had resulted in increase in income levels, while increase in pensions – in decrease in inequality and poverty. As income levels increase significantly over the examined period, we conduct an extra analysis to separate impact of change in levels from impact of changes in dispersion. We find that decrease in income inequality and poverty is the result of increase in levels of pensions and earnings from public sector and decrease in dispersion of earnings from private sector. Over the last 20 years of decrease in inequality, pensions had the strongest equalizing effect on distribution of income. Additionally, most of the changes in income distribution occurred at the lower part of income distribution. Our results are robust to changes in the base year and adjustments to the top tale of income distribution.

By reporting on a statistical decomposition of income inequality and poverty in Russia over 1994-2015 period, we hope that this contributes an important first step in the analysis of remarkable inequality dynamics. But while it establishes the stylized facts that must be explained, it does not offer a causal analysis of why levels of public sector earnings and pensions had increased and dispersion of private sector earnings had decreased. This task is left for future work.

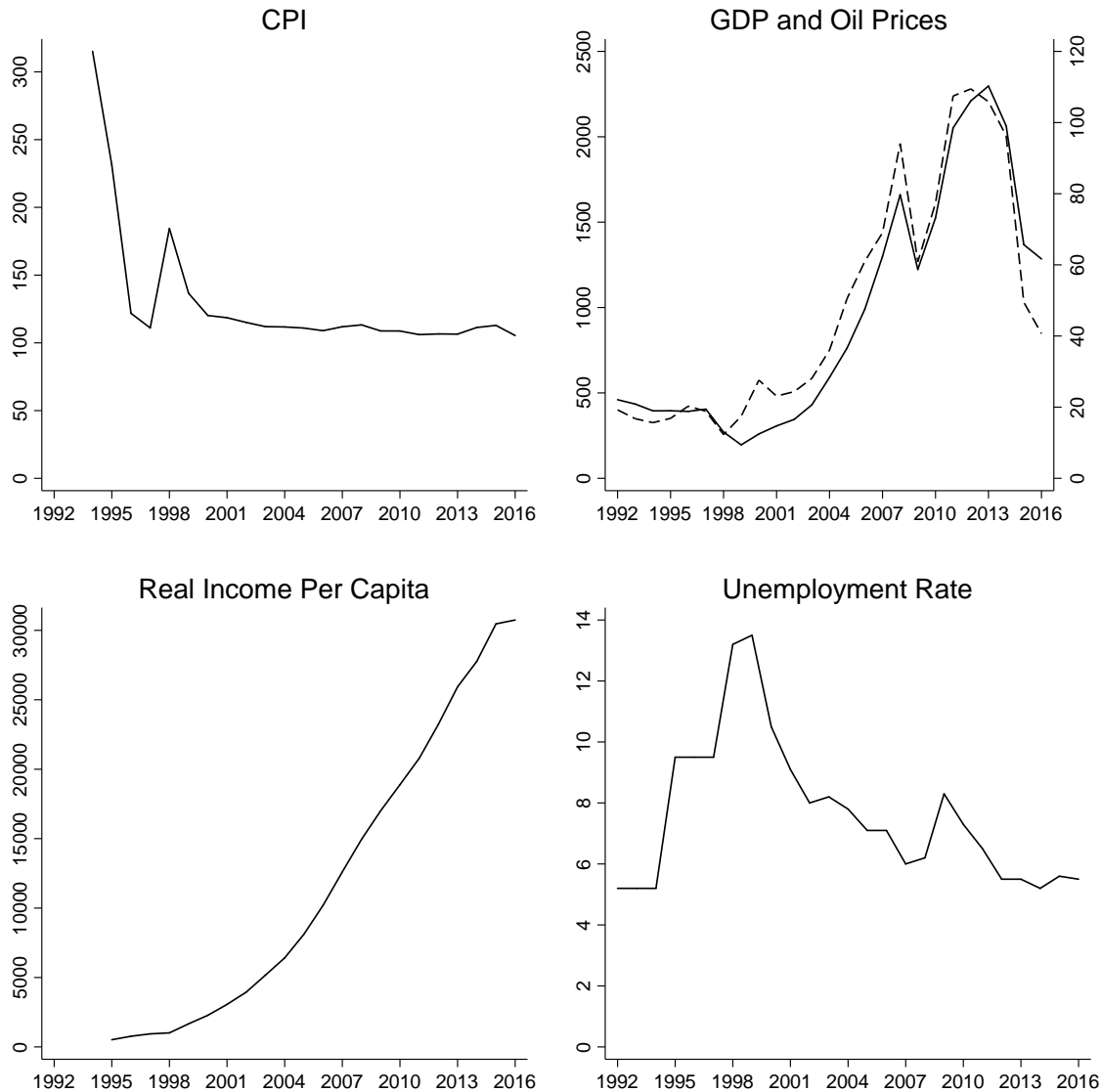
The remainder of the paper is organized as follows. In section 2 we present Russia's development over the period 1994-2015. In section 3 we discuss possible data sources to study changes in income distribution. Consequently, we introduce the data, and document trends in income inequality and poverty. In section 4, we determine and analyze possible determinants of the observed changes in income distribution. Section 5 presents empirical methods for studying changes in income inequality and poverty, and finally in section 6 we present the results. Section 7 concludes.

## **2. ECONOMIC CONDITIONS**

The analyzed period covers 20 years including recession, economic growth and crisis. We, thereby, believe that understanding the economic situation during this time will help to analyze the trends of inequality and poverty in Russia. We divide the period from 1994 to 2015 into three distinctive phases and sketch the most important economic changes. Figure 1 summarizes the main stylized facts about the Russian economy, on the one hand, including GDP, CPI and, not least important, oil prices, and

well-being of its citizens including real per-capita income and unemployment rate, on the other hand.

The last decade of the 20<sup>th</sup> century was a tumultuous period for the Russian economy. The collapse of the Soviet Union brought an unprecedented scope and speed of changes, which affected more than 250 million people in many countries. These changes were price liberalization, establishment of new economic institutions and property rights, high and very high inflation, and, in the end, government default in 1998. Moreover, while a tiny group of people was accumulating its wealth, the majority of Russians were suffering from a severe and worsening recession, reflected in a decline of real earnings starting right after the Soviet collapse. There is much more that could be said, but the most important outcome is that the economic reforms of this time led to an extreme and rapid social and economic stratification in Russia.



**Figure 1.** Economic Development in Russia 1994-2017  
**Note.** Russian Statistical Office, (2017); The World Bank, (2019).

By the period 2000 to 2008, thank to constantly increasing oil prices, Russia was enjoying its economic growth. On average GDP was growing by 26% on annual

base. The rates of inflation were reasonably moderate and fluctuating on average between 11% and 15%. Note that in the context of Russia these inflation rates are seen reasonably low. The economic growth had an ultimate effect on well-being of individuals. The real income per capita increased from 2281 rubles in 2,000 to 15,000 rubles in 2008. The average unemployment rate decreased to 6.2% by 2008 compared with 7.1% in France, 5.6% in the UK and 7.1% in Germany (see World development indicators, 2019). The economic growth in Russia had a non-negligible impact on well-being of Russian families in general, but poor households benefited from it relatively more. Gorodnichenko et al., (2010) documents that the economic growth had a pro-poor character.

This was the economic situation right before the financial crisis in 2008: stable GDP growth, financially stable economy, surplus of state budget, increase in real individual income and decrease in unemployment. In 2008 the financial crisis was spreading all over the world. Russia experienced massive after-math impacts of this crisis: increase in capital outflow, fall of oil prices by 35% and, thus, budget revenues, decrease in GDP by 26.4%, fall in real income per capita and rise in unemployment. This was the end of economic growth and the beginning of a bumpy-ride development.

Looking at the after-crisis period, we see a very uneven dynamics: fast and momentary economic recovery in 2010-2011, economic stagnation in 2012-2015, and even growth in 2016. It is not surprising to see that this dynamics follows ups and downs of oil price developments. This clearly tells us that the country's development is still strongly dependent on oil prices. Apart from this, it is difficult to tell how this dynamics affected the well-being of Russian families. On the one hand, figure 1 shows that since 2010 the real income per capita was on increasing path and unemployment rate – on decreasing. On the other hand, it is impossible to ignore the impacts of on-going geo-political crisis, depreciating national currency and diminishing national budget on inequality and poverty in Russia.

In sum, despite a very unbalanced economic development during the last 30 years there has been a distinctive step in poverty and inequality reduction and improvement of well-being. Despite this good news, these are all good news to tell. We do not know much about future policies in Russia. However, what we know is that there is still a long way towards more equality and poverty reduction.

### **3. DATA**

The goal of this paper is to measure and explain changes in income inequality and poverty among individuals in Russia. For this analysis we need a reliable source of data that collects regularly information on income, its sources and various households and individual characteristics such as age, gender, educational qualification, working status, number of working hours, etc. Therefore, survey data is our principal source of evidence. In addition to the above-mentioned criterion, we need a survey that is conducted on a regular base for a long time period. For this reason, we do not consider the National Survey of Household and Program Participation (NOBUS) as potential data source. Based on the requirements and availability, we are

left with two options: Rosstat Household Budget Survey (HBS) and the Russia Longitudinal Monitoring Survey (RLMS-HSE).

### **3.1. DATA AVAILABILITY**

The HBS is a survey conducted by the Federal Statistical Service of Russia on annual and quarterly basis. The survey is designed to monitor consumption, expenditures, well-being and living conditions of Russian households across the whole country. It is a cross-sectional dataset that contains information on income, consumption, expenditures, and living conditions on household level. This is the source that is used to construct poverty and inequality indices published by Russia's statistical agency. An indisputable advantage of the HBS that it aims to survey 45,000 households in all 85 Russia's regions and, therefore, it is a nationally and regionally representative survey. Furthermore, it includes extremely large questionnaire on consumption and expenditures. The publicly available data covers time span 2003-2015.

On one hand, the HBS seems to be an appropriate data source. However, like many survey data it has its disadvantages too. The most important feature of the HBS is that the main variable of interest, income, is not collected, but constructed using expenditures and flow of funds information. As we aim to understand trends in inequality and poverty measured by household income, making an analysis with income variable constructed from expenditure data might bias our results. Additionally and not least importantly, the information on individual characteristics is very limited: no data on employment status neither on education of individuals. Thus, using this survey we would not be able to quantify effects of changes in socio-demographic characteristics and labour market outcomes on inequality and poverty trends. For all other limitations including inequality indices based on model estimations and relatively over-representativity of small regions (Yemtsov, 2008).

For very long time the only source of data on Russia for many researchers was the RLMS-HSE (National Research University "Higher School of Economics" and OOO "Demoscope" together with Carolina Population Center, 2019). This survey is managed by the Carolina Population Center, the University of North Carolina and the Higher School of Economics in Moscow. It is a household panel and cross-sectional survey that is conducted annually since 1994 with the exception in 1997 and 1999. It aims to survey households in 38 out of 85 regions in Russia. This still accounts for 96% of the whole Russian population (Kozyreva, Kosolapov, & Popkin, 2016). This means that it is a nationally, but not regionally representative survey. Additionally, the RLMS-HSE survey measures a wider range of socio-economic variables than the HBS. It includes detailed individual and household information such as educational qualification, employment, type of employment and many others. The data is available on household and individual levels (including adults and children).

Here comes a question: should the RLMS-HSE be a preferred source over the HBS and other way around? The RLMS-HSE was never designed to substitute the HBS, but to capture as much variation as possible (Kozyreva et al., 2016). This has resulted in higher between households inequality in comparison to the HBS. The

RLMS-HSE is indeed a small survey compare to the HBS and, thus, it is prone to data contamination issues.

Despite the disadvantages of the RLMS-HSE, we regard it as the most reasonably suitable data source, as it provides sufficiently rich information on income and its different sources along with a wide range of individual and household characteristics over the last 20 years. These aspects of the data are very crucial for our study because the more data we have on household and individual levels, the better our understanding of changes in inequality and poverty in Russia is. Following this logic, the analysis would be impossible by using the HBS data. Additionally, we do not aim to explain regional differences and, thus, the issue of non-regional representativity is not relevant for this paper.

### **3.2. RLMS-HSE DATA**

Our dataset includes 20 waves from 1994 to 2015. The RLMS-HSE was not conducted in 1997 and 1999 due to a lack of financing and, thus, we miss data for these years. The variable of interest is total net household income. Total net income includes all private sources of income (earnings, home food production, help from family etc), state transfers (pensions, benefits for children etc) minus household taxes and debts. We adjust the net total income by inflation and regional price differences, as prices vary greatly on a regional level in Russia. We represent indicators of well-being in monetary units with uniform purchasing power. To do so, we use price levels relative to price level in Moscow in 2015 (Gluschenko and Karandashova, 2016). Then we correct 2015 consumer price index from Rosstat by this index and, thus, we establish price relations across regions relatively to prices in Moscow in 2015. Finally, we convert consumer price indexes for 1994-2014 to 2015. As a result, all the income values are expressed in prices of Moscow in 2015.

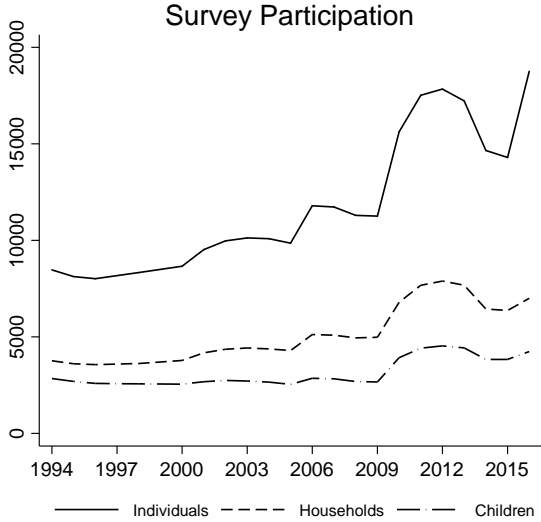
Based on the information on different income sources, we create 5 groups of income sources: earnings from public sector, earnings from private sector, pensions, other income sources and other benefits. Other income sources includes capital income, rental income, home food production and etc. Any income flows received from the property sales are excluded due to highly irregular and rather consumption related nature. Other benefits consists of unemployment benefits, benefits for children, apartment benefits and others.

The units of our analysis are household individuals. This means that we create a dataset of individuals from household data and merge it with individual data. Doing so we add such information as educational qualification, employment type, race etc. According to the RLMS-HSE survey, households are defined as a group of people living together in a given domicile and share a common income and expenditures. It also includes unmarried children under 18 years of age who were temporarily absent in the household.

In Graph 2, we present basic descriptive statistics for the cross-sectional part of the RLMS-HSE. Like any survey, the RLMS-HSE has undergone changes in its survey design. Particularly in case, there was a sample refreshment in 2010 which has resulted in 1600 new households entering the survey in 2010. Given the fact that the



RLMS-HSE is a small survey, this is a considerable increase in sample size. We document changes in 2010 that cannot be explained by anything else rather than sample refreshment. The changes have affected trends in families' characteristics. We observe that there were proportionally less pensioners and more children in the RLMS-HSE survey in 2010 than before. This affects dynamics of family composition and, correspondently, dynamics of income, inequality and poverty. Despite this change, trends before and after 2010 follow parallel dynamics. This means that the explanatory power of these variables remain the same.



**Figure 2.** Participation of households, individuals and children in the RLMS-HSE.

Income inequality and poverty are measured in terms of household disposable income which is defined in the following way:

$$Y = \frac{\text{Household Income}}{(1 + \alpha * (N_{adults} - 1) + \beta * N_{children})^q} \tag{1}$$

As basis we use the total household monthly income. This information is taken from the total household income variable constructed by the RLMS-HSE. Then we redistribute this income across all household members using the OECD modified equivalence scale. According to this scale the head of household receives a weight of 1.0 (refers to  $q$ ), further household members over 14 years receives a weight of 0.5 (refers to  $\alpha$ ) and those under 14 years are assigned with a weight of 0.3 (refers to  $\beta$ ). This means that in our dataset all individuals receive a net total income that is adjusted by status in household and/or age. We have both individual (such as education and type of job) and household (such as consumption data and expenditures data) information for each individual.

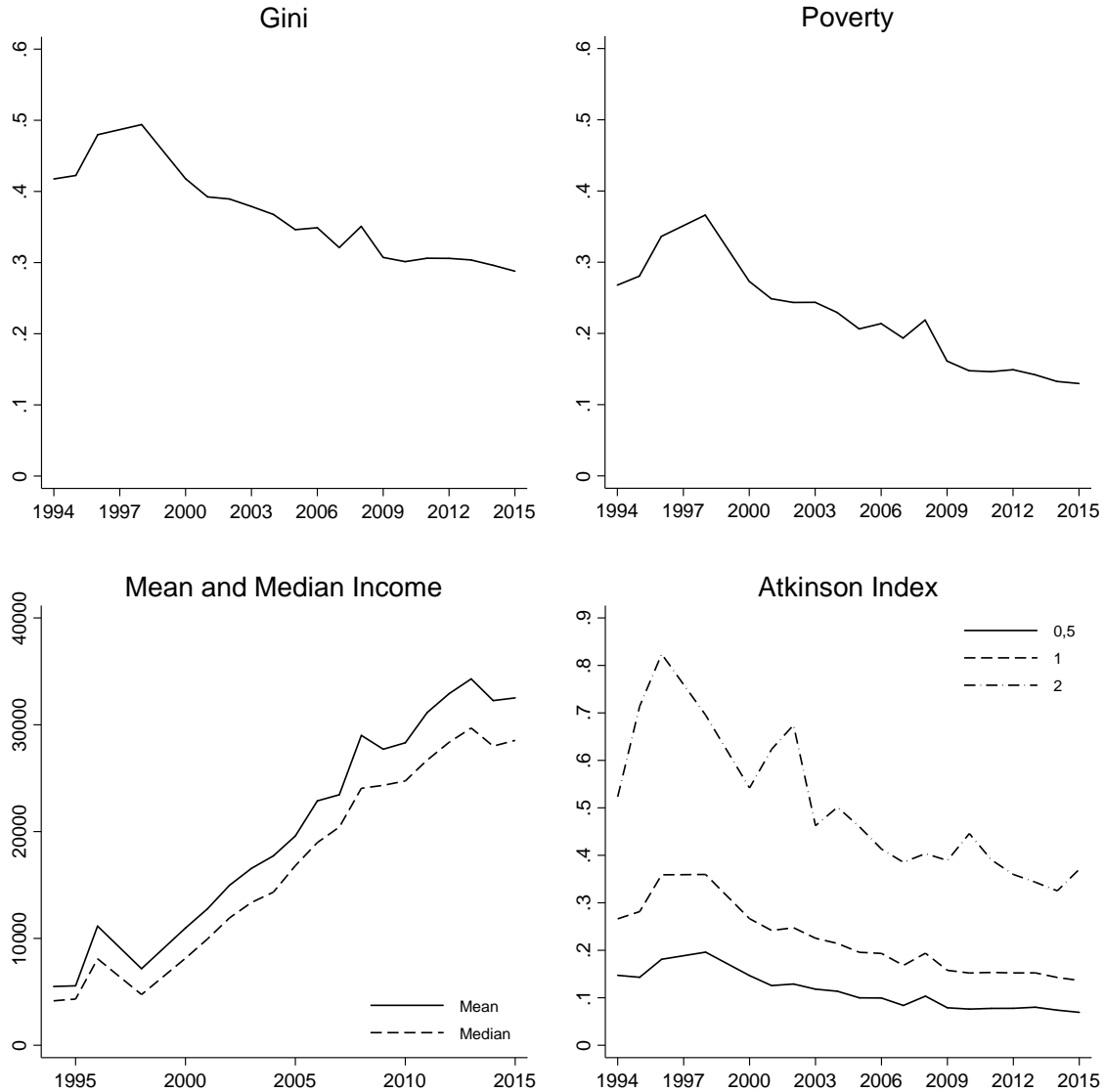
Note that all individual and household characteristics described in the dataset is what individuals and households report about themselves by themselves. Our analysis refers to income inequality and poverty between individuals. The data used in this paper are individual data. However, individual are assigned to the characteristics and incomes of the households they live in.

### 3.3. OVERALL TRENDS

Before turning to the empirical analysis of inequality, we present aggregate trends of key variables describing the economic behavior of Russian households. Figure 3 displays the development of income inequality and poverty over the period 1994-2015 using different welfare indicators: Gini index, poverty rate, mean and median income, and Atkinson index (AI) with different degrees of society aversion to inequality. We include different measures to allow for less biased understanding of inequality and poverty (see Figure 3 and 4). Gini index is the most common measure of income inequality which varies from 0, a state of absolute equality, to 1, absolute inequality. Poverty rate is defined as share of individuals with less than 50% of the income threshold. Median income was chosen as poverty threshold as most of the Russian possess less than the average income. The last inequality measure is the Atkinson index. It shows a percentage of income that society would have to give up to have more equal income among different individuals. Societies might have different attitudes towards inequality which itself affects inequalities too. Therefore, different degrees of aversion are introduced, where higher values denote higher willingness to redistribute.

The first thing to notice is that the overall evolution is quite similar: first, income inequality and poverty increased reaching its peak value in 1998, then it decreased. The poverty rate decreased more than the inequality which indicates that a fall in inequality is not entirely associated with improved financial situation at the lower part of income distribution. The Atkinson Indices indicate a decrease in income inequality as well, especially with higher degree of sensitivity to the inequalities at the bottom of the income distribution. It indicates that most of the changes in income distribution were happening at the lower part of income distribution. Interestingly, the Atkinson Index with the highest degree of aversion reached its maximum in 1996, while the Gini index and poverty rate – in 1998. This proves that different parts of income distribution lost its shares at different years.

Income levels rise tremendously and continuously since the fall of the Soviet Union: from small values in the 90s to high values in 2015. Median income lies below average income, which means that majority of Russians have less than the average income and that income of the very rich is pushing the average income up. Due to big changes in income levels, we consider only relative measure of poverty.



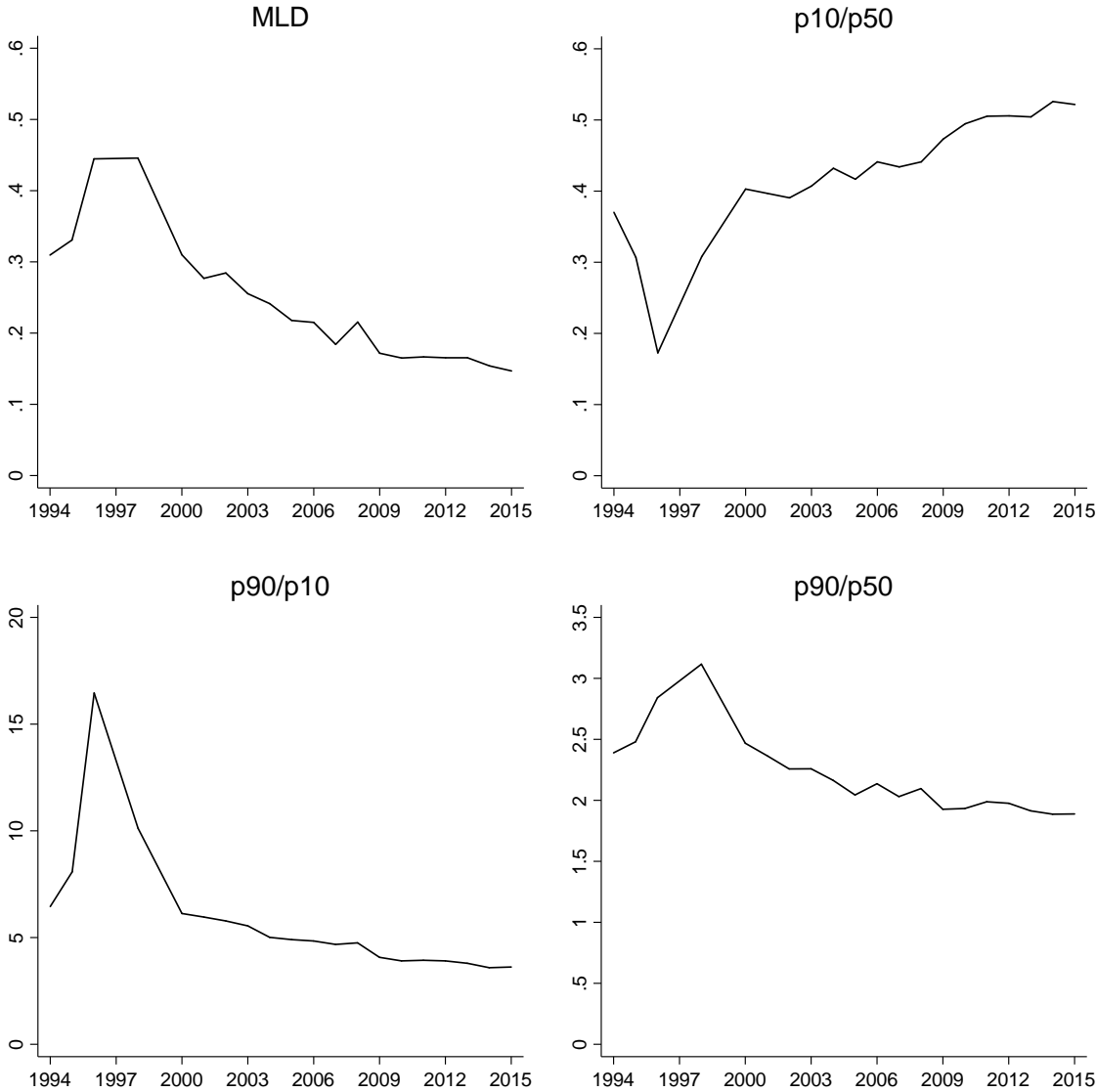
**Figure 3.** Inequality and poverty trends in Russia: 1994-2015.

**Note.** Income is measured as total net household monthly income adjusted to the household size and regional differences. We excluded eight households with suspiciously high reported total income in 2008.

Seeking to understand welfare dynamics better, we also present more socio-economic indicators. Figure 4 illustrates dynamics of the mean log deviation measure (MLD) and different ratios of income percentiles. The MLD measure is another measure, which belongs to the class of generalized entropy measures. It is more sensitive to the changes at the lower tail of distribution. Percentile ratio means exactly what is said: ratio of different income percentiles.

The dynamics of the above-described measures is very similar compared to what we documented above: first, income inequality increased reaching its maximum in 1998, and, then, decreased. The MLD index depicts dynamics that is very similar to the Gini and poverty rate, though the levels are different. After reaching its peak in 1998 the MLD decreased more than the Gini index. This is a sign of changes towards more equality at the bottom of distribution. The percentile ratios, however, have a similar but at the same time different pattern. The percentile ratio between the lowest,

P10, to the median income, that is P50, reached its minimum in 1996. An opposite pattern is observed for the ratio between the highest income percentile, P90, and the lowest: it reached the maximum in 1996. Interestingly, the percentile ratio between the highest and the median income gained its highest value in 1998. This confirms the fact that individuals at the low tail of income distribution lost its shares in 1996, while individuals at the top of income distribution experienced most dramatic decline in income shares in 1998. Similar evidence was found in the previous studies on inequality in Russia (Novokmet et al (2018)).

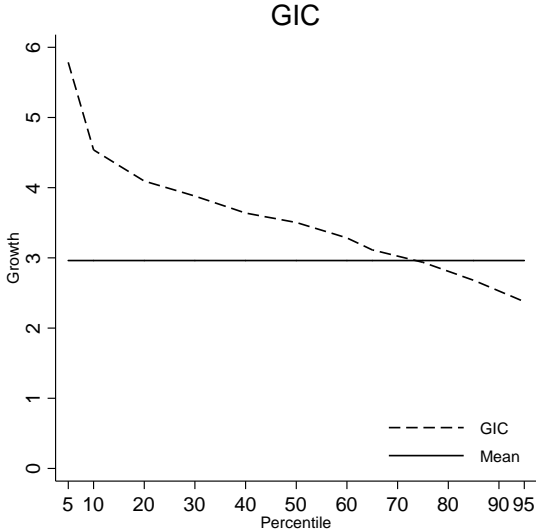


**Figure 4.** Inequality and poverty trends in Russia: 1994-2015.

**Note.** Income is measured as total net household monthly income adjusted to the household size and regional differences. We excluded eight households with suspiciously high reported total income in 2008. MLD stands for mean log deviation.

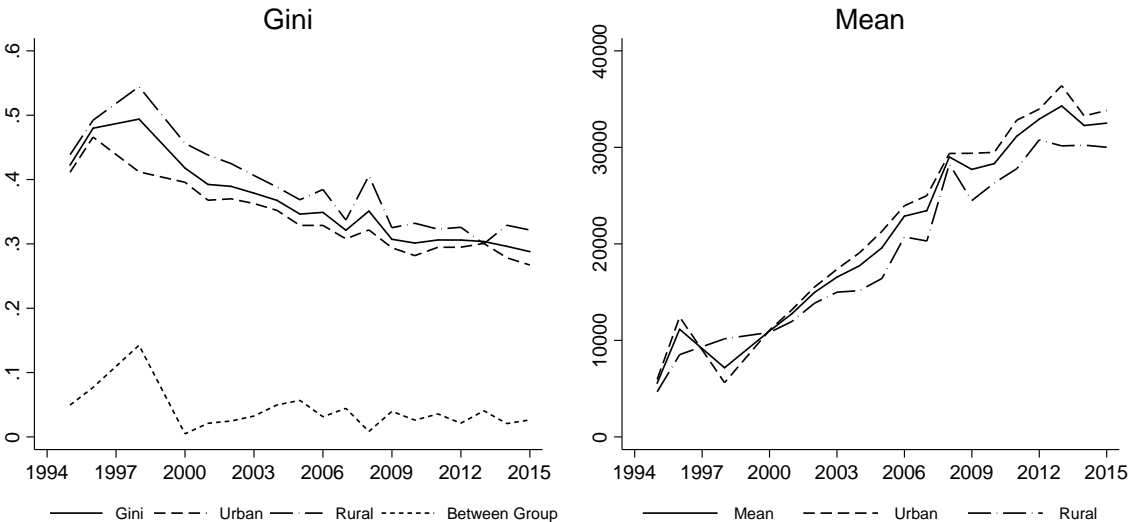
After analyzing basic measures of inequality and poverty, it is clear that income below and above median behave differently. Therefore, figure 5 depicts growth incidence curves (GIC) and changes in total household income composition. The GIC is a tool to capture graphically income growth for every percentile of income

distribution: from P5 to P95. Growth of the income below the 70<sup>th</sup> percentile was higher than the growth rate of the average income (a straight line). The income of the lowest 5 percentiles increased by almost 6 times from 2000 to 2015, while the richest 5 percentiles – by twice. This confirms that the economic growth in Russia had a pro-poor nature.



**Figure 5.** Growth incidence curve 2015/2000

**Note.** Income is measured as total net household monthly income adjusted to the household size and regional differences. We excluded eight households with suspiciously high reported total income in 2008.



**Figure 6.** Regional perspective on inequality and poverty in Russia: 1994-2015.

**Note.** The RLMS-HSE distinguishes between rural, urban and PGT types of settlement. We make two groups by adding PGT (poselok gorodskogo tipa) to rural type. No data on settlement type is available for 1994.

As prices and life standards vary greatly across the country, inequality and poverty dynamics might differ as well. Therefore, we present dynamics of average income and the Gini coefficients in urban and rural areas. Naturally, the average income in urban settlements is higher than in rural. Rural and urban average income

are very close to the values of the country's average income, and they follow the same trend. Thus, there are no significant differences in income trends between rural and urban areas in Russia, and the above-mentioned documented trends in inequality and poverty are not attributed to income differences between urban and rural areas.

At this stage, the following conclusions can be drawn regarding changes in income distribution in Russia over the past 20 years. Firstly, we document an overall decrease in income inequality, poverty and different ratios of income percentiles. For example, the Gini index decreased from 0.42 to 0.30, while the ration between 90<sup>th</sup> and 10<sup>th</sup> percentiles decreased from 6.5 to 3.6 in 15 years. Similarly, the share of individuals below the poverty line of 50 percent of the median equivalized income fell from 27% in 1994 to 13% in 2015, excluding the jump in 1998. Secondly, lower part of income distribution had undergone significant changes over the past 20 years: increase in income levels and income shares. Thirdly, we document a continuous increase in income levels (median and average). Fourthly, regional analysis of income dynamics does not reveal significant income differences, and thus, inequality dynamics is not attributed to changes in income across urban and rural regions.

The financial well-being of Russians has changed considerably since the last decade. Consequently, we come to the main question of the study: what are the determinants of these changes?

#### **4. POSSIBLE DETERMINANTS**

In this section, we provide a discussion of possible sources of changes in income inequality and poverty in the Russian Federation since 1994. Figures 3-4 from the previous section show fall in inequality and poverty measured by total household disposable income. Therefore, we aim to identify factors that have resulted in changes in household income. We carefully select our explanatory factors and divide them into three main groups: socio-demographic (household type, share of children, share of pensioners, age structure etc.), labour market participation (employment status and employment type) and labour market returns (different sources of income such as earnings, pensions, home food production etc.). Note that below we focus only on those factors that changed most during analyzed period and, therefore, most likely to be the candidates of observed changes.<sup>1</sup>

##### *Group 1: Changes in household types*

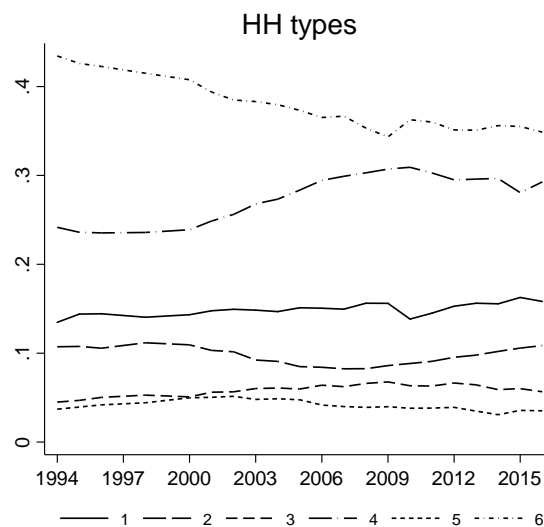
Naturally, any household can change its household type from year to year. Given that income within a household is pooled together, we expect that different household types differ in their income, and, thus, changes in household types might explain a change in the overall distribution. We distinguish 6 types of households: type 1 - single pensioner, type 2 - multiple pensioners, type 3 - single adult without children,

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<sup>1</sup> We checked carefully the dynamics of all the possible household and individual characteristics including different age groups, educational qualification, working industry, share of students, share of housewives, every income source and many others. We do not include those the characteristics that do not change from 1994-2015 and rather focus on those that changed. Similar approach was implemented by other studies (see Biewen et al. (2017) for Germany; Hyslop & Maré (2005) for New Zealand; and others).

type 4 - multiple adults without children, type 5 - single adult with children, type 6 - multiple adults with children. This means that every household is assigned to a particular household type according to its composition.

Dynamics of household types is depicted on figure 7 below. We see that, indeed, households change their structure over time. We observe a remarkable decrease in the population share of multiple adults with children and, correspondently, an increase in the share of multiple adults without children (type 4). We also document a moderate increase in the share of households consisting of single pensioners (type 1) and share of single adults without children (type 3). Similar tendencies were found for other countries (Biewen et al., 2017; Ferreira et al., 2017).

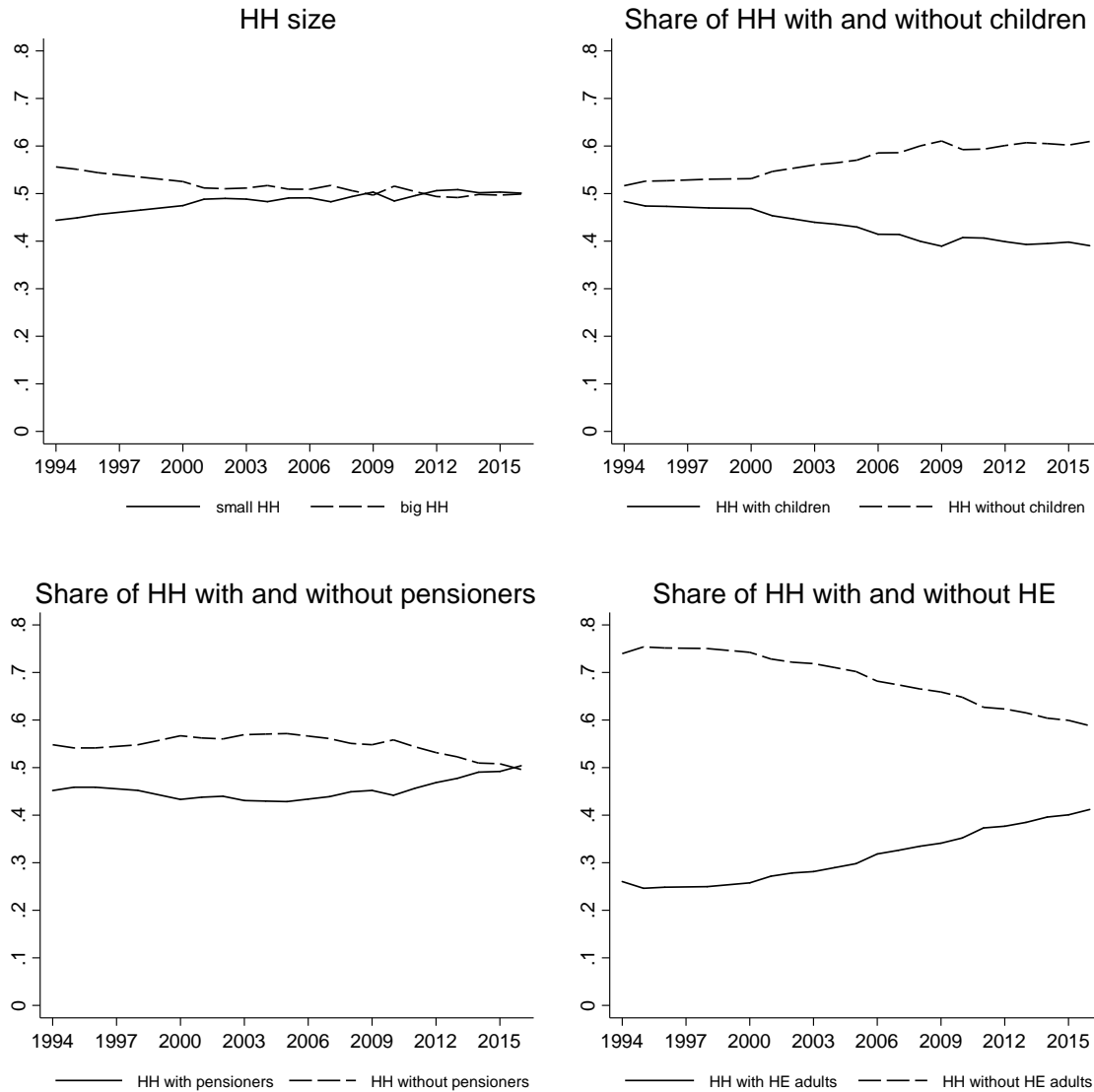


**Figure 7.** Dynamics of family types in Russia 1994-2015.

*Group 1(extended): Changes in other socio-demographic attributes*

Not only the composition of families has changed, but also its socio-demographic attributes (family's size, share of pensioners, share of children and educational qualification). Figure 8 depicts dynamics of family's size, changes in age structure and educational qualification of the families. In particular, we document the trends towards smaller families with pensioners, no children, and with tertiary educated family members.

Since families tend to become smaller, with less children and, at the same time, more pensioners (changes in age structure), we expect that less income is shared among family members, and, consequently, inequality and poverty should be rising. Changes in educational qualification, that is rise in the share of household members with tertiary education, should result in increase in inequality as well, since not all the families improved its educational qualification, but only half. Therefore, the analysis of changes in socio-demographic characteristics revealed changes, which should have resulted in rise of inequality and poverty.



**Figure 8.** Dynamics of socio-demographic indicators in Russia.

**Note.** Small families consist of up to two individuals. HE stands for highly educated individuals.

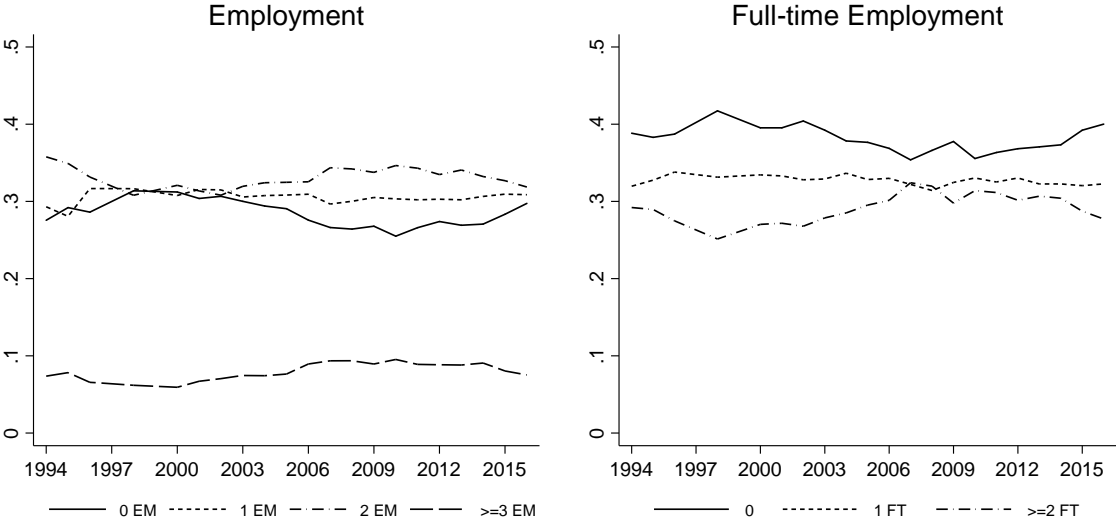
### *Group 2: Changes in labour market participation*

The second group of factors responsible for falling inequality and poverty are changes in labour market participation. This include, for example, the share of employed individuals, the share of self-employed, working hours, the industry of employment and many others. These factors are important for analysis of inequality, as Russia experienced economic growth from 2000-2008. During this period, unemployment rate decreased from 10.6% to 5.6%, which accounts for 2.7 million of people entering the labour market and having positive income. Given that, we expect that this increase would have large and positive impacts on inequality and poverty, especially if the employment growth was concentrated in the lower part of the income distribution.

This group of factors includes share of employed individuals and share of full-time employed individuals. The later one captures dynamics of working hours. These



are the factors that changed the most. For this reason, part-time labour participation is not included. We consider people to be employed if: (a) they are currently working; or (b) they are on paid leave; or (c) they are on unpaid leave; or (d) they are self-employed; or (e) they are farmers. Those people that do not fall into one of these categories are considered to be non-working. For example, students, pensioners, actively and passively unemployed. We consider people to work full-time if they work more than 120 hours at the first job. Figure 9 shows dynamics of these factors.



**Figure 9.** Dynamics of labour market determinants in Russia.  
**Note.** EM stands for employed member, FT – for full-time employed.

The left-hand graph of the figure 9 shows the share of families with none, one two or more employed (EM) family members. By the end of the 90s the share of unemployed households had risen to 30% of the population, and remained at this level over 1998-2003 period. From 2003 to 2015 it was declining and in 2015 it reached its 2000 unemployment levels. We also observe that trends in share of families with no and two employed individuals mirror each other. Analysis of socio-demographic characteristics revealed that families tend to consist of up to two adults or single adults (or pensioners). Figure 9 shows that in most of the families job loss happens for two family members at the same time and the opposite patterns of no one and two employed individuals prove it.

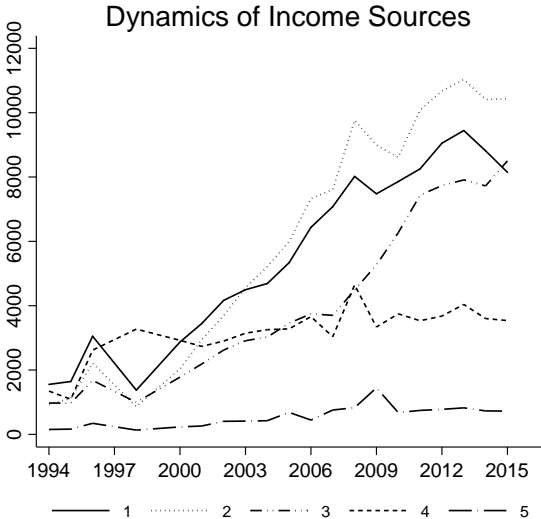
Due the direct link of employment sector and type of employment to the changes in market returns and, consequently, inequality and poverty, we include all the above mentioned determinants to the analysis.

*Group 3: Changes in labour market incomes*

As the next group of factors, we consider changes in market returns. Market returns is a broad term, which might include such income as salaries, self-employment income, pensions, state transfers, capital gains and many others. They have been growing since the collapse of the Soviet Union following the process of privatization. Dynamics of different income sources such as wages, pension and home food production are shown in figure 10. The RLMS-HSE survey allows to decompose total

household income into more than 10 components including salaries, pensions, child benefits, unemployment benefits, help from other family members and many other. We decompose the total household income into earnings from public sector, earnings from private sector, pensions, other income sources, and other benefits. The other income sources is a sum of all different income sources of households apart from earnings. This includes home food production, rental income, capital income, sales of wild stock help from other family members etc. Property sales is excluded from in this paper due its irregular nature. The other benefits is a sum of all possible benefits which might be entitled to a household (apart from pensions) including child benefits, unemployment benefits, fuel benefits, apartment benefits etc.

The graph 10 shows that earnings from public and private sectors occupy the largest share in total household income. We find a persistent increase in average values of earnings and pensions. The earnings from private sector, however, had increased much more than earnings in public sector. This pattern can be explained by growth in employment in private sector and by fall – in private sector. Other income sources had remained constant since 1994. The share of other benefits in total household income is persistently small over the observed period.



**Figure 10** Dynamics of average income sources in Russia.

**Note.** Income sources: 1 - earnings from public sector, 2 – earnings from private sector, 3 – pensions, 4 – other income sources, 5 – other benefits. We excluded eight households with suspiciously high reported total income in 2008.

Despite these clear dynamics of market returns, on the one hand, and, on the other hand, its complexity, it is very difficult to predict to which extend different sources of income contribute to the inequality and poverty trends of individuals. We include these 5 groups of income sources in the analysis of possible determinants as they have contributed to the decrease of poverty and inequality during the period.

Until now, we have documented trends in inequality and poverty and defined possible factors responsible for these trends. These factors are divided into 3 groups: socio-demographic characteristics, labour market participation and labour market

returns. Are changes of these determinants responsible for changes in income inequality and poverty in Russia since 1994?

## 5. METHODOLOGY

To answer the above-defined question, we apply a semi-parametric reweighting method. This method was proposed by DiNardo et al. (1995), and, therefore, it is known as DFL method. The main idea is to build a counterfactual state of the world where defined determinants remain fixed in time, but other things change. We conduct this exercise for the three above-defined group of determinants: socio-demographic characteristics, labour market participation and labour market returns. We do this stepwise. Firstly, changes in socio-demographic characteristics of families are hold constant and new inequality and poverty measures are estimated. Then, changes in socio-demographic characteristic together with changes in labour market outcomes are tested for being the factors of changes. Finally, we come to the last step of the analysis where we keep market returns conditional on socio-demographic characteristics and labour market outcomes constant. By keeping possible influence factors constant, we quantify the effect of these factors by eliminating their effects on total inequality and poverty. Put it differently, this methodology helps us to answer the following question: what would happen to inequality and poverty if a particular factor(s) would not change?

The DFL approach has two main advantages compare to other decomposition procedures. The first one is that the DFL method is very easy to implement by running a single probability function (logit or probit). Formal results from Hirano et al. (2003) and Firpo (2007, 2010) prove that the DFL method is sufficiently efficient as estimation method of decomposition.

The DFL has, however, its limitations too. Firstly, it might be sensitive to the order of determinants. However, we argue that the order of determinants introduced in the paper is reasonable: starting with pre-determinants such as socio-demographic characteristics of households, following with employment characteristics and finishing with market income. Analyzing the effects of income sources before checking impacts of different household and individual characteristics might be illogical. Secondly, the method does not account for interaction between groups of determinants. However, the DFL is generally acknowledged as a reasonable approach for detecting the main drivers of distributional changes (see Fortin, Lemieux, & Firpo ,2011).

### *Stage 1: Changes in socio-demographic characteristics*

At the first stage of the decomposition, we consider changes in socio-demographic characteristics only. More specifically, suppose we are interested in estimating changes in the distribution of income between two periods (period  $0$  and period  $t$ ) and we relate these changes to shifts in household characteristics. Then the counterfactual distribution in which distribution of household characteristics as in period  $0$ , but everything else change over time (period  $t$ ) is given by:

$$f_{cf} = f_{tj}(y | t_x = 0) = \int_x f_{tj}(y|x) dF_{0j}(x) \quad (2)$$

, where  $f_{tj}$  is income distribution of households  $j$  in period  $t$ ,  $t_x = 0$  denotes the distribution of household characteristics in period  $t = 0$ . The actual distribution of income in the base period would be given as  $f_0(y | t_x = 0)$ . Multiplying equation 2 by  $F_{tj}(x)/F_{0j}(x)$  leads to

$$f_{cf} = f_{tj}(y | t_x = 0) = \int_x f_{tj}(y|x) dF_{0j}(x) \frac{F_{tj}(x)}{F_{0j}(x)} = \int_x f_{tj}(y|x) \omega(x) dF_{tj}(x) \quad (3)$$

, where reweighting factor is  $\omega(x) = \frac{F_{0j}(x)}{F_{tj}(x)} = \frac{\Pr(x|t=0)}{\Pr(x|t=1)}$ .

Following the Bayes' rule  $\Pr(A|B) = \Pr(B|A) * \Pr(A)/\Pr(B)$  we can rewrite the reweighting factor as

$$\begin{aligned} \omega(x) &= \frac{\Pr(x|t=0)}{\Pr(x|t=1)} = \frac{\Pr(t=0|x)\Pr(x)}{\Pr(t=0)} * \frac{\Pr(t=t)}{\Pr(t=t|x)\Pr(x)\Pr(t=t)} = \\ &= \frac{\Pr(t=0|x)/\Pr(t=0)}{\Pr(t=t|x)/\Pr(t=t)} \end{aligned} \quad (4)$$

A reweighting factor  $\omega(x)$  can be easily estimated:  $\Pr(t=0)$  and  $\Pr(t=t)$  are proportions of time periods in the sample, and  $\Pr(t=0|x)$  and  $\Pr(t=t|x)$  can be estimated by regressing  $t$  on  $x$ . Once the weighting factor is estimated, we compute inequality and poverty trends accounting for fixed socio-demographic characteristics and compare those estimates with actual estimates.

At this stage of the decomposition the household income distribution is solely explained by changes in socio-demographic characteristics: household type, family's size, age structure and educational qualification.

### *Stage 2: Changes in socio-demographic characteristics and labour market participation*

The second stage of our decomposition considers changes in distribution of socio-demographic characteristics  $x$  and changes in labour market outcomes  $e$  conditional on the characteristics  $x$ . The counterfactual distribution is the distribution where we keep distribution of socio-demographic characteristics  $x$  and distribution of labour market outcomes  $e$  conditional on these characteristics as in the period 0. That is

$$\begin{aligned} f_{cf}(y|t_x = 0, t_e = 0) &= \int_e \int_x f_{tj}(y|x, e) dF_{0j}(e|x) dF_{0j}(x) \\ &= \int_e \int_x f_{tj}(y|x, e) \left[ \frac{dF_{0j}(e|x)}{dF_{tj}(e|x)} \right] dF_{tj}(e|x) \left[ \frac{dF_{0j}(x)}{dF_{tj}(x)} \right] dF_{tj}(x) \\ &= \int_e \int_x \Psi_{x|j} * \Psi_{e|x,j} * f_{tj}(y|x, e) dF_{tj}(e|x) dF_{tj}(x) \end{aligned} \quad (5)$$

, where  $\Psi_{x|j}$  and  $\Psi_{e|x,j}$  are reweighting factors, which can be rewritten as

$$\Psi_{x|j} = \frac{P_j(x|t=1)}{P_j(x|t=0)} = \frac{P_j(t=1|x) * P_j(t=0)}{P_j(t=0|x) * P_j(t=1)} \quad (6)$$

$$\Psi_{e|x,j} = \frac{dF_{1j}(e|x)}{dF_{0j}(e|x)} = \frac{P_{1j}(e|x)}{P_{0j}(e|x)} \quad (7)$$

At this stage of the DFL decomposition we aim to answer the following question: what would have happened to the income inequality and poverty in Russia if socio-demographic characteristics and labour market outcomes conditional on those socio-demographic characteristics would remain fixed in time?

### Stage 3: Changes in market returns

Now we consider changes in the components of total household income. The counterfactual distribution of total household income in period  $t$  accounting for the expected change in market income (earnings from public sector, earnings from private sector, other income sources, pensions and other benefits) due to changes in individual and household characteristics together with labour market outcomes is given by:

$$\begin{aligned} y_{jt}^{cf} = & y_{jt}^{total} - y_{jt}^{earn_{pub}} * \left( 1 - \frac{\hat{y}_{j0}^{earn_{pub}}(x_{jt})}{\hat{y}_{jt}^{earn_{pub}}(x_{jt})} \right) - \\ & - y_{jt}^{earn_{priv}} ** \left( 1 - \frac{\hat{y}_{j0}^{earn_{priv}}(x_{jt})}{\hat{y}_{jt}^{earn_{priv}}(x_{jt})} \right) - y_{jt}^{pen} * \left( 1 - \frac{\hat{y}_{j0}^{pen}(x_{jt})}{\hat{y}_{jt}^{pen}(x_{jt})} \right) - \\ & - y_{jt}^{othinc} ** \left( 1 - \frac{\hat{y}_{j0}^{othinc}(x_{jt})}{\hat{y}_{jt}^{othinc}(x_{jt})} \right) - y_{jt}^{othben} * \left( 1 - \frac{\hat{y}_{j0}^{othben}(x_{jt})}{\hat{y}_{jt}^{othben}(x_{jt})} \right) \end{aligned} \quad (8)$$

, where  $y_{jt}^{total}$  is total household income of household  $i$  in period  $t$ ,  $y_{jt}^{earn_{pub}}$  are earnings from public sector of individual  $j$  in period  $t$ ,  $\hat{y}_{jt}^{earn_{priv}}(x_{jt})$  are expected earnings from private sector of individual  $j$  in period  $t$  due to changes in individual and household characteristics (1<sup>st</sup> group of determinants) and labour market outcomes (2<sup>nd</sup> group of determinants). Similar logic applies for pensions, other income sources and other benefits.

When expected earnings of the base year is equal to expected earnings in period  $t$ , then counterfactual distribution becomes equal to actual. At this stage of the DFL decomposition, we consider changes in different income sources separately. This means that we keep levels of pensions, for example, as in the base year and check what changes it brings to the income distribution. At this stage of the analysis the question we aim to answer is: what would had happened to the income distribution in Russia if particular income sources would not change its values since the base year?

In overall, we build 7 counterfactual income distributions, then we compute different inequality and poverty measures again and at the last step we compare actual

and counterfactual states in order to see the effect of a particular determinant on changes in income distribution.

Most of the previous studies on decomposition of income distribution include taxes to the decomposition analysis. Despite a switch from progressive to flat income tax rate in 2001 in Russia, we do not include changes in taxes to the counterfactual analysis. The period before the tax system change is well-known for massive tax evasion and informal employment, especially in rural areas (see Gorodnichenko, Martinez-Vazquez, & Sabirianova Peter, 2009; Ivanova, Keen, & Klemm, 2005). In addition to this, the RLMS-HSE survey asks people to report any monetary income without taxes. Thus, including taxes would lead to bias results.

#### *Stage 4: Changes in levels and dispersion*

The income distribution changed significantly in Russia over the past 20 years and we need to exploit changing nature of the income distribution in a more comprehensive manner. The counterfactual analysis at the stage 3 implies fixing the values of a particular income source in time. The difference between actual and counterfactual distributions is the effect of an income source. We should be clear about what we keep fixed in time when computing a counterfactual distribution. The truth is that we do not only fix values of a particular income source, but we also fix a dispersion (level of heterogeneity) of this income in time. This section is devoted to the empirical approach of analyzing the effects of changes in income levels and effects of changes in dispersion on changes in inequality and poverty. We also show that by accounting for changes in income levels, we account for changes in the importance of a particular income source in total household income.

Firstly, we derive an equation, which accounts for the effect of changes in real levels of income. A counterfactual distribution with fixed, for example, pensions and adjusted income levels is given by:

$$\begin{aligned}
 y_{jt}^{cf} &= y_{jt}^{total} - y_{jt}^{pen} + y_{jt}^{pen} * \frac{\hat{y}_0^{pen}(x_{jt}) / \mu_0}{\hat{y}_t^{pen}(x_{jt}) / \mu_t} = \\
 &= y_{jt}^{total} - y_{jt}^{pen} + y_{jt}^{pen} * \frac{\hat{y}_0^{pen}(x_{jt})}{\hat{y}_t^{pen}(x_{jt})} * \frac{\mu_t}{\mu_0}
 \end{aligned}
 \tag{9}$$

,where  $\mu_0$  is average total household income in base period,  $\mu_t$  is average total household income in period  $t$ . Note that  $y_{jt}^{pen}$  stands for not only pensions, but for any income source of individual  $j$  in time period  $t$ .

The difference between equation 9 and 8 is the ratio between average total household income in time  $t$  and time 0 (the last term in equation 9). We multiply the new fixed income by how much the average household income increase between the base year and  $t$  year. If counterfactual distribution (equation 9) is equal to the actual, then changes in income distribution between different periods of time are caused by changes (increase in this study) in income levels. However, if counterfactual

distribution is different from the actual, then the changes are not caused by changes in levels.

At the second stage, we analyze how changes in income dispersion explain changes in income distribution. A counterfactual distribution of pensions, for example, with fixed values of pensions and its dispersion is given by

$$\begin{aligned}
 y_{jt}^{cf} &= y_{jt}^{total} - y_{jt}^{pen} * \left( 1 - \frac{\frac{\hat{y}_0^{pen}(x_{jt})}{\mu_0^{pen}}}{\frac{\hat{y}_t^{pen}(x_{jt})}{\mu_t^{pen}}} \right) = \\
 &= y_{jt}^{total} - y_{jt}^{pen} + y_{jt}^{pen} * \frac{\hat{y}_0^{pen}(x_{jt})}{\hat{y}_t^{pen}(x_{jt})} * \frac{\mu_t^{pen}}{\mu_0^{pen}}
 \end{aligned} \tag{10}$$

, where  $\mu_0^{pen}$  is average pension in base period,  $\mu_t^{pen}$  is average pension in period  $t$ . Note, that we run this equation for all the income sources.

This equation takes into account real growth of the particular income source, which might be different from growth of total household income. The ratio of average income between time  $t$  and  $0$  allows adjusting income value by how much this particular income source changes between the base and  $t$  year. If an actual distribution of income is equal to the counterfactual, then changes in income distribution are caused by changes in levels of income of this particular source. If the actual is not equal to the counterfactual, then changes in income distribution are caused by changes in dispersion of this income source. Equations 9 and 10 differ in the last term, which is the average income ratio. The ratio in the equation 9 allows us to separate the effect of the (increase in) levels by increasing or decreasing the new income source to the level of average household income. While in the equation 10 it allows to reveal the effect of changes in income dispersion by comparing averages of income source between two periods.

Thirdly, increase in income sources might be due to increased importance of this source in total household income. We rewrite the equation 10 in the following manner taking changes in shares of income sources into account:

$$\begin{aligned}
 y_{jt}^{cf} &= y_{jt}^{total} - y_{jt}^{pen} * \left( 1 - \frac{\frac{\hat{y}_0^{pen}(x_{jt})}{\mu_0^{pen}}}{\frac{\hat{y}_t^{pen}(x_{jt})}{\mu_t^{pen}}} \right) = \\
 &= y_{jt}^{total} - y_{jt}^{pen} + y_{jt}^{pen} * \frac{\hat{y}_0^{pen}}{\hat{y}_t^{pen}} * \frac{\mu_t^{pen}}{\mu_0^{pen}} * \frac{\mu_t}{\mu_0} * \frac{\mu_0}{\mu_t} = \\
 &= y_{jt}^{total} - y_{jt}^{pen} + y_{jt}^{pen} * \frac{\hat{y}_0^{pen}}{\hat{y}_t^{pen}} * \frac{\mu_t}{\mu_0} * \frac{\mu_t^{earn}}{\mu_0^{earn}} / \frac{\mu_t}{\mu_0}
 \end{aligned} \tag{11}$$

, where  $\frac{\mu_t}{\mu_0}$  is ratio of average household income as described in equation 9,  $\frac{\mu_t^{pen}}{\mu_t}$  represents a share of pension in total household income in period  $t$ ,  $\frac{\mu_0^{pen}}{\mu_0}$  is the same but for period 0. This suggests that equation 11 equalizes household income by the growth of pensions (or any other income source) between two periods (see the first line of the equation 11), on the one hand, and to the growth of the average household income and changes in shares of pensions, on the other hand (see the last line of the equation 11). Therefore, by accounting for changes in growth of a particular income source, we account for the changes in the share of a particular income source too.

## 6. RESULTS

We present our results in three parts. First, we present results for the three groups of possible determinants: socio-demographic characteristics, labour market employment and market returns. We then show results for detailed decomposition of market returns: to levels and dispersion. Finally, we show that our results are robust to sensitivity check: change in the base year.

### 6.1. Impacts of possible determinants

We begin with presenting the results for the first two groups of factors; changes in socio-demographic characteristics and labour market participation. We keep constant only one factor at the level of the base period, but change everything else to its period  $t$  level. The base year in this study is 2000. In the last section we show that this choice does not change our results. Each possible determinant is added gradually. This allows to see a marginal impact of every factor. We believe that the current decomposition technique is close to what one has in mind when asking about possible factors of change in the income distribution.

Figures 11-12 presents the results of the DFL decomposition over time for the 1<sup>st</sup> and 2<sup>nd</sup> groups of determinants. When reading this figure a reader should answer the following question: what would have happened to the inequality and poverty if the determinant's value would not change since 2000. The figures depict two lines: blue line is an actual estimate and orange line is counterfactual estimate. They are connected by an arrow line which shows direction of the impact of the determinant. If arrow goes down, then the dynamics of this determinants had resulted in decrease of an estimate, and other way around. If the impact is small, then the arrow is replaced by a hollowed circle.

Evidence shows that keeping the socio-demographic characteristics and labour market participation of Russian households constant does not explain changes in the income distribution and poverty. Neither of inequality nor poverty measures do not change from its actual measures if we keep socio-demographic characteristics and labour market employment constant. There are, however, small negative impacts on the income levels (see the average income graphs). The arrows on the average income graph from figure 11 and 12 go down and, thus, it indicates that dynamics of those determinants had resulted in decrease of average income. This also means that



despite increase in income levels over 1994-2015 period, income levels would have increased even more if the two groups of factors would not change.

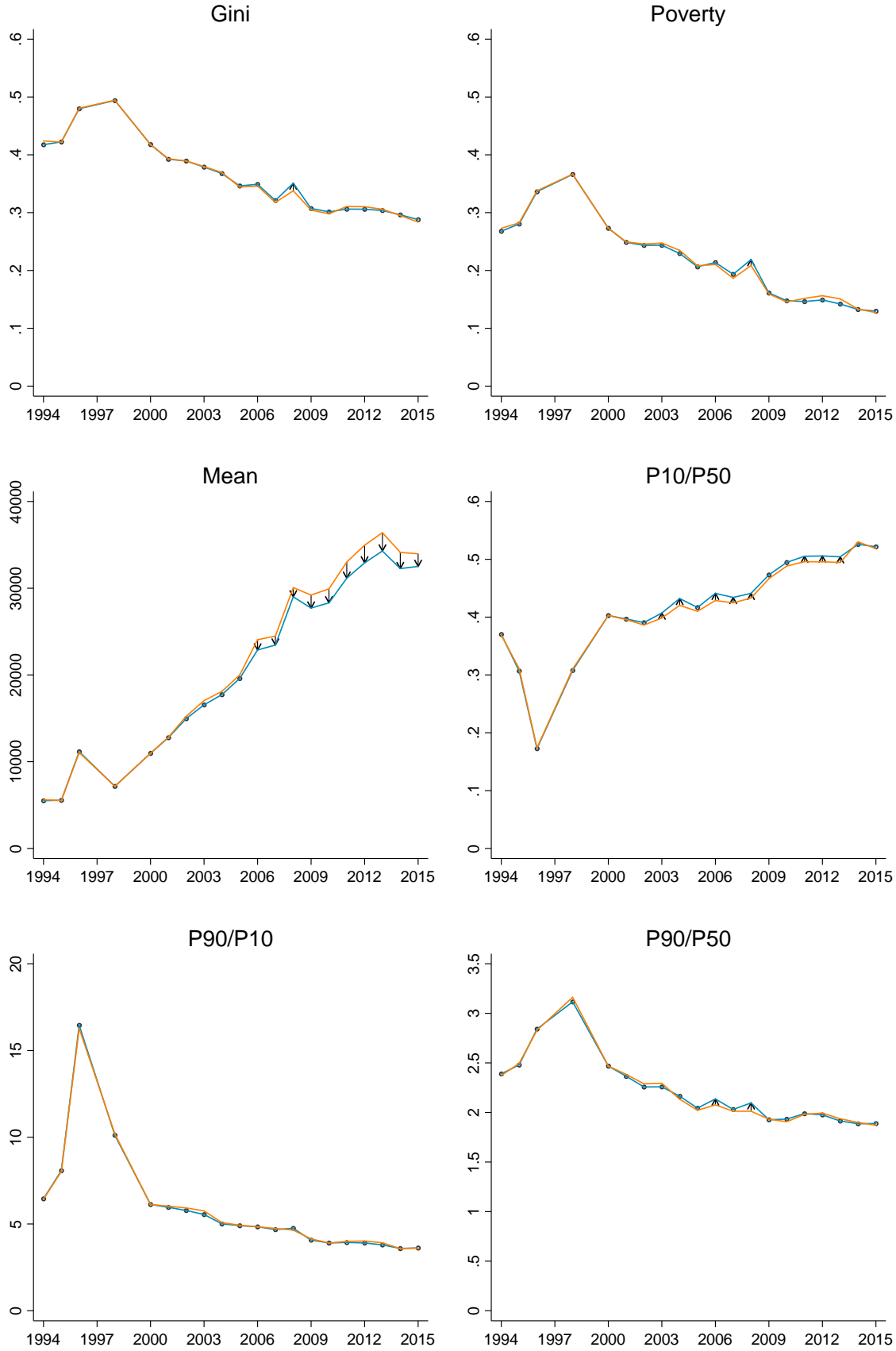
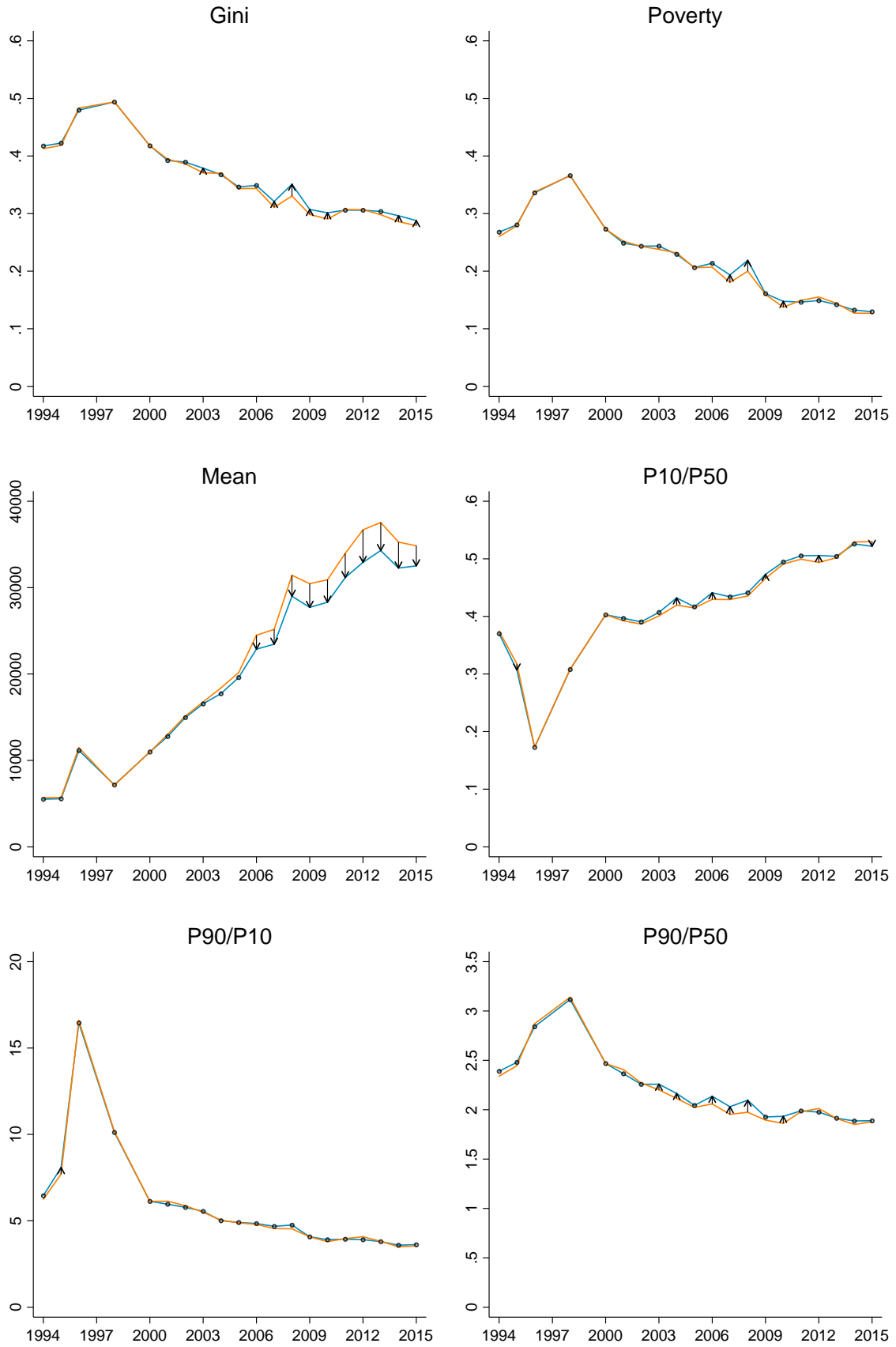


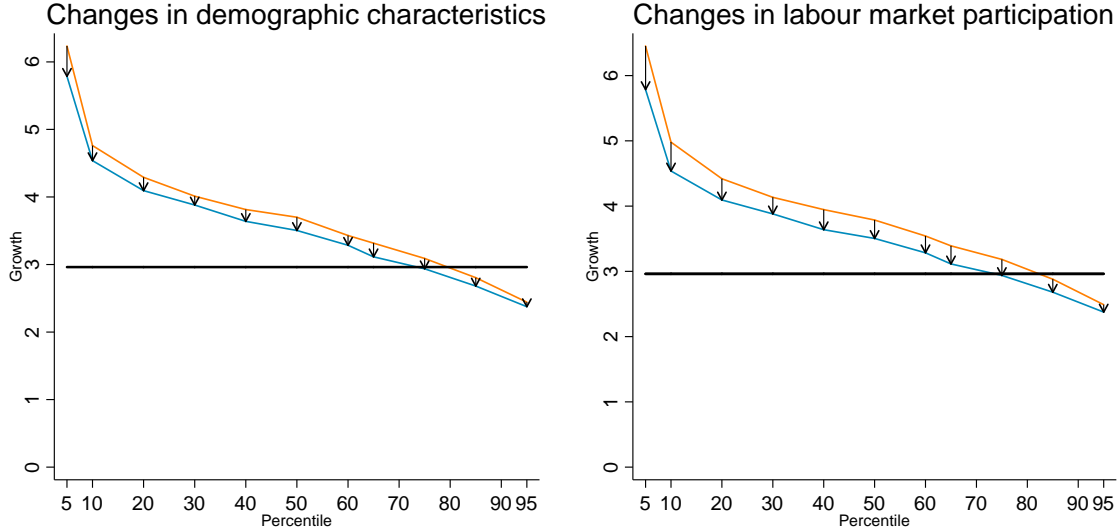
Figure 11. Impact of changes in socio-demographic characteristics.



**Figure 12.** Impact of changes in labour market participation.

In addition to the overall trends in inequality and poverty, we show growth incidence curve (GIC) on figure 13 below. It depicts income growth (y-axis) of different percentile ratios (x-axis) which happened from 2000 to 2015 time period. The graph shows a similar evidence to the average income graphs above. Households below 70 percentiles experienced larger income growth than the average income growth. The income growth at every percentile would be higher if socio-demographic characteristics and labour market participation would remain as in 2000 (arrows look down). In other words, these two groups of determinants were developing in a way (smaller families with more pensioners, less children, more individuals with tertiary education and uneven changes in labour market employment) which decreased income levels between 2000 and 2015 across the whole income distribution. Those factors, however, had no impact on relative position of individuals and, therefore, we document no effect on income inequality and poverty.

Previous studies on decomposition of income distribution show that a much longer time period is needed in order to see the larger impacts of non-economic determinants (see Biewen et al., 2017; Ferreira et al., 2017; Fiorio, 2006).



**Figure 13.** GIC for 2015/2000.

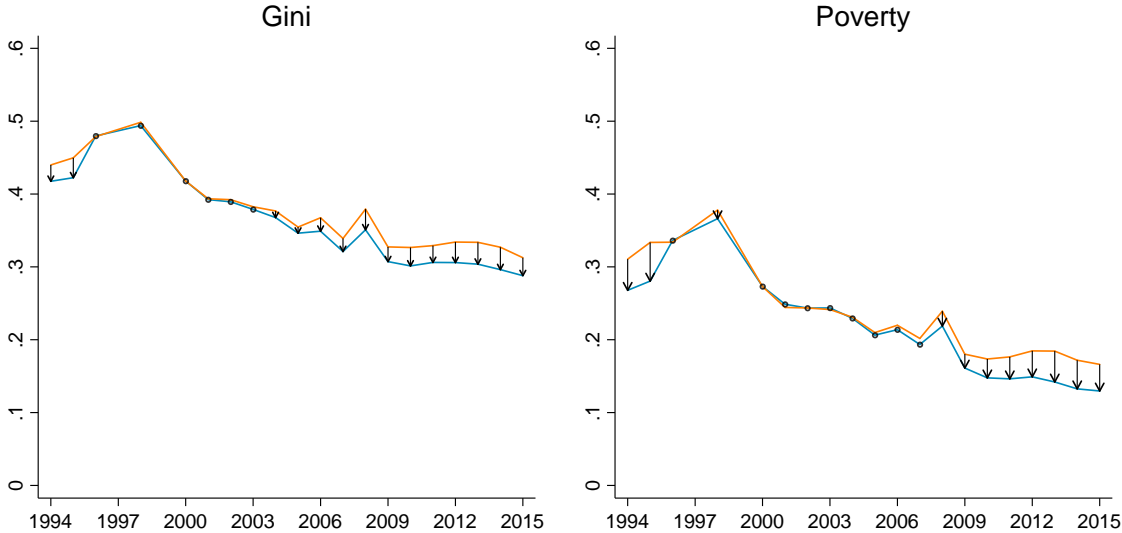
The last group of determinants are changes market returns: earnings from public sector, earnings from private sector, pensions, other income sources and other benefits. The results for earnings and pensions are depicted on figures 14-16 below. The rest can be found in the Appendix. A question which might help a reader to interpret the results is: what would happen to the income distribution if a particular income source would not change since 2000?

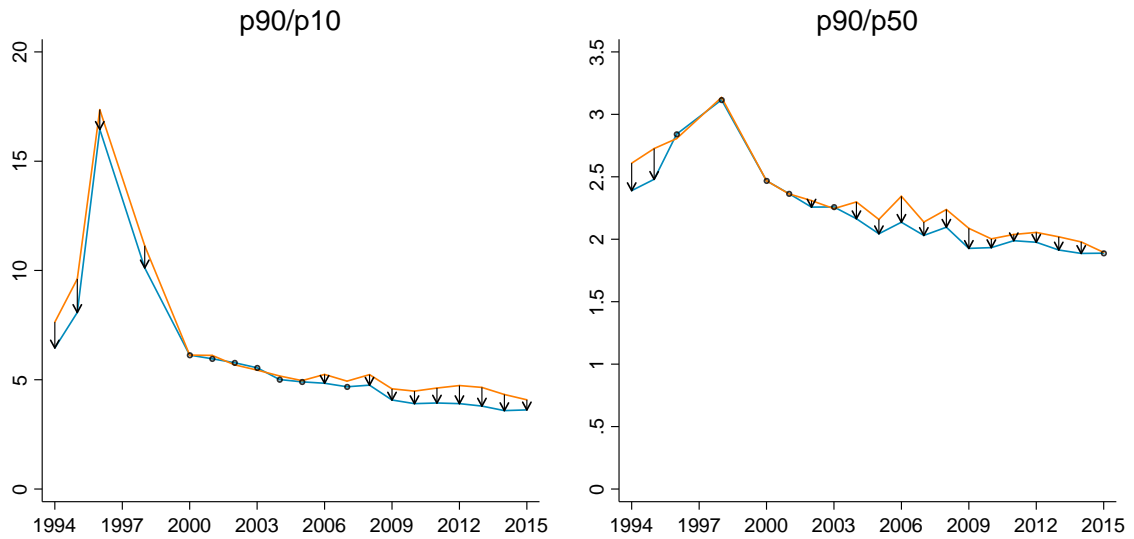
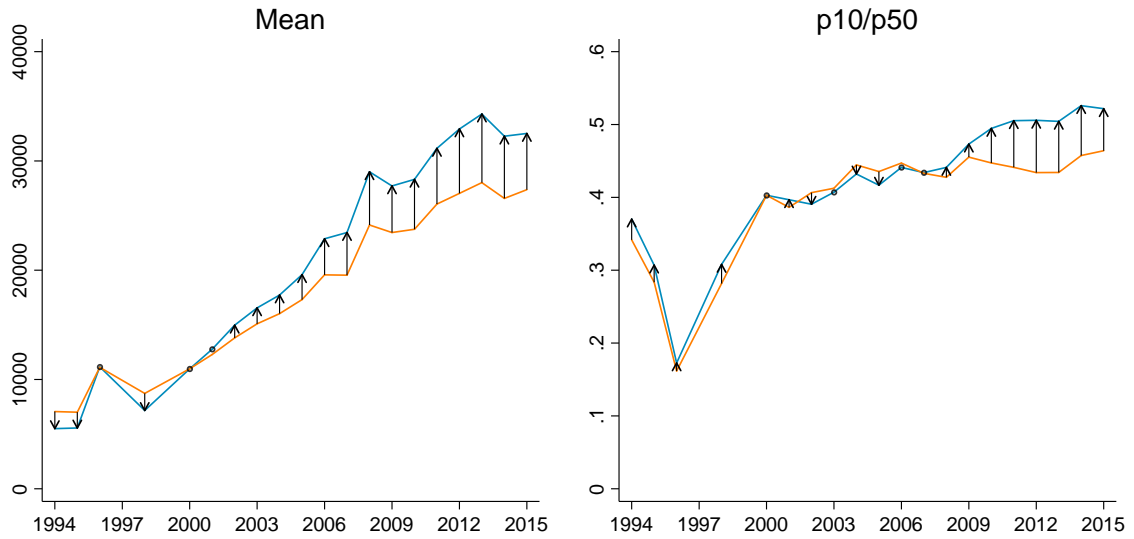
Figure 14 indicates that dynamics of earnings from public sector had resulted in decrease in Gini index, poverty rate, p90/p10 and p90/p50 ratios. The dynamics, however, had also resulted in increase in income levels and p10/p50 ratio. For example, if earnings from public sector would be fixed at 2000 values, then average income in 2015 would be 27000 rubles compare to 32000 rubles. The fact that p10/p50 ratio would be even lower indicates that dynamics of earnings from public sector improved financial well-being of those at the lower part of income distribution. The

improvement was so strong which resulted in decrease in overall income inequality and poverty.

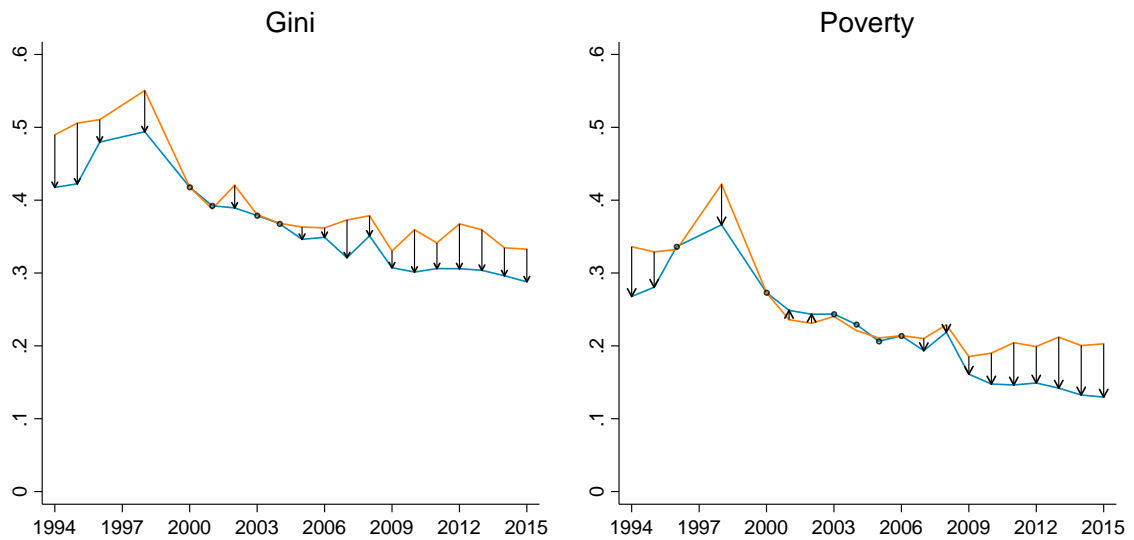
Dynamics of earnings from private sector (see figure 15) is very similar to dynamics of earnings from public sector. However, this group of earnings had contributed more to the overall decrease in the Gini index, the poverty rate, p90/p10, p90/p50 ratios and to increase in income levels and p10/p50 ratio in comparison to impacts of earnings from public sector. If private sector earnings would be fixed at 2000 levels, the Gini index would be equal to 0,33 compare to 0,29. The counterfactual change of the Gini for the changes in public sector earnings is equal to 2 points.

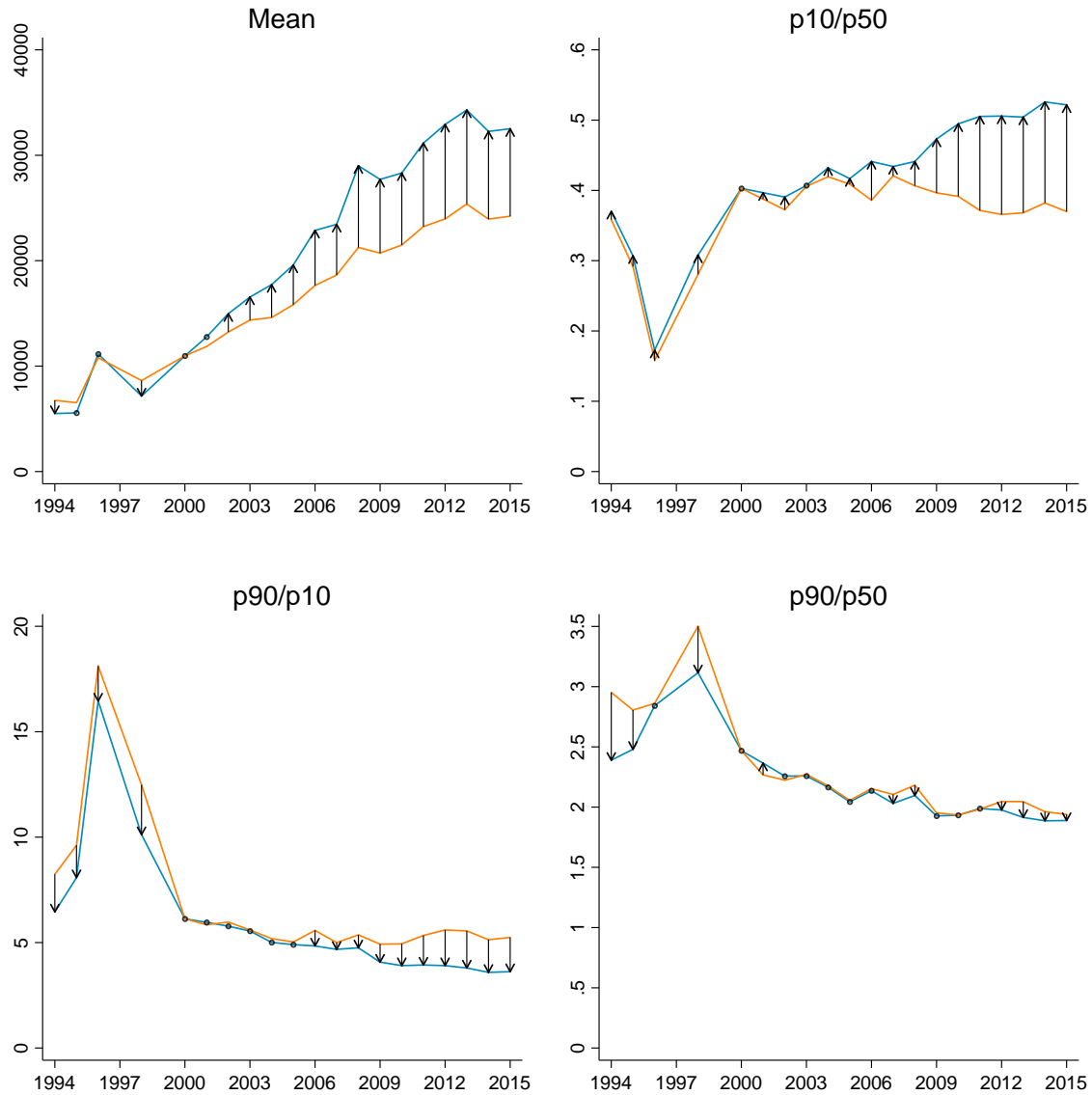
This is explained by the fact that in absolute terms earnings from the private sector are larger than earnings from the public sector, and that share of individuals employed in private sector kept increasing since the fall of the Soviet Union. Figure 14 shows that changes in private earnings caused the biggest impact on the income levels: if earnings from private sector would be fixed at its 2000 values, then average income in 2015 would be 25000 rubles compare to 33000 rubbles. This is explained by the fact that private sector earnings occupies the largest share in total household income (see Figure 10).





**Figure 14. Changes in earnings from public sector.**





**Figure 15.** Changes in earnings from private sector.

Next component of the total household income is pension. Pensions (see figure 16) kept increasing annually since 1994. Figure 16 indicates that the increase in levels of pensions brought the biggest impact on income inequality measured by the Gini index, percentiles ratios and on the poverty rate. The difference between actual and counterfactual Gini index for pensions in 2015 would be 11 points, the poverty gap – 15 points of reduction. We also document the largest impact on the P10/P50 ratio: if pensions would be at its 2000 level, then the P10/P50 ratio would be equal 0,28 which is 24 points difference. This indicates that over 1994-2015 period increase in pensions had large equalizing effect on the income inequality, poverty and, in particular, on the income of the 10<sup>th</sup> income percentile.

The analysis for two more components (other income sources and other benefits) of total household income is presented in Appendix. These two sources do not explain changes in income distribution in Russia. Though, we document that other income source, most probably home food production, played an important role for the inequality and poverty reduction in 1994-1998 period.

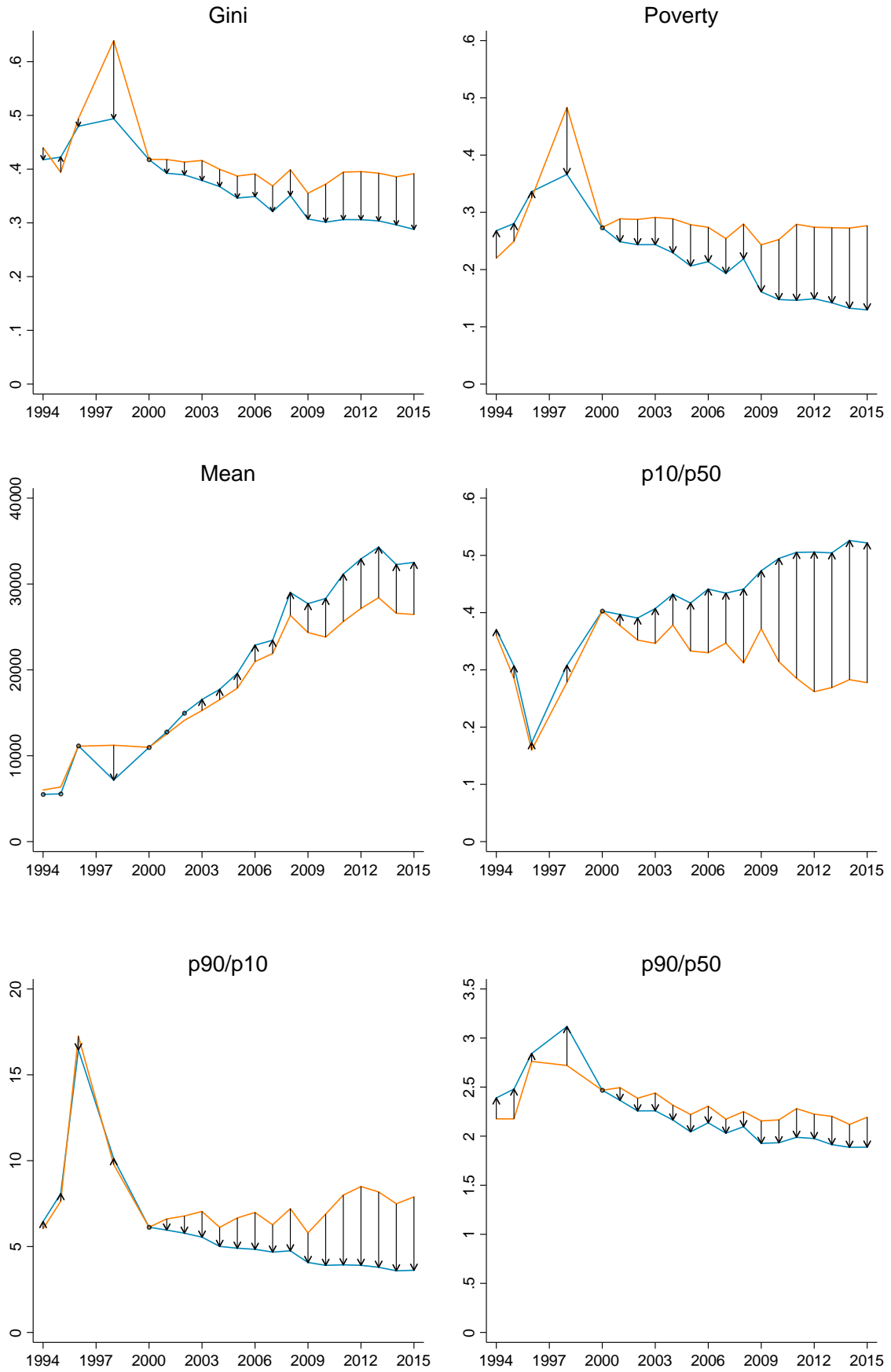
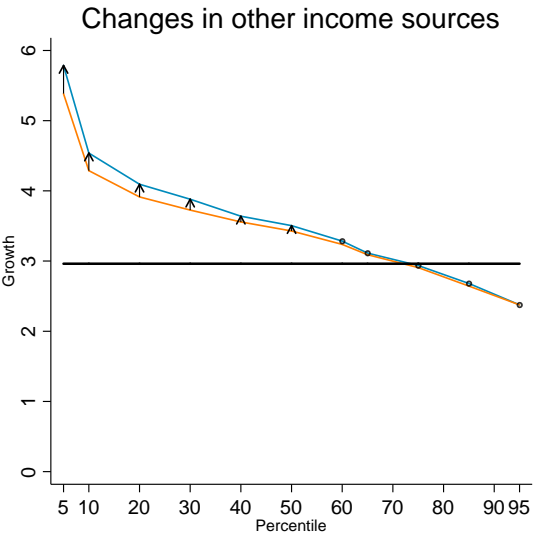
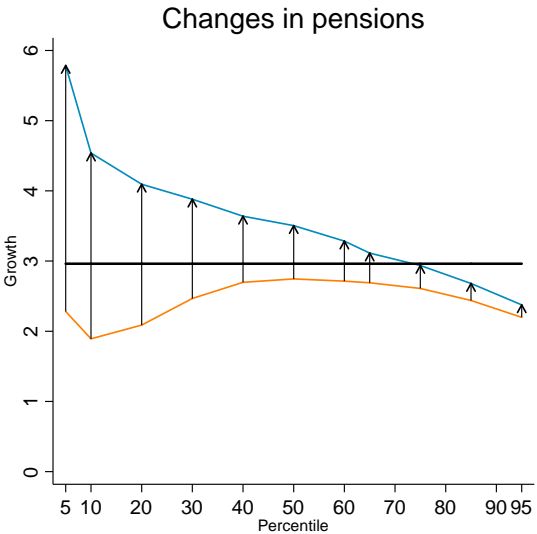
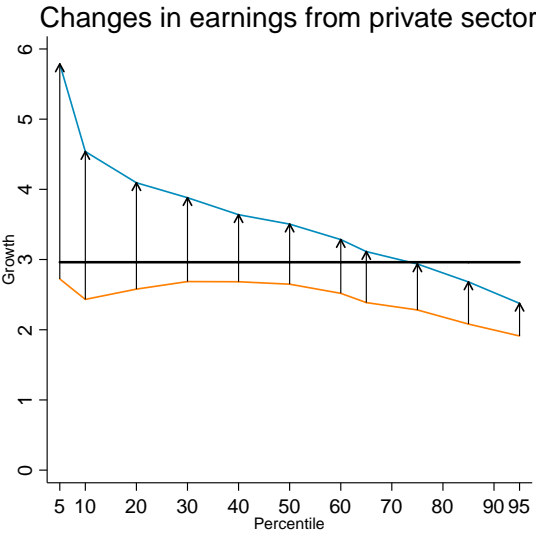
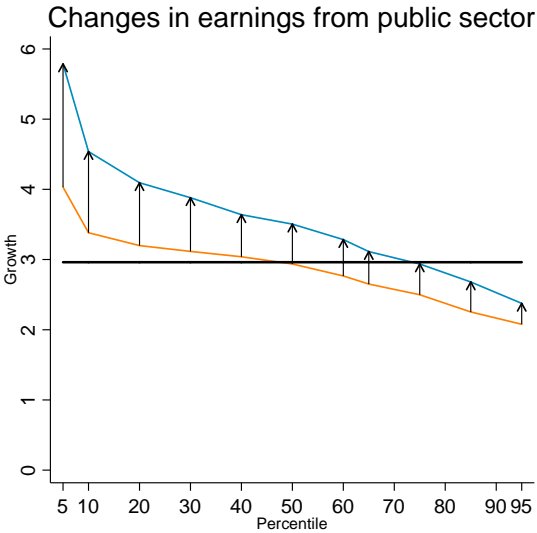
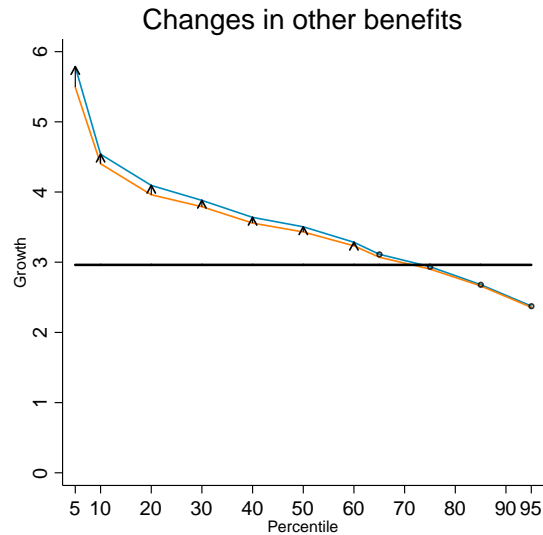


Figure 16. Changes in pensions.

We also document income growth for the different counterfactual scenarios over 2000-2015 period. The GIC curve indicates that increase in pensions had brought the biggest increase in income levels: if pension would be at its 2000 level in 2015, then income growth of the poorest 10 percentile would be equal to 1,9 compare to the actual 4,5 GIC. The increase was especially profound for the below median income levels. Changes in private sector earnings had resulted in increase in income levels at every income percentile. Changes in public earnings had resulted in increase in income growth too, but this impact is smaller than the impact of the private earnings. Changes in other income sources had resulted in small increase of income growth, alike changes in other benefits. In total, most of the changes in income levels happened at below median income part: if earnings, pensions and other income sources would fix its values as in 2000, then income growth of those below the median income would be much lower.







**Figure 17.** GIC over 2015/2000 period.

Summing up so far, we find that changes in socio-demographic characteristics together with labour market participation do not explain reduction in income inequality, poverty and increase in income levels. Controversially, despite increase in income levels dynamics of these factors had resulted in decrease in income levels.

Dynamics of various income sources (earnings from private and public sectors, pensions) are the main factors of decrease in income inequality and poverty in Russia. Earnings from private sector had large impacts on income levels. Increase in pensions had the strongest equalizing effect on inequality by improving financial well-being of those at the lower end of income distribution. Other income sources and other benefits do not explain changes in income inequality and poverty in Russia.

In the next section, we present a decomposition of increase in income by separating effects of levels and dispersion.

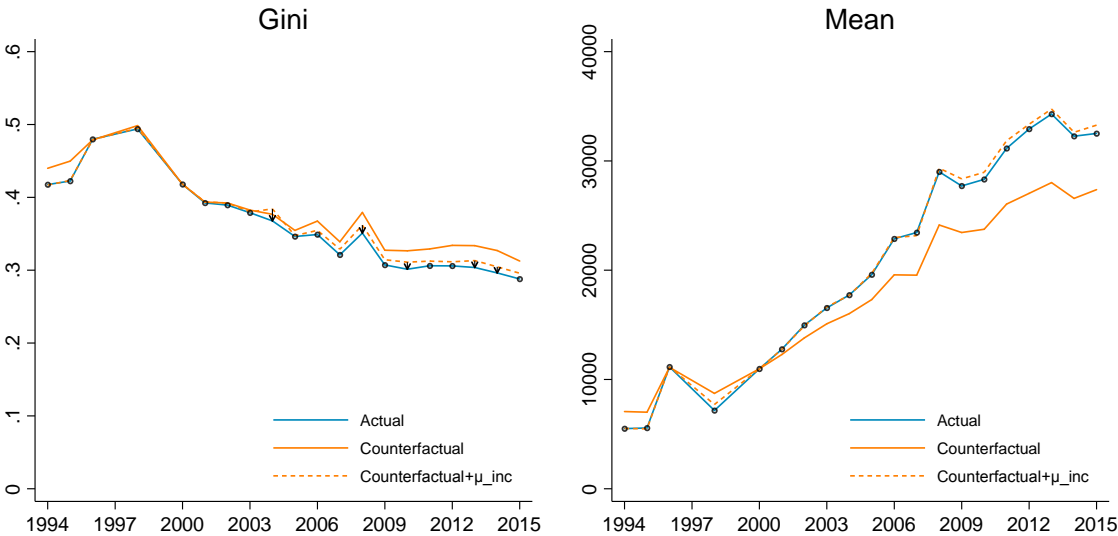
## 6.2. Impact of Changes in Levels and Dispersion

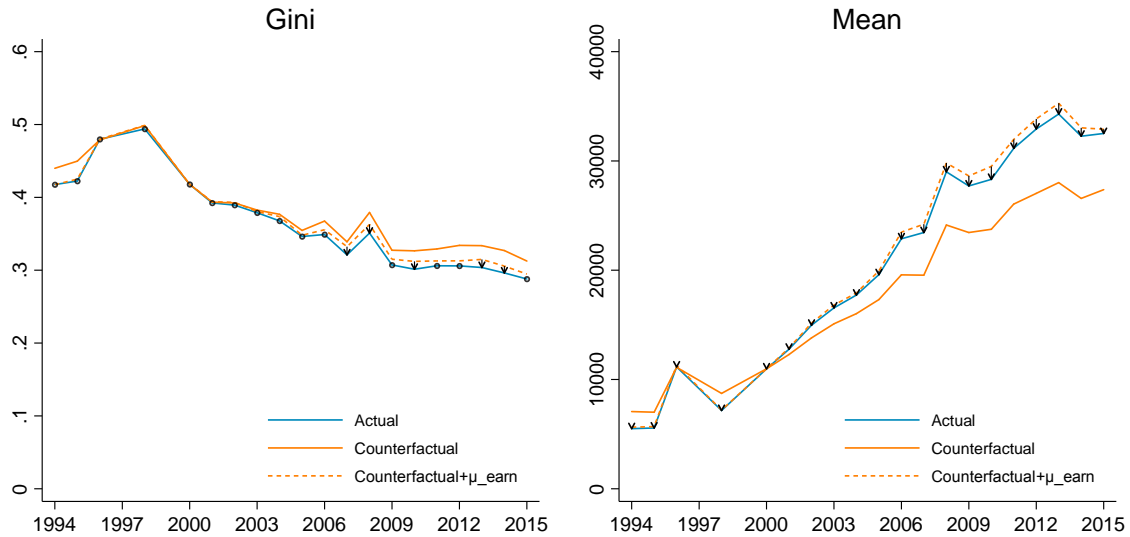
The decomposition of income inequality and poverty in Russia over the 1994-2015 period is unique because income levels increased significantly. Increase in income levels might occur unevenly across different income classes. This might lead to decrease or increase in dispersion of income. However, if income growth was even across the whole income distribution, then dispersion of income is unchanged. In this section, we separate effect of changes in income levels and changes in dispersion of income.

We conduct the additional decomposition steps only for those incomes, which contributed to the changes in income inequality: earnings from public sector, earnings from private sector and pensions. First, we fix the distribution of income following the FDL approach. Then we allow those incomes to grow at the growth rate of the average total household income between the base and t year. This step reveals the impact of increase in levels of income by answering the following question: what would have happened to the income distribution if income would be fixed at its base year values and grow as fast as average total household income?

The second step of this analysis consists of “fixing” income values and, at the same time, allowing it to grow as fast as the average income source (earnings or pensions) between two periods. The results for public sector’s earnings, private sector’s earnings and pensions are depicted on Figures 18-20 below.

Figure 18 depicts results for impact of changes in levels and dispersion for public sector’s earnings. The figure consists of two parts: the above part shows the impact of earnings increase by the average growth of household income, while the below part – the impact of increase by the average growth of public sector earnings. The difference between orange and blue lines might contain effect of changes in levels and changes in dispersion. The length of arrow indicates the impact of “what is fixed” at 2000 level. The graph shows that if earnings are fixed at its 2000 levels and, at the same time, increased by the growth of the average household income, the counterfactual Gini index (dashed orange line) is equal to the actual Gini index (blue line). The results are the same if we increase earnings by the growth of average public sector’s earnings. The average income graph indicates that earnings from public sector increase at the same growth for all individuals. However, on the second graph of the average income we see that orange dashed line is above the blue line. It indicates that the growth of the earnings from public sector was higher than growth of the household income for the same time period. All in all, the analysis of changes in levels and dispersion revealed that increase in levels of public sector’s earnings had contributed to the decrease in income inequality in Russia.

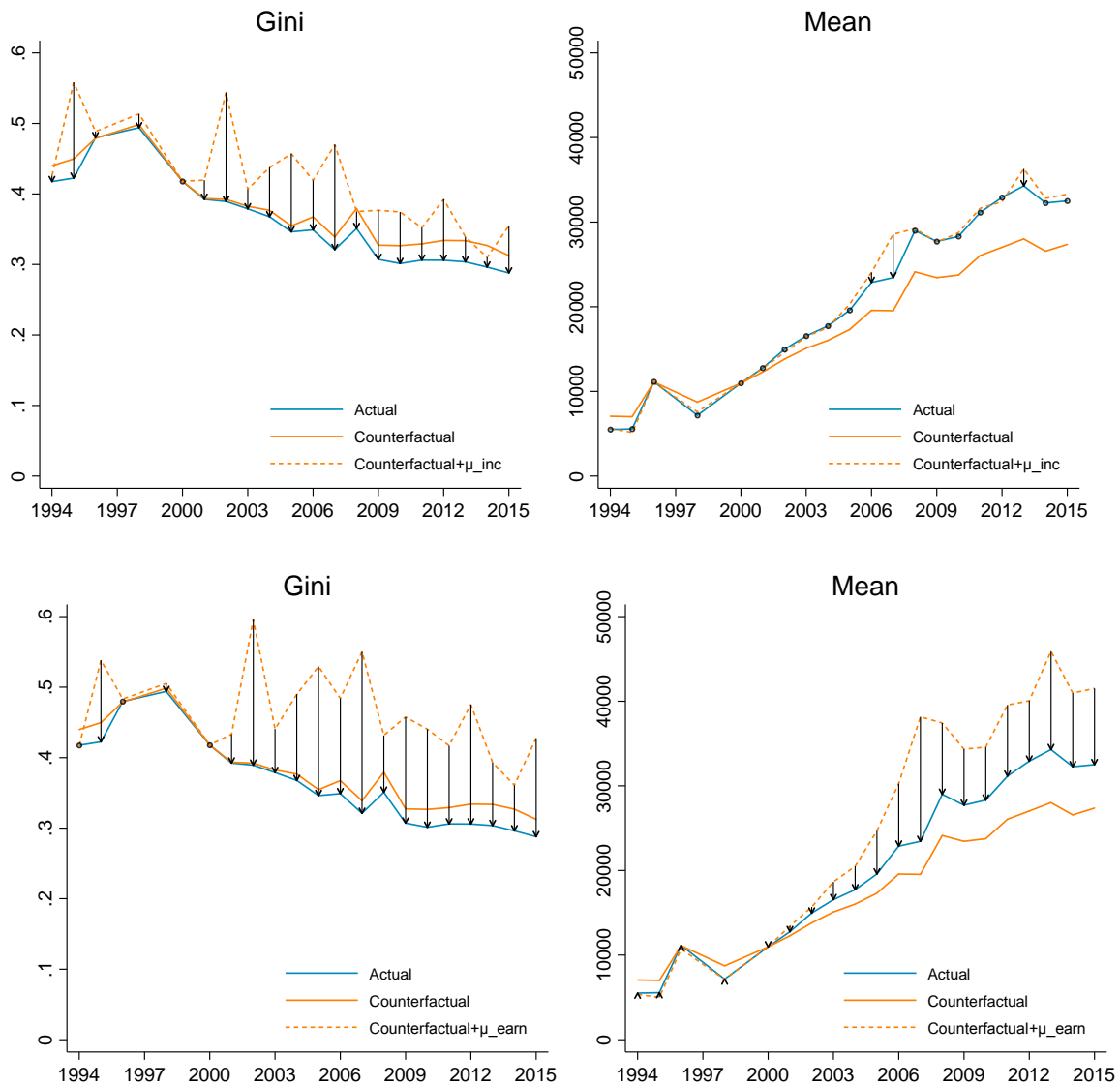




**Figure 18.** Effect of changes in levels and dispersion of earnings from public sector.

**Note.** “Counterfactual” stands for a counterfactual Gini index with fixed income levels at 2000 values. “Counterfactual+ $\mu_{inc}$ ” is a counterfactual Gini index with fixed income levels that are increased by the average household income. “Counterfactual+ $\mu_{earn}$ ” is a counterfactual Gini index with fixed income levels that are increased by the average earnings from public sector.

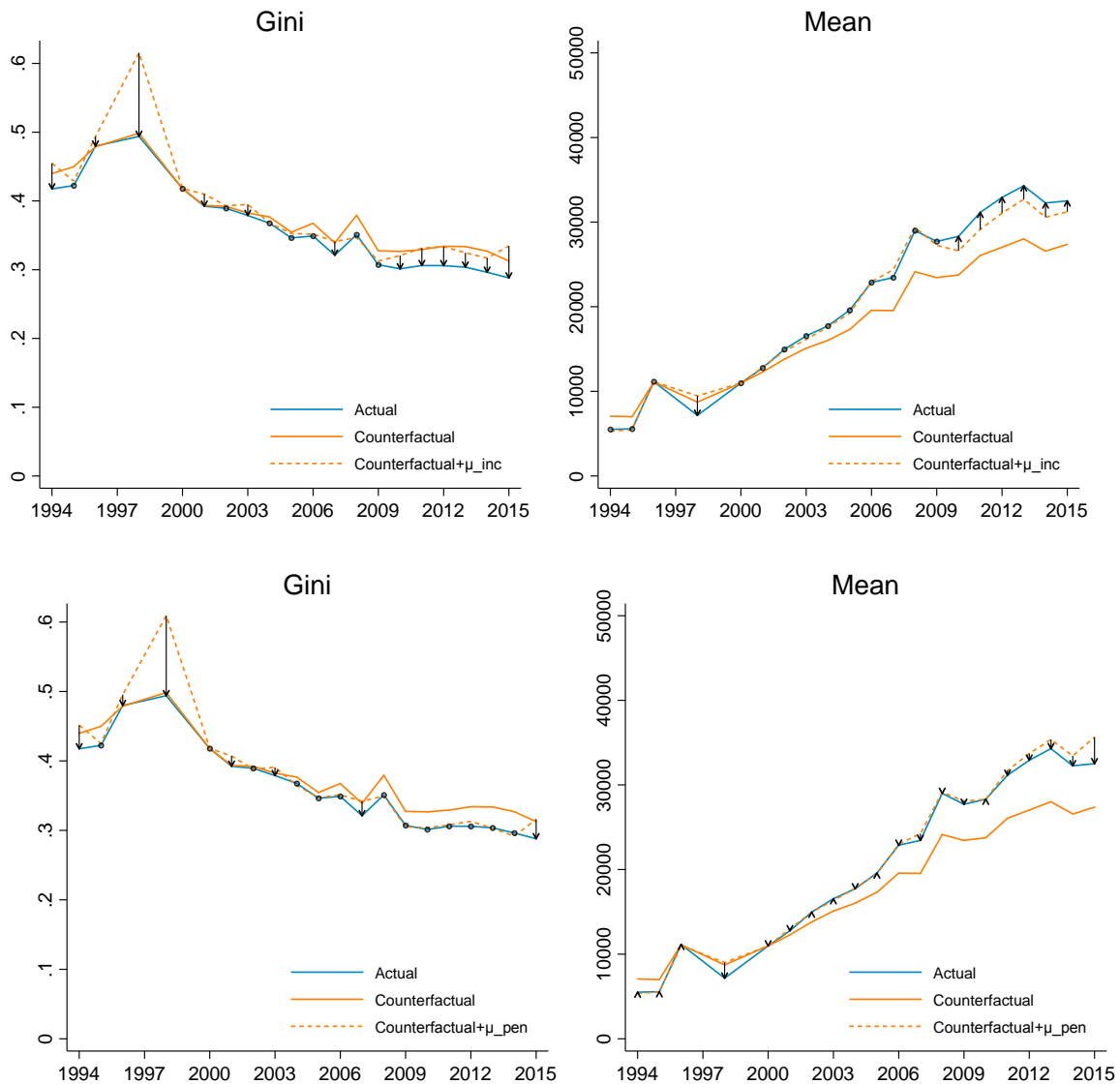
Figure 19 depicts decomposition of changes in levels and dispersion for private sector earnings. If the growth of private sector earnings would be same across different income percentiles, then the inequality and poverty would be higher (dashed orange line is above the blue and orange lines). The inequality would be even higher than a “counterfactual” inequality with fixed income levels. It indicates that the growth of private sector’s earnings was not the same across income percentiles, and that over 1994-2015 period there was a decrease in dispersion of this income source. When comparing effects of increase by the average household income and increase by the average earnings we find that earnings increased much faster than total income (see difference between orange line and orange dashed line for both graphs). The decomposition reveals that decrease in income inequality is a result of decrease in dispersion of earnings from private sector.



**Figure 19.** Effect of changes in levels and dispersion of earnings from private sector.

**Note.** “Counterfactual” stands for a counterfactual Gini index with fixed income levels at 2000 values. “Counterfactual+ $\mu_{inc}$ ” is a counterfactual Gini index with fixed income levels that are increased by the average household income. “Counterfactual+ $\mu_{earn}$ ” is a counterfactual Gini index with fixed income levels that are increased by the average earnings from private sector.

Decomposition of pensions into effects of changes in income levels and dispersion is depicted on figure 20. If 2000-year-pension are increased on the same growth for all individuals, then we get the actual income distribution. This means that growth of pensions was the same for all individuals and that decrease in income inequality and poverty is a result of increase in levels of pensions. We also find that increase in pensions was slightly higher than growth of total household income.



**Figure 20.** Effects of changes in levels and dispersion of pensions.

**Note.** “Counterfactual” stands for a counterfactual Gini index with fixed income levels at 2000 values. “Counterfactual+ $\mu_{inc}$ ” is a counterfactual Gini index with fixed income levels that are increased by the average household income. “Counterfactual+ $\mu_{pen}$ ” is a counterfactual Gini index with fixed income levels that are increased by the average pensions.

### 6.3. Sensitivity analysis

In this section, we address major limitations of the study: order of determinants when using the DFL method and underrepresentation of the rich in the RLMS-HSE survey.

We study changes in income inequality and poverty in Russia over 1994-2015 period using RLMS-HSE survey. Household surveys are widely used to study income inequality. There are, however, several limitations of the household surveys including high non-response rate among the well-off. The “missing rich” issue is not novel. Many researchers tackle this problem by adjusting the survey estimates by administrative data (Piketty, 2003). Though the administrative data on Russian tax-payers exist, it is not perfect data, and we do not observe many characteristics of these people including

socio-demographic characteristics and employment status. This information is very crucial for the study, and we are not able to decompose changes in inequality and poverty without data on these characteristics. We also argue that adjustment that top income share adjustments for Russia proposed by Novokmet, Piketty, & Zucman, 2018 is not perfect due to quality of the data: they only take into account high incomes from entrepreneurial activity, none from salaries. Thus, we believe that the “true” level of inequality for Russia is still unknown and the RLMS-HSE might underestimate it. Nevertheless, our inequality estimates are compared with estimates from Novokmet, Piketty, & Zucman, 2018, and we find similar trends, but different levels (see figure 1 in Appendix).

The second limitation of the study is about the DFL methodology. The DFL decomposition we apply in this paper might be sensitive to the order of determinants. We argue that the order of determinants introduced in the paper is reasonable: starting with pre-determinants such as socio-demographic characteristics of households, following with employment characteristics and finishing with market income. Analyzing the effects of income sources before checking impacts of different household and individual characteristics is illogical.

## **7. CONCLUSION**

This paper documents and explains trends in income inequality and poverty in Russia since 1994. We find that income inequality and poverty decreased over the period, but the levels of income increased. To understand which factors are behind this fall, we define three groups of possible determinants: socio-demographic characteristics, labour market participation and labour market returns. Using a semi-parametric method introduced by DiNardo et al. (1996), we analyze how changes in these groups of determinants relate to changes in income inequality and poverty in Russia. The idea of this method is to construct counterfactual income distributions, where possible determinant(s) are fixed at its base-year level. Afterwards, actual and counterfactual inequality and poverty measures are compared, and the effect of the possible determinant is defined as the difference between actual and counterfactual value.

Evidence shows that changes in socio-demographic characteristics together with labour market participation do not explain changes in income inequality and poverty in Russia. However, dynamics of these factors had resulted in decrease in income levels. It means that income levels would be even higher if socio-demographic characteristics together with labor market employment would not change. The evolution of income sources such as earnings from public and private sectors and pensions are the main drivers of decrease in income inequality and poverty in Russia. If earnings from private and public sector would not change since 2000, then income inequality and poverty would be higher and income levels lower. Dynamics of earnings from private sector had larger equalizing effects on income distribution than earnings from public sector. Increase in income levels is a result of increase in earnings from private sector. We also find that pensions had the largest equalizing effects on income

distribution. Pensions increased significantly for the lower end of income distribution, which had resulted in fall in inequality and poverty.

We find a large increase in income levels in Russia over this period. Therefore, we investigate increase in income sources further. We introduce two more steps by allowing to distinguish between effect of changes in income levels and changes in dispersion. We find that increase in income levels of pensions and earnings from public sector was uniform for all individuals. However, dynamics of private sector's earnings was different: income growth of the poorest was larger than growth of the richest. It leads to a conclusion that decrease in income inequality and poverty in Russia is a result of increase in levels of pensions and earnings from public sector and decrease in dispersion of private sector's earnings.

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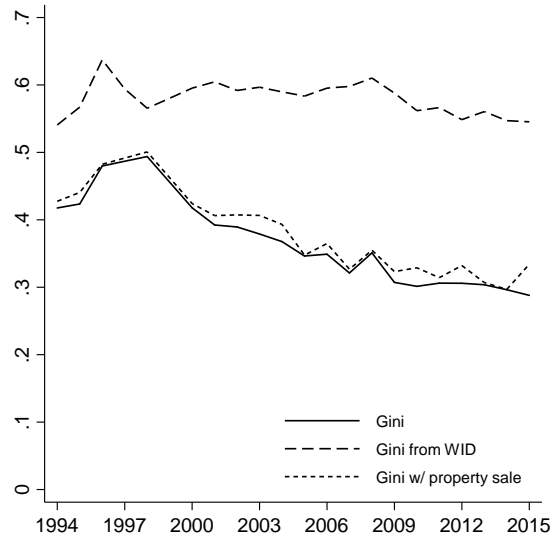
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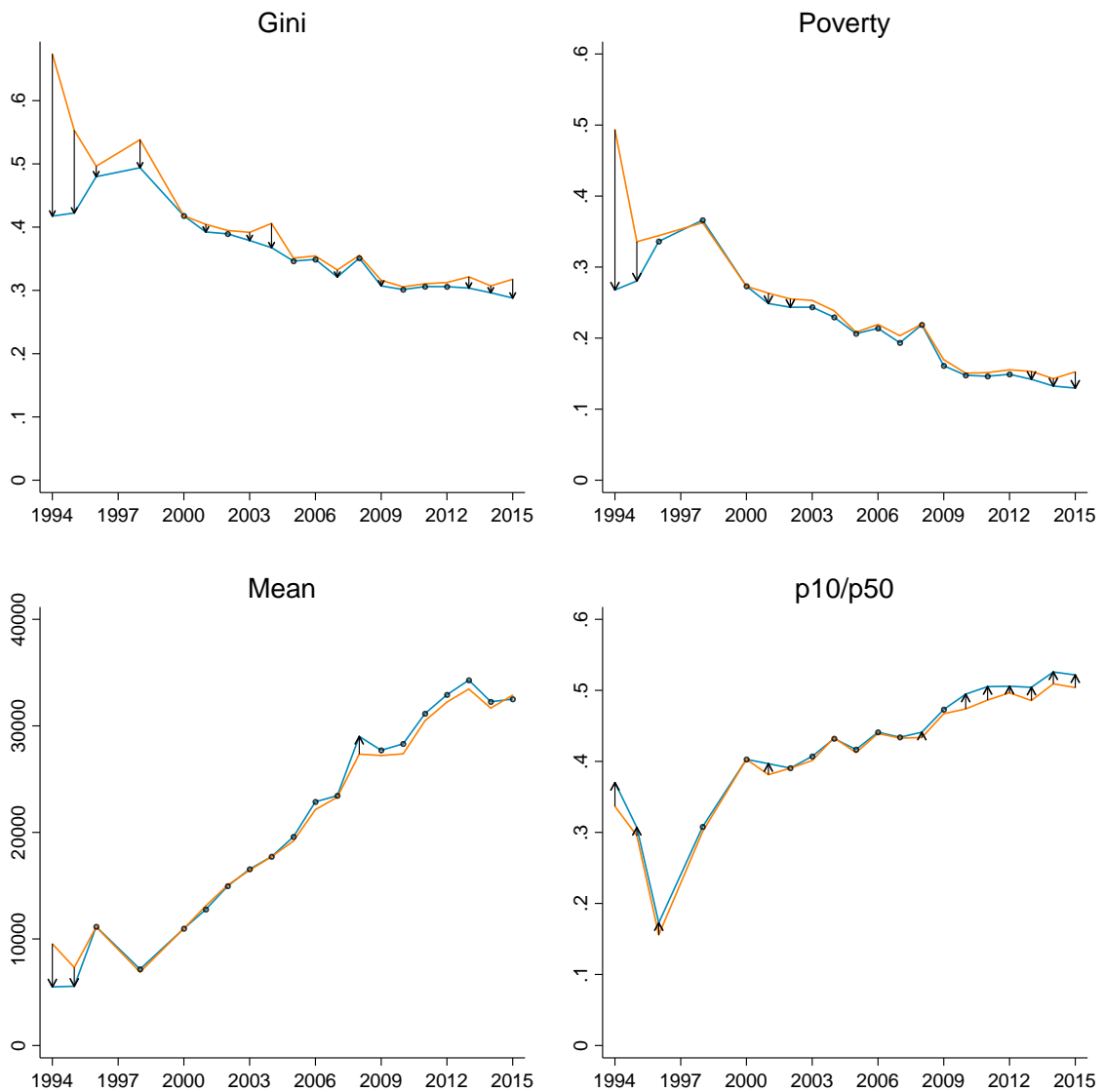
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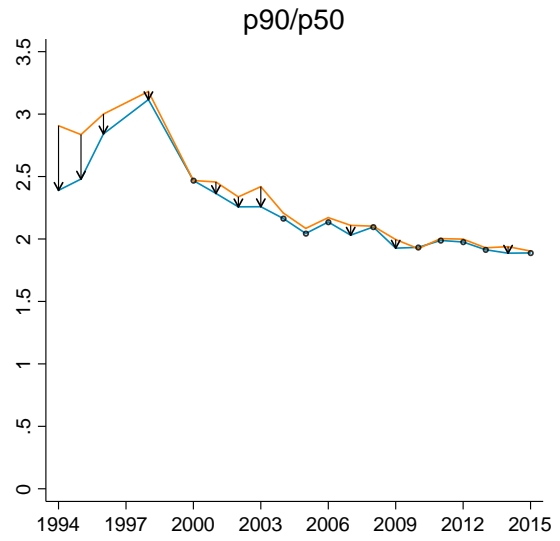
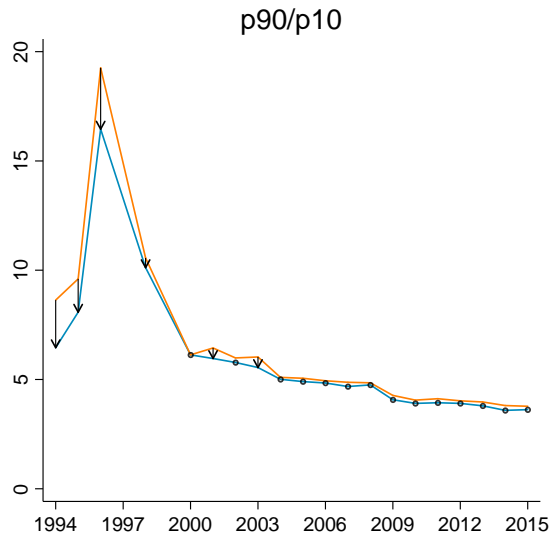
## FIGURES AND TABLES

**Figure 1. Inequality's Estimates Comparison**

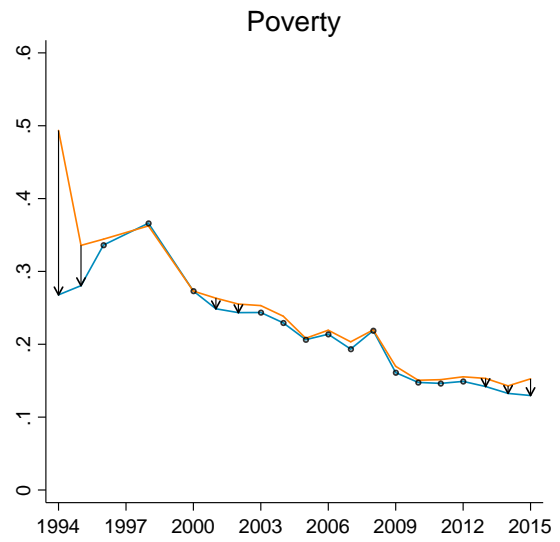
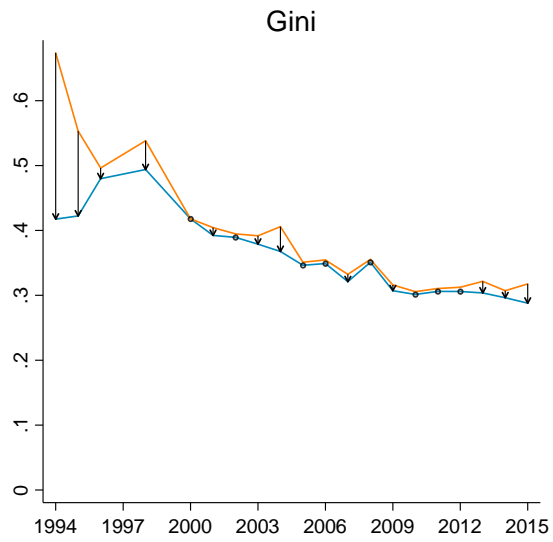


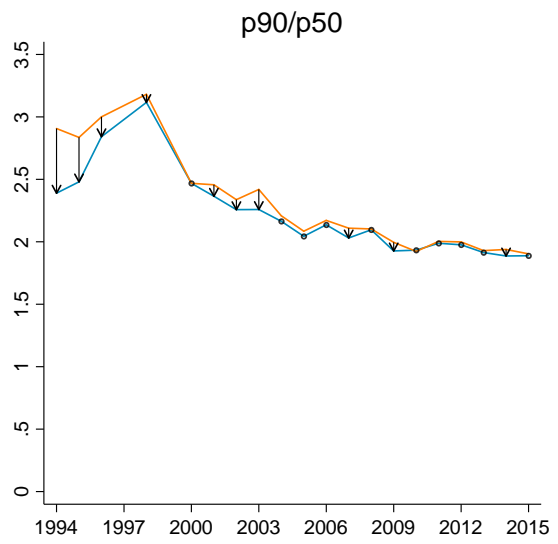
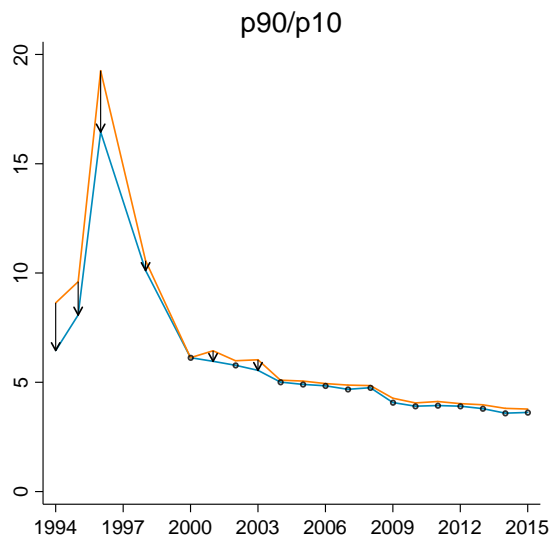
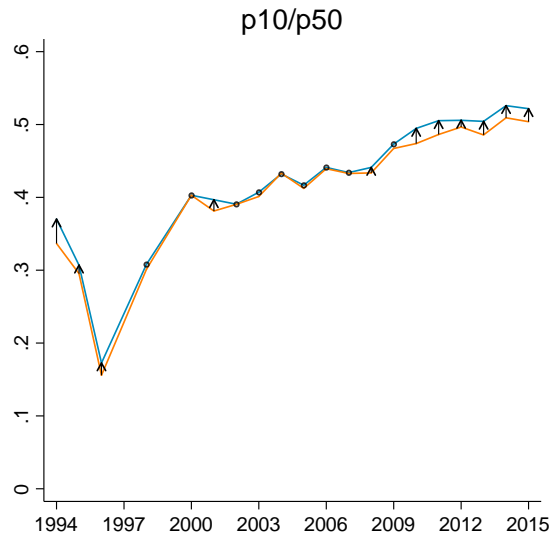
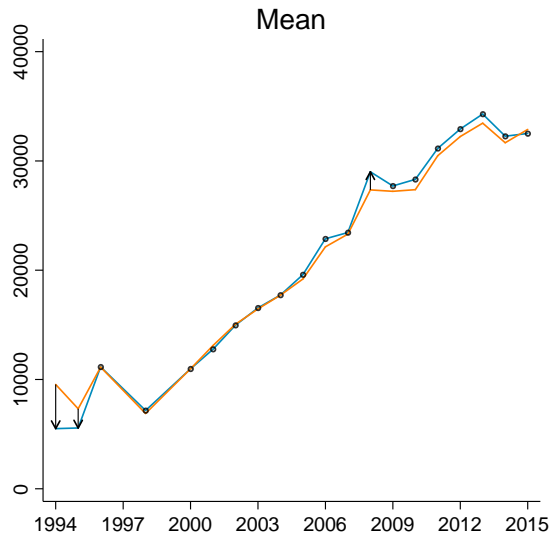
**Figure 2. Impact of changes in other income sources**





**Figure 3. Impact of changes in other benefits**





**Figure 4.** Changes in the base year

**Note.** Income is defined as total net household monthly income adjusted to the household size and regional differences. Income is measured as total net household monthly income adjusted to the household size and regional differences.

