

# INEQUALITY IN BELARUS FROM 1995 TO 2005

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# Inequality in Belarus from 1995 to 2005

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## Abstract

Income and consumption inequality increased in all transition economies, albeit to very different levels. Existing findings suggest that countries that were slow to undertake pro-market reforms experienced the largest increase in inequality, with the notable exception of Belarus, one of the least reformed ex-Soviet republics, that nevertheless has inequality comparable to the most advanced and least unequal transition countries of Central Europe. This article studies the evolution of inequality in Belarus in 1995-2005, decomposes inequality by region and source of income, and provides cross-country comparisons. Specifically, a comparison of Belarus and Ukraine, based on DiNardo-Fortin-Lemieux Counterfactual Kernel Densities, suggests that the large difference in inequality levels is due to different income policies of the two countries: Belarus is unusual not only in its lack of privatization, but also in that it kept many of the old-style Soviet social security features.

## Abstrakt

Nerovnost v příjmech a spotřebě se zvýšila ve všech transformujících se ekonomikách, ačkoli ne všude stejně. Nalezené důkazy naznačují, že zmíněné země pomalu přebíraly pro-tržní reformy a tudíž čelily nárůstu nerovnosti. Výjimku tvoří Bělorusko, jedna z nejméně reformovaných postsovětských republik, která má nerovnost porovnatelnou s nejvíce rozvinutými zeměmi transformujících se republik Střední Evropy s nejmenší nerovností. Tato práce se zabývá studiem nerovnosti v Bělorusku mezi lety 1995 a 2005, rozkládá nerovnost podle regionů a podle zdrojů příjmů a také poskytuje srovnání napříč zeměmi. Konkrétně porovnání na základě DiNardo-Fortin-Lemieux Counterfactual Kernel Densities ukazuje, že největší rozdíl mezi těmito zeměmi je kvůli rozdílným příjmovým pravidlům. V Bělorusku je vzácná jakákoli privatizace a také tam v sociálním systému převládají původní sovětské prvky.

**Keywords:** Belarus, Ukraine, transition, income inequality, expenditure inequality, social security

**JEL classification:** D31, D63, H55, O15

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## 1. Introduction

Since the demise of central planning, income and consumption inequality in the transition economies are of high policy concern, as this is one of the most illustrative economic indicators, easily understandable by the general public. It is now well documented that inequality increased from the initial artificially low levels in all ex-socialist countries, albeit to varying extents. It rose only moderately in most central European economies, while it increased rapidly in most post-Soviet countries. The existing literature (e.g., World Bank, 2000) suggests that post-communist countries that experienced slower and less consistent pro-market reforms also witnessed the largest increases in overall inequality, with the notable exception of the Republic of Belarus.

Although there is much research on inequality in other transition countries, especially Russia and Ukraine, the existing literature on inequality does not go beyond mentioning the overall inequality level of Belarus (e.g., Milanovic, 1998; World Bank, 2000, 2004, 2005a). This paper intends to fill this gap in the existing literature on inequality in transition and provide the first detailed analysis of inequality in Belarus, a country with a non-typical transition path.

The lack of inequality research on Belarus is not surprising given that for Western researchers Belarus remains the least known European country and one of the least known countries of the former USSR.<sup>1</sup> Yet, thanks to its lack of reforms, both of the supply side of the economy and of its social support system (International Monetary Fund [IMF], 2005, 2006), Belarus offers an interesting benchmark case for studying many economic questions including inequality.

Within the Soviet Union, Belarus had the lowest inequality level, closely followed by Russia and Ukraine (Dikhanov, 1996; Kakwani, 1995). These three coun-

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<sup>1</sup>As of April 2008, the Scopus database lists only 47 economics, econometrics, and finance articles containing the word “Belarus” in their titles or abstracts, versus 1207 for Russia, 206 for Ukraine, 569 for Poland, 102 for Lithuania and 56 for Latvia. The latter two countries are considerably smaller than Belarus in their size (population). If one takes comparable CEE countries, the numbers are 654 for the Czech Republic and 516 for Hungary.

tries historically have tight political, cultural, and economic links and also share somewhat similar paths of transition, at least for the most of the 1990s (World Bank, 2002, Figure 2.1). In spite of the inherited links and similarities, Figure 1 shows that the evolution of inequality in these three economies is strikingly different. While in Russia and Ukraine inequality doubled within a few years of independence, reaching levels typical for some of the most unequal countries in the World, inequality evolution in Belarus remained similar to those of the Czech Republic and Hungary—transition countries that experienced significant pro-market reforms but also upheld their income equality with generous, western-style social support systems (World Bank, 2000).

This paper aims to provide an understanding for this surprising pattern. Specifically, using several waves of the Belarusian Household Budget Survey, it answers the following three questions: (i) What are the main factors explaining the structure of household income and expenditure inequality in Belarus? (ii) What was the influence of the 1998 Russian financial crisis on the level of inequality? (iii) What is the importance of demographic and labor market characteristics for explaining the inequality gap between Belarus and Ukraine?

The paper is structured as follows: Section 2 provides a brief review of the literature on inequality in other transition countries. Section 3 gives some background information on the transition path of Belarus and its economy. Section 4 describes the methodology and the data used. Section 5 provides detailed information on inequality in Belarus and its breakdown by sources and regions, Section 6 offers a comparison of Belarus and Ukraine using the DiNardo-Fortin-Lemieux Counterfactual Kernel Densities, and Section 7 concludes. All tables and graphs are in the Appendix.

## **2. Inequality in the transition countries**

A 2005 World Bank survey of poverty and inequality in Eastern Europe and the Former Soviet Union during transition (World Bank, 2005a) recounts:

The wage distribution was compressed under central planning because of the egalitarian ideology and the centralized wage-setting mechanism. [...] The new market economy environment has contributed to the widening of wage disparities. Although the increase in wage disparities is consistent with growing productivity differentials, market distortions have also played a role (particularly pronounced in CIS countries). The worst affected have typically been those who are the most vulnerable to shocks and least able to adjust to the new market paradigms: mostly less skilled and older workers (p.14).

Indeed, income inequality increased in all transition economies during the late 1980s and 1990s. In central European countries such as Hungary, the Czech Republic, Poland or the Baltic republics, the increase was modest. On the other hand, the inequality rise was dramatic in the Commonwealth of Independent States (CIS). In Russia, Armenia, Moldova, Tajikistan, and Turkmenistan, the Gini coefficients for income almost doubled according to World Bank's WDI and UNICEF's Trans-MONEE databases that collect information from national statistical offices.<sup>2</sup> With Gini coefficients of 0.5 or more, inequality in Russia, Armenia, Tajikistan, and the Kyrgyz Republic is now comparable to that observed in some of the most highly unequal economies in Latin America. However, unlike in Latin America, where inequality has been high but fairly stable, the deterioration of the income distribution in the CIS has occurred within only a few years, resulting in an unprecedented magnitude and speed of inequality change. In Russia this increase in income inequality was associated with a sharp increase in mortality, discussed by Brainerd<sup>3</sup> (1998, 2002), who finds a negative and statistically significant correlation between income inequality and the change in life expectancy in Russia mainly because the mortality crisis has been heavily concentrated among working age men, which in

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<sup>2</sup>According to Luttmer (2001), these numbers may be overestimated by 10-45 percent because of measurement errors and otherwise noisy data.

<sup>3</sup>She calls it "an upsurge in mortality and decline in life expectancy of a magnitude never experienced by a country at peace" (Brainerd, 2002, p. 162).

turn suggests that it was at least partially linked with the substantial changes in the labor market.<sup>4</sup>

Some researchers (e.g., Garner & Terrell, 1998; Keane & Prasad, 2002) ask whether the comparison of inequality indices before and after the transition is meaningful at all. They note the distortion of pre-transition figures on income distribution and the use of surveys with differing methodologies, coverage, and objectives.<sup>5</sup> On the other hand, others (e.g., Milanovic, 1998) argue that the real increase in wage disparities was the most important factor behind the increase in income inequality in transition, not the underestimated inequality in the past.

Government transfers and taxes are another significant factor, in many countries—such as the Czech and Slovak Republics, Estonia, Hungary, and Poland—they have played an important equalizing role, alleviating the effect of rising earnings inequality. In other countries, those transfers had almost no effect. In still others, most notably in Russia and to a lesser extent in other CIS countries, they have actually contributed to increasing inequality, as government size and transfers have declined sharply (World Bank, 2000).

Rising educational premia played a much less prominent role in the Commonwealth of Independent States, according to Alam et al. (2005) for Russia; Lindauer (1998) for Moldova; and Yemtsov (2001) for Georgia. All find that education explains only a small share of observed wage inequality, which could be interpreted as reflecting the low market value of the stock of education inherited from the Soviet Union.

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<sup>4</sup>Along similar lines, Lynch et al. (1998) find that higher inequality is associated with higher mortality across U.S. Metropolitan Areas, even after controlling for per capita income and other factors such as median household size or proportion of the population below poverty line.

<sup>5</sup>According to the World Bank (2000), “pretransition surveys were usually not designed to be representative of the entire population but rather of certain socioeconomic groups. As a result, they tended to be biased toward the average household and to exclude nonstandard households—in particular, marginal groups with a high probability of being poor. Thus, the distribution of income was usually truncated, leading to an underestimation of true income disparities”.



The countries that had quicker and more determined reforms witnessed the smallest increases in overall inequality. On the other hand, the countries that have lagged in reforms, or undertaken reforms in an incomplete and inconsistent manner, have experienced the largest increases in inequality. World Bank (2000) explains this by three interrelated institutional factors:

First, [...] the failure to put in place the policies and institutions needed to allow product and factor markets to operate effectively as the main mechanism to allocate resources. A socially costly consequence of this failure has been the disintegration of the formal labor market (falling employment, collapsing wages, and growing wage arrears), which has pushed many people into self-employment and led directly to widening disparities in income. The second factor is the co-opting of national governments by vested interests. These interests have blocked reforms that would erode their privileges and allow for a more equal distribution of opportunities and incomes. Finally, widespread rent-seeking behaviors and corruption in public administration at the local and national levels have also contributed to high inequality. Such behaviors constrain the emergence of new private activity and nurture dysfunctional governments. [...] Each of these factors has played a role, and together they have powerfully reinforced the adverse distributional consequences (pp.163-164).

Dikhanov (1996, Table A-1) calculates several inequality measures (including the Gini coefficient and the Theil index) for each of the former Soviet republics in 1990. The calculations are based on incomplete information on income intervals (using only income boundaries and population shares), but still it is the best source of information on inequality in the Soviet Union just before the start of transition. Dikhanov shows that the three Slavic republics—Belarus, Russia, and Ukraine—in 1990 had the lowest levels of all inequality measures, closely followed by the three

Baltic republics: Latvia, Lithuania, and Estonia. The other Soviet republics (of Caucasus and Central Asia) had much higher levels of inequality.

These findings are totally supported by Kakwani (1995, Table 20). Combining them with later studies of inequality in the ex-Soviet Union (consistent yearly data are available starting from 1995-1996 from, e.g., the World Bank), one can divide the former Soviet republics into 3 groups: those that kept low levels of inequality (Baltic countries and Belarus); those that had dramatic increases in inequality (Russia and Ukraine); and those that had their inequality steadily high (all other republics). Belarus stands out as an interesting case because it is one of the least reformed post-Soviet countries, yet it has low inequality more typical to the most advanced transition countries of Central Europe.

In Russia (and other former Soviet Union countries) the Kuznets curve representation does not apply, meaning that inequality is not likely to fall away from the peak (as in Central Europe), it settles early at a higher level with persistence mainly because of high differences in labour income within the private sector, according to Aghion and Commander (1999). In the long run, Aghion and Commander predict increases in both between and within group inequality because educational systems in transition countries are not expected to speed up the acquisition of skills that takes place in the economy. The deterioration in the education systems will further amplify wage and earnings differences between the skilled and the unskilled, or between the adaptable and the non-adaptable. In the Belarusian case, the state creates even more confusion by the reform that changes the education system back and forth<sup>6</sup>.

Aivazian and Kolenikov (2001) assert that the shifts of human capital and skills demand during the transition have ousted the “Soviet middle class”, i.e., relatively qualified workers, who have had to look for other, usually less profitable, income sources. This search has been adversely affected by low labor mobility (primarily,

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<sup>6</sup>In 1998 the Belarusian government introduced a new “European” 12-year school system instead of the old “Soviet” 11-year one. In May 2008, less than 10 years after the start of the reform, it decided to switch the system back to 11 years by September 2009.

geographical) typical for Russia. At the same time, new “extra rich” population groups have acquired substantial rent flows. These two factors led to an increase in inequality in post-communist Russia, according to Aivazian and Kolenikov.

Berkowitz and Jackson (2006) attribute the differences in the evolution of Polish and Russian income distributions during the transition to different rates of entry of new enterprises. According to them, Poland’s greater success in *de novo* firm entry contributes to its more equitable income distribution. Berkowitz and Jackson find that new firm creation is associated with both larger income and a larger portion of income distributed to the lower quintiles, decreasing both poverty and inequality.

Brück, Danzer, Muravyev, and Weißhaar (2007) study poverty and inequality in Ukraine. Using data from two household budget surveys (1996 - the year of severe economic depression; and 2004 - the year of relative recovery), they find a substantial level of extreme poverty in Ukraine in the middle of the recession and greater poverty among households with children and with less education. When comparing the years 1996 and 2004, Brück et al. find some decline in both poverty and inequality over the eight-year period, especially when measured by income. On the other hand, they document an increase in socioeconomic stratification over time and across space.

Ganguli and Terrell (2005, 2006) examine changes in wage inequality in Ukraine from 1986 to 2003. They find that wage inequality rose moderately and more for men than for women. Applying the DiNardo, Fortin, and Lemieux (1996) counterfactual decomposition method, they assert that changes in the wage structure explain almost the entire rise in inequality. Although relatively less important in its impact, changes in the composition of the labor force did affect the change in inequality as well. Changes in the composition of the labor force contribute to a reduction in overall wage inequality of men; but to an increase in inequality in the top half of women’s wage distribution.

Ersado (2006) tries to explain why Azerbaijan Household Income and Expenditure Survey (AHIES) data show extremely low inequality measures, which would

wrongly suggest that Azerbaijan is one of the most or perhaps the most equal country in the world, while according to Dikhanov (1996) and Kakwani (1995), Azerbaijan had the highest inequality levels among all Soviet republics in 1990. Ersado finds that AHIES is unrepresentative of living conditions of the population because of the fact that the richer households are disproportionately less willing to participate in the surveys. He also asserts that transfers have an inequality reducing effect, and there is significant amount of transfer incomes going into the hands of Azeri households. Inequality in the AHIES data would increase significantly—more than two-fold—if the effects of top truncation and transfers were accounted for (from the Gini coefficient of around 0.18 to more than 0.45).

Griffin (2002) finds a precipitous fall in the average standard of living and a dramatic rise in income inequality in Armenia since the transition to a market economy began. This happened mainly because wage differentials widened. The distribution of expenditure tends to be less unequal than the distribution of income, and this is indeed what Griffin finds in Armenia.

Yemtsov (2001) studies income distribution and inequality in Georgia. He finds that the level of inequality for money income in Georgia is comparable to the highest inequality countries of Latin America (the Gini coefficient of 0.6). Yemtsov argues that consumption is a much better indicator of welfare<sup>7</sup>, especially in the Georgian context (high informalization and demonetization of the economy). Using consumption, he gets very high, but not exceptional inequalities (the Gini coefficient of 0.36). He attributes the highest impact on inequality to high informal incomes and to state transfers reduced to minimum levels.

To sum up, most studies attribute the inequality increase in transition countries to the increase in wage dispersion and the destruction of old social security and

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<sup>7</sup>Which is true for some other transition countries as well, according to World Bank (2000): “In fact, the existence of large differences between consumption inequality and income inequality correlates with our low/high inequality split. In other words, those countries that show the highest levels of income inequality reveal the largest gap between consumption-based measures and income-based measures” (p. 143).

government transfers. In this paper, I will check whether the same is true for Belarus.

### **3. Institutional and economic background in Belarus**

After the collapse of the USSR in 1991, all ex-Soviet republics experienced major macroeconomic instability and sharp output declines. In Belarus, this fall was the deepest in 1992–94 when the country was undertaking some initial and indecisive market reforms. Then, since the mid-1990s, the country has pursued a strategy based on re-establishing centralized state control over the economy. As a result, for the first years of transition Belarus had essentially the same transition path as other countries in the region, but since 1995 they diverged. While several reform measures were undertaken (notably the lifting of price controls and the elimination of most energy crosssubsidization), the economy of Belarus was and still remains highly regulated and under strict state control. The share of the private sector in GDP is only 25% percent, the lowest among all transition economies except Turkmenistan (IMF, 2005).

Figure 2 here.

The Belarusian government brought inflation down only by the beginning of the 2000s, not by the middle of the 1990s as most other transition countries did. The Russian 1998 financial crisis was a major shock to the Belarusian economy because of tight economic links between the two countries. In 1998, inflation<sup>8</sup> in Belarus (measured by the CPI) reached 182% and in 1999 – 251% p.a. Even in 2005, 14 years after the start of transition, inflation was 8% p.a., which is very low by Belarusian standards, but still high compared with other transition economies. Inflation was accompanied by a rapid depreciation of the national currency, making

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<sup>8</sup>As suggested by Randall K. Filer, inflation can have direct effect on inequality levels, because real prices can be more or less biased for products consumed by high or low income consumers, meaning that reported changes in inequality will be biased as well. Unfortunately, the separate data on those price changes is not available.

any conversions to real terms methodologically difficult (I return to this point in Section 4.3). The depreciation stopped in 2003, and the exchange rate of the Belarusian ruble to US dollar has been de-facto fixed ever since (though no official “pegging” was ever proclaimed).

Table 1 here.

Unlike other transition economies, Belarus managed to overcome the initial GDP decline very quickly (at least, according to the official data). The country had steady GDP growth since the mid-1990s, sometimes reaching 10% p.a. However, this did not have much effect on real wages: after the 1998 crisis, they fell to USD32 per month, but then slowly recovered, reaching the USD100 bar only in 2003 and USD200 in 2005.

Unemployment remained low during the whole transition period, but again this is according to the official data, which does not take into account hidden unemployment and job market frictions.

Table 2 here.

One of the most particular features of the Belarusian transition path is that in spite of having inflation, depreciation, and wage levels comparable to Russia and Ukraine, it did not experience such a huge increase in inequality. The three Soviet republics that had the lowest inequality levels in 1990—Belarus, Russia, and Ukraine—have seen very different changes in inequality during their transition. In Russia and Ukraine it doubled by the mid-1990s, while in Belarus it increased only slightly, remaining very low, at the level of the most successful and advanced transition countries of Hungary and the Czech Republic. Even in Poland, inequality increased more than in Belarus.

Table 3 here.

There may be two main reasons for such a low inequality level in Belarus during the transition period. The first one is that the Belarusian population has some inherent features (e.g., Belarusians may be more equity-loving and have more homogeneous skills and education) that assure low inequality even during

such major social and economic changes as the transition “from plan to market”. The other is that the Belarusian government deliberately kept inequality low (and inflation/depreciation high), mainly by keeping most of the old Soviet social guarantees, which were almost entirely abolished in Russia and Ukraine. I investigate this hypothesis in Section 6, first I describe my methodology and give some overall information on inequality in Belarus, its evolution over time and decomposition by factors and population subgroups.

## 4. Methodology and data description

### 4.1. Measures of inequality

There are many measures of income/expenditure inequality<sup>9</sup>; the most popular and widely used is the Gini index<sup>10</sup>, which is easily available for virtually all countries and for many years, making possible cross-country and inter-temporal comparisons. It can be calculated for any type of income/wealth as well as for expenditure/consumption, the second option is more preferable because of systematic underreporting of income in the surveys in post-Soviet countries (for discussion see, e.g., Yemtsov, 2001). To overcome this drawback, I calculate and report inequality indices for both income and expenditure.

The Gini coefficient is calculated (for the whole population) using the following formula:

$$G = \frac{1}{n} \left( n + 1 - 2 \frac{\sum_{i=1}^N (n + 1 - i) y_i}{\sum_{i=1}^N y_i} \right), \text{ where } y_i \leq y_{i+1}. \quad (1)$$

The smaller the coefficient, the less unequal the distribution. When it equals 0, meaning perfect equality, everyone has the same income or consumption, when it equals 1, meaning total inequality, one person possesses all the income.

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<sup>9</sup>They date back to the seminal work of Dalton (1920) and the works of Gini and other Italian researchers.

<sup>10</sup>The Gini index is the Gini coefficient expressed as a percentage.

For a random sample  $S$  of size  $n$  with the values of  $y_i$  ( $i = 1$  to  $n$ ) that are ranked in non-decreasing order the statistic

$$G(S) = \frac{1}{n-1} \left( n+1 - 2 \frac{\sum_{i=1}^n (n+1-i) y_i}{\sum_{i=1}^n y_i} \right) \quad (2)$$

is a consistent estimator of the population Gini coefficient.

The Gini coefficient is the most popular and widely used inequality measure, but unfortunately it is not directly decomposable, even though various indirect methods of decomposition exist, e.g. the one proposed by Shorrocks (1982). The contribution of any income source to overall income inequality is:

$$s_k(I) = \frac{S(Y^k, Y)}{I(Y)} = \frac{cov(Y^k, Y)}{\sigma^2(Y)} \text{ for all } Y \neq \bar{y}, \quad (3)$$

where  $Y_i^k$  denote the income of individual  $i$  ( $i = 1, \dots, N$ ) from the source  $k$  ( $k = 1, \dots, K$ );  $Y = (Y_1, \dots, Y_N) = \sum_k Y_k$  represents the distribution of total incomes;  $S_k(Y_1, \dots, Y_k; K)$  represents the absolute contribution of the source  $k$  to the total inequality. This decomposition does not depend on the choice of inequality measure, but is usually applied to the Gini index.

Foster, Greer, and Thorbecke (1984) proposed a set of decomposable inequality and poverty measures which allows for the analysis of the relation between poverty and specific household characteristics. One of the special cases of their measures is the Theil index. This summary statistic measures income inequality based on information entropy. It is similar to, but less commonly used than the Gini coefficient. The Theil index can be expressed as:

$$T = \sum_{i=1}^N \left( \frac{y_i}{\sum_{j=1}^N y_j} \ln \frac{y_i}{\bar{y}} \right) \quad (4)$$

The first term inside the sum stands for the individual's share of aggregate income, and the second term is that person's income relative to the mean. If



everyone has the same income, then the index equals 0 (perfect equality). If one person has all the income, then the index equals  $\ln(N)$ .

The advantage of this inequality measure over Gini is that the underlying population can be divided into groups using any criteria (regional, demographic, socio-economic etc.), and the Theil index for the whole population will (by construction) be equal to the weighted sum of Theil indices for groups plus the Theil index for inequality between groups, so the Theil index is directly decomposable without any special methods. The Theil index for a country with the population of  $N$  people living in  $K$  regions can be decomposed into 2 parts:

$$T_{country} = T_{within\_regions} + T_{between\_regions}, \text{ where} \quad (5)$$

$$T_{within\_regions} = \sum_{l=1}^K \left[ \frac{N_l}{N} \sum_{i=1}^{N_k} \left( \frac{y_i}{\sum_{j=1}^{N_k} y_j} \ln \frac{y_i}{\bar{y}} \right) \right] \quad (6)$$

(each region  $K$  has a population  $N_K$ ) and

$$T_{between\_regions} = \sum_{l=1}^K \left( \frac{y_l}{\sum_{j=1}^K y_j} \ln \frac{y_l}{\bar{y}} \right) \quad (7)$$

(derived from Conceição & Ferreira, 2000).

Another commonly used inequality measure is the coefficient of variation which is a measure of dispersion of a probability distribution. It is defined as the ratio of the standard deviation  $\sigma$  to the mean  $\mu$ :

$$c_v = \frac{\sigma}{\mu} \quad (8)$$

The coefficient of variation<sup>11</sup> is a dimensionless number. For distributions of positive-valued random variables, it allows comparison of the variation of populations that have significantly different mean values. It is often reported as a percentage by multiplying the result of calculation by 100. The absolute value of

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<sup>11</sup>I calculate it, but do not report to save space, as it follows exactly the same patterns as the Gini and Theil indexes.

the coefficient of variation expressed as a percentage is often referred to as the relative standard deviation (RSD or %RSD).

Apart from the Gini and Theil indices and the coefficient of variation there are other insightful but less commonly used inequality measures which include Kakwani measure and Atkinson's social-welfare measures (Atkinson, 1970; Kakwani, 1979, 1981).

Studies of inequality using income data are quite difficult in Russia and other post-Soviet countries, mainly because of a remarkable expansion of wages' and social transfers' arrears and increasing importance of informal economic activities (the income from these activities is very unlikely to be reported truthfully). So I apply the above-mentioned inequality measures and their decompositions both to expenditure inequality and to income inequality.

## 4.2. Data description

Unfortunately, there are no reliable and consistent data on the inequality in Belarus for the first years of transition (1991-1994). Only from 1995 when the Belarusian Household Budget Survey<sup>12</sup> (BHBS) was started can one construct adequate measures of inequality among the Belarusian population. The Survey is designed to be representative of the total Belarusian population, unlike Soviet surveys which usually included only working population.

The data I'm using for this paper are pooled cross-sections from 1995 to 2005 obtained from the Ministry of Statistics and Analysis of the Republic of Belarus. Each cross-section contains approximately 5000 observations representing the whole population of Belarus. Each observation includes detailed information about the household and its members; breakdown of income by categories; break-

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<sup>12</sup>This project was established with the assistance from the World Bank and the Statistical Office of the European Commission (Eurostat); the quality of the data is at the level of similar surveys in other European countries. The results are published on regular basis, see, e.g., <http://belstat.gov.by/homep/en/publications/1-09n.htm> and <http://belstat.gov.by/homep/en/publications/2-11n.htm>

down of expenditures by categories; more detailed data on food consumption; information about their dwellings.

I also use data on individuals that form the households in question (approximately 14000 observations for each yearly cross-section), including their age, socio-economic status, wages and other sources of income, number of children, information on their education, work experience and health.

The data on income and expenditure are monthly averages for a given year. They are collected quarterly using a diary completed by household and survey questions asked by interviewers. The sample is different each year, so I cannot follow the same households over time; it is possible however to follow the age cohorts.

This dataset was never used in the Western scientific literature. Only four articles by Pastore and Verashchagina are based on it, but only partially, using the data for years 1996 and 2001 only and studying returns to human capital and gender wage gap, which are beyond the scope of my research.

### **4.3. Problems with conversion from nominal to real terms**

Figure 3 here.

Unlike other transition countries that experienced high inflation rates during the first years of transition, but quite quickly managed to reduce them down to reasonable values, Belarus had significantly high inflation rates until the middle of the 2000s. Even in 2005 the Belarusian CPI grew almost 8% p.a., and this nevertheless was low compared with the previous years (see table 1). The impact of the 1998 Russian financial crisis was so big that in Belarus the CPI rose 182% in 1998 and 251% in 1999 (meaning that consumer prices grew 3.5 times in just one year). (See Figure 2.)

Figure 3 shows the evolution of average total income of the Belarusian households (both mean and median). The first graph shows these two time series in nominal terms. Because of very high inflation in the second half of the 1990s, the

data must be converted into real terms, otherwise this graph is meaningless.

The second graph shows the same series expressed in 2000 prices (using the official CPI provided by Belarusian Ministry of Statistics and Analysis). The series exhibit a clear upward trend; however, the income seems to go down in 1996 and 2000, without any major macroeconomic events to explain this decrease. Moreover, on this graph it looks like the 1998 Russian financial crisis had no effect on income of Belarusians, which is also very unrealistic, at least because of tremendous increases of the CPI and PPI.

The third graph shows the same time series converted into USD using the PPP exchange rate provided by the World Bank in its WDI publications (e.g., World Bank, 2006). Again, there is a clear upward trend, but total income suddenly jumps up in 1998 and jumps down in 2002. There is no sign of negative effect of the 1998 Russian crisis as well. It looks like there was some change in the methodology that the World Bank was using to calculate PPP exchange rate in 1998-2001 (and then returned to the previous methodology). Unfortunately, more convincing and realistic estimates of PPP exchange rates are not available, so constructing them for Belarus (and providing a reliable methodology of calculation of PPP exchanges rate for high-inflation transition countries in general) could be one of the areas for further research.

Finally, the fourth graph shows total income converted into USD using the market exchange rate. While these series look the most realistic (with a clear decrease in 1998-1999), they are methodologically flawed as well, because of high inflation in 1995-2001 and de-facto “pegged” exchange rate in 2004-2005.

While inequality measures are *relative*<sup>13</sup> and thus do not depend on the choice of base year or exchange rate, to study poverty (a phenomenon tightly linked with inequality) in Belarus one first needs to find a good way to convert all data into real terms. Because this methodological problem has not been solved yet, in this

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<sup>13</sup>If incomes of all households are scaled up or down with the same factor, by construction Gini and Theil indices do not change.

article I study only inequality<sup>14</sup>.

## 5. Inequality evolution and its decomposition by sources and cohorts

### 5.1. Overall inequality

Figure 4 here.

Inequality in Belarus reached its maximum in the mid-1990s (see figure 1). After 1995 it was at a low and quite stable level (as figure 4 shows), regardless of whether it is measured by Theil or Gini indices (for both income and expenditure). Note that both inequality and its variation increased in 1998, the year of the Russian financial crisis, then the indices followed their downward trend with a very small slope.

One should note that in the Belarusian case inequality of expenditure and inequality of income follow the same pattern, but the former is *higher* than the latter (I consider this phenomenon in more detail in Section 5.4). Nevertheless, they still are lower compared with other post-Soviet countries.

Figure 5 here.

My findings are consistent with the data from the other sources. Figure 5 shows the comparison of my estimates with those from TransMONEE 2007 Database (UNICEF IRC, Florence). There are some minor discrepancies (still within 95% confidence interval) that are most probably due to some differences in methodologies<sup>15</sup>, equivalence scales and sampling weights, but the overall trend is clearly the same.

Figure 6 here.

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<sup>14</sup>I also try not to duplicate, but to complement a 2004 World Bank report that studies poverty in Belarus in much detail, but touches inequality only briefly.

<sup>15</sup>TransMONEE states that “...most data are collected directly from National Statistical Offices using a standardized template. Indicators are calculated by the TransMONEE database manager on the base of raw data and using standardized methodologies”.

Despite an extensive literature on inequality and growth, the exact nature of their relationship is still disputed. Some studies (e.g. Miyazawa, 2006; Sukiassyan, 2007) find that the relation is negative, others assert it is positive (e.g. García-Peñalosa and Turnovsky, 2006; Lopez, 2007). In the case of Belarus, it may look that they are positively correlated, but in fact I didn't find any significant dependence between them. The Gini index for income fluctuates within less than 1 percentage point for the whole 11 years of my sample, and its 95% confidence intervals hardly change at all (see Figure 4). When the data on subsequent years become available (and if income inequality in Belarus changes more significantly), I may be able to identify some relationship.

## **5.2. Regional decomposition**

Figure 7 here.

The regional inequality in Belarus is spread almost uniformly across regions, none of the regions' contributions is significantly different from the others. The changes in inequality levels over years are mainly due to the changes in inequality in Minsk city (the capital) that also has the highest inequality level.

Unfortunately, the breakdown into smaller regions that could allow for the checking of the influence of trade and other relations with neighboring countries, is not possible, as only seven big regions are coded in the data provided by the Ministry.

## **5.3. Inequality decomposition by sources.**

Figure 8 here.

Table 4 here.

Wages are by far the most important source of income in Belarus. "Income from small land plots" was the second most important income source in the mid-1990s, but its share is steadily decreasing ever since. The share of pensions (retirement benefits), on the contrary, is rising (Table 4.A and the first graph of Figure 8).

This may be one of the factors that keep the total inequality low as pensions' contribution to the total inequality is much smaller than their contribution to the total income (Table 4.B) and is a sign of the importance of government transfers.

The contribution of "Income from small land plots" is decreasing along with the decrease in its share. An interesting phenomenon - the share of "other" income never exceeds 10%, but its contribution to inequality sometimes reaches 50%! A closer examination of the data shows that this is mainly due to the "receipts from sale of real estate". Only few households (less than 0.5% of the sample) sell their houses or apartments in any given year, but these transactions have a huge effect on total inequality. When I exclude this type of income (the second graph of Figure 8), the contributions to the total inequality roughly correspond to the shares in the total income.

The total income as defined by the Belarusian Ministry of Statistics and Analysis includes the "receipts from sale of real estate" and other similar items (e.g. loans and operations with shares and other securities) that are more related to assets than to income<sup>16</sup>. To obtain a better and more methodologically sound estimates of inequality, I subtract those sources from income and expenditure. All graphs and tables in this paper contain the updated estimates.

#### **5.4. Income versus expenditure inequality**

One of the interesting features of inequality in Belarus is that inequality of income is *lower* than inequality of expenditure, while studies of other transition economies (e.g., Yemtsov, 2001, for Georgia) usually find that income inequality is *higher* than consumption inequality, because low-income households borrow to sustain a higher consumption level.

Let's assume for now that there is no underreporting, i.e., all income and consumption is reported wholly and truly. Then differences in income and consumption/expenditure inequality will imply different savings levels for different income

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<sup>16</sup>I'd like to thank Randall K. Filer for pointing this out.

levels, as in principle  $savings = income - consumption$ .

If there is underreporting of income, higher inequality of expenditure will mean that underreporting is more prevalent for people with higher income. Unfortunately, in the Belarusian case it is difficult to measure, as in Belarus both underreporting of income *and* underreporting of expenditure are present. Because of higher prices and narrower choice of high-quality imported goods and services, many Belarusians prefer to go shopping abroad, usually to Moscow, Kiev, Vilnius or Warsaw. Of course, this applies mostly to more affluent people and is virtually impossible to measure directly.

The apparent convergence of income and expenditure inequality (see Figure 4) may mean that the underreporting of expenditure increases, reaching the level of income underreporting. Again, this situation (when people not only have some “hidden” income, but also spend it secretly) is impossible to measure, only some very rough indirect estimates can be constructed, e.g., by using the number of visas issued to Belarusians<sup>17</sup>.

The decomposition of income and expenditure of Belarusians by deciles reveals two interesting patterns (see Table 5):

- (1) The shares of decile groups are virtually constant during 1995-2005, with only three exceptions: (a) a huge drop of the income share of the most poorest 10% of population due to the 1998 Russian financial crisis (from 4.2% in 1997 to 2.7% in 1998 and 3.1% in 1999), but only for this decile and for income (apparently the poorest managed to smooth their expenditure/consumption during the crisis); (b) a drop in expenditure share of the poorest 10% from 3.6% in 2004 to 2.4% in 2005 (there is a need of investigating what happened in the subsequent years to find out whether this was an isolated “jump” or a beginning of a new trend); (c) a slow and gradual decrease of expenditure

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<sup>17</sup>Unfortunately, even these measures will be biased downwards, as Belarusian citizens do not need visas to visit Ukraine and Russia, in the latter case there are even no customs controls on border crossings.



share of the richest 10% (but not of income share) that is the most likely to be the reason of overall decrease in expenditure inequality (see Figure 4).

- (2) Except for the poorest 10% of population (whose income and expenditure shares change considerably from one year to another), the difference between income and expenditure share decreases with the increase of income, but almost doesn't change over time. The poorest have their income shares considerably higher than expenditure shares, while the richest have their expenditure shares higher (but decreasing) (see Figure 9). This is indeed a sign of income underreporting among richer Belarusians, but there is no sign that it is decreasing - on the contrary, it is likely to be accompanied by growing expenditure underreporting.

The topic of income and expenditure underreporting in transition countries (and particularly in Belarus) could be a promising area for future research.

### **5.5. Age cohorts**

Because of the limitations of the data (the sample is different each year), I could not follow the same individuals and/or households over years to study the evolution of their income and expenditure.

Deaton (1998, p. 117) provides an approach that could be used to overcome this limitation. Although the BHBS does not give a possibility of following individuals over time, it is still possible to follow *groups of people* over years. The groups can be constructed by regions, sectors or occupation, but a potentially more fruitful approach is to construct and follow over time the *cohorts* of individuals (defined by their year of birth). Provided the population is not too much affected by immigration and emigration, we can use successive surveys to follow each cohort over time by looking at the members of the cohort who are randomly selected into each survey. For example, we can look at average total income of those who are 30 in 1995, 31 in 1996 and so on. These averages, because they relate to the same groups of people, have many of the properties of panel data. Because there

are many cohorts alive at any moment of time, cohort data are more rich and diverse than aggregate data, they allow for the separation of generational from life-cycle components in income and consumption profiles (Deaton finds that the profiles themselves usually move upward over time with economic growth as each generation becomes better off than its predecessors).

Dividing the working-age population (from 16 to 66 years old) into 10 cohorts, we can observe that the three oldest cohorts earn significantly less than the average, while the youngest cohort has income above average only when all its members are at least 23 years old (meaning that they have finished their university education). The income of the 4th oldest cohort (those who are 51-55) becomes smaller than the average when large proportion of its members reach retirement age (in Belarus it is 60 years for women and 65 years for men). Retired people clearly benefit less from the economic growth as their relative income decreases almost every year, the opposite is true for younger people.

This is consistent with the conclusions made by Deaton for Taiwan. The lines for younger cohorts (Figure 2.5 in Deaton) are almost always above the lines for older cohorts observed at the same age. For Belarusian data it is almost always true as well.

Figure 10 here.

Finally, to eliminate growth and exchange rate effects I have constructed the age-income graph for relative income. Figure 10 shows a very well-known “inverted U” shape dependence of earnings on age, where the maximum is reached between 40 and 50 years, meaning that *income structure in Belarus is not distorted* and thus can be compared with other countries, which is what I do in the following section.

## 6. DiNardo-Fortin-Lemieux Counterfactual Kernel Densities and their application to Belarus and Ukraine

### 6.1. Belarus and Ukraine

Although Belarus has tighter economic links with Russia than with Ukraine, because of their relative sizes (population, territory, GDP) it is more preferable to compare Belarus with the latter than with the former.

Before comparing Belarus and Ukraine using DiNardo-Fortin-Lemieux Counterfactual Kernel Densities in Section 6.2, I give some basic comparisons of income and expenditure in the two countries. To keep the comparisons simple and save space, I compare the “snapshots” of the two economies in 2002 - by that time both countries had already 10 years of transition and the impact of the 1998 Russian crisis was already smoothed away (all figures in this section are for year 2002 and come from Belarusian and Ukrainian national statistical offices<sup>18</sup>, unless explicitly noted otherwise).

In 2002 Ukrainian households were getting an average income of 114.1 USD (or 44.3 USD per capita): 42.8% of their income came from wages, 3.2% from self-employment, 20.4% were pensions, stipends and other social security transfers, 15.3% from their land plots (both from sales and in-kind) and the rest from other sources, including 8.6% as a “financial assistance received from relatives, friends or charitable organizations”. However, when I re-calculate these shares using the micro-data from Ukrainian Household Budget Survey (similar in construction to BHBS), I obtain slightly different results:

Table 6 here.

The income decompositions by sources are quite similar in both countries, with few notable exceptions. The share of pensions in Ukraine is 15%, while in Belarus it is 20%. Income from land plots is significantly more important in Ukraine by both share (20% vs. 13%) and contribution (25% vs. 6%).

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<sup>18</sup>Ukrainian State Statistics Committee and Belarusian Ministry of Statistics and Analysis.

It may appear that social security systems are quite similar in both countries, but in fact they are not. The first reason is that in Ukraine the unemployed are 10.3% (official figure<sup>19</sup>) or 17.2% (my calculations from UHBS) of the economically active population while in Belarus they are only 3.0% (official figure<sup>20</sup>) or 5.8%, while the average shares and contributions of unemployment benefits are very close in both countries (meaning that in Belarus the unemployment benefits are more generous). The second reason is the payment arrears, still widely spread in Ukraine and virtually nonexistent in Belarus (Berry & Schelzig, 2005). The third reason is that “financial assistance received from relatives, friends or charitable organizations” is very significant in Ukraine (8.6% of total income) while in Belarus it is not.

As for the expenditures, Ukrainian households spent on average 123.5 USD per month and per household, 59.1% on food, while in Belarus the households spent 154 USD and this share was only 43.9%, meaning that Ukrainian households are on average poorer than Belarusian ones. They also spend more than they get (on average), that can be explained by borrowing and income underreporting.

I have calculated Gini and Theil indices for Ukraine, using the micro-data from the Ukrainian HBS and the same methods and formulas I applied to BHBS. The results for Ukraine were the following: Gini coefficients for income/expenditure 0.418/0.411 and Theil 0.291/0.280. Note that the coefficients for income and expenditure are very close, in fact their 95% confidence intervals overlap. Note also that in Ukraine the inequality of income is higher than the inequality of expenditure, which is more intuitive than the Belarusian case.

Table 7 here.

The comparison of decile shares for income and expenditure reveals additional interesting patterns. Income and expenditure decile shares are almost equal in Ukraine and different in Belarus (see section 5.4 for discussion), but the distribution is clearly more compressed in Ukraine: the poorest Ukrainians are poorer than the

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<sup>19</sup>[http://www.ukrstat.gov.ua/operativ/operativ2006/rp/prc\\_rik/prc\\_r/osp\\_rik\\_r.htm](http://www.ukrstat.gov.ua/operativ/operativ2006/rp/prc_rik/prc_r/osp_rik_r.htm)

<sup>20</sup>[http://www.belstat.gov.by/homep/ru/indicators/svodn\\_2000-2005.php](http://www.belstat.gov.by/homep/ru/indicators/svodn_2000-2005.php)

poorest Belarusians, but the richest Ukrainians are richer.

A World Bank (2007) country brief characterizes Belarus as having a “...comprehensive social security and good basic health and education services [that] have been sustained since independence and remain available.” Another World Bank (2004) report states that “... the Republic of Belarus has a well-developed system of social support. More than 14% of GDP or 31% of the consolidated budget expenditure in 2002 were channeled to social assistance and insurance programs. In addition it is estimated that quasi-fiscal social transfers by enterprises were equivalent to about 2-3% of GDP” (p.59). As for Ukraine, a similar report (World Bank, 2005b) explains: “The differences in coverage and on pension benefits across income groups result in a regressive incidence. Pension benefits are similar across beneficiary households, with the poor earning 8 percent lower pensions compared to the better off. These smaller pensions, combined with slightly lower coverage of pensions among the poor result in an unequal distribution of benefits... There are major gaps in terms of coverage and targeting of the poor” (p. 45). This explains why pensions play an important role in reducing inequality in Belarus, but not in Ukraine.

My overall conclusion is that the two countries started their transition with the same income distributions, and by 2002 they had grown apart in some features, but remained close in others.

## 6.2. DFL

In their seminal paper, DiNardo et al. (1996) [DFL] present a way of studying the effect of changes in structural variables on the distribution of income (expenditure), and in particular on income inequality. Their semiparametric approach is based on the construction of counterfactual *densities* by reweighting the original population according to the changes in underlying characteristics (generalizing the ideas of Oaxaca, 1973, who calculated counterfactual *means*). The DFL procedure allows for referring to the distribution as a whole, instead of focusing on specific aggregate

measures. The results can be visualized and the effects of particular variables isolated in a well-defined way.

The methodology of DFL can be presented as follows: each individual observation is viewed as a vector  $(w, z, t)$ , where  $w$  is the wage (or income/expenditure),  $z$  is the vector of individual attributes, and  $t$  is the date. The joint distribution of wages and attributes conditional on the date can be defined as  $F(w, z|t)$ . The density of wages at some time,  $f_t(w)$  is then expressed as the integral of the density of wages, conditional on some individual attributes and on the date  $t_w$ ,  $f(w|z, t_w)$ , over the distribution of individual attributes  $F(z|t_z)$  at date  $t_z$ , or:

$$f(w; t_w = t, t_z = t) = \int_z dF(w, z|t_{w,z} = t) \quad (1)$$

where the set of wages  $w$  come from period  $t_w$  and the set of characteristics  $z$  come from period  $t_z$ .

The counterfactual for  $z$  from  $\tau$ ,  $f(w; t_w = t, t_z = \tau)$ , can be expressed as re-weighted actual

$$f(w; t_w = t, t_z = \tau) = \int_z f(w|z, t_w = t) \Psi_z(z) dF(z|t_z = t), \quad (2)$$

where

$$\Psi_z(z) = \frac{dF(z|t_z = \tau)}{dF(z|t_z = t)} \quad (3)$$

Instead of two different dates one can use other binary criteria, say women/men, employed/unemployed etc., or compare the populations of two different countries<sup>21</sup>. The continuous version of the DFL method was implemented in Stata software (starting from version 9.0) by de Azevedo<sup>22</sup>.

Using the semiparametric procedure from DFL, I develop counterfactual densities of total expenditure<sup>23</sup> of Belarusian and Ukrainian population in 2002. For

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<sup>21</sup>Data comparability across countries could be a problem, but not in my case as I am using the data from two identically constructed household budget surveys.

<sup>22</sup>His `.ado` code is based on the original DFL paper and on Van Kerm (2003).

<sup>23</sup>Expenditure is used instead of income to offset for underreporting, especially in Ukraine.

instance, I estimate the density that would have existed in Belarus if the distribution of demographic and other characteristics of the population was as in Ukraine:

$$f(w; t_w = Belarus, t_z = Ukraine) = \int f(w|z, t_w = Belarus) \Psi_z(z) dF(z|t_z = Belarus) \quad (4)$$

and  $\Psi_z(z)$  is a “reweighting” function where

$$\Psi_z(z) = \frac{dF(z|t_z = Ukraine)}{dF(z|t_z = Belarus)} = \frac{Prob(t_z = Ukraine|z) Prob(t_z = Belarus)}{Prob(t_z = Belarus|z) Prob(t_z = Ukraine)} \quad (5)$$

The weight  $\Psi_z(z)$ —the probability of living in country  $t$ , given individual’s characteristics  $z$ —is estimated using a logit<sup>24</sup> or probit model, which predicts the probability  $Prob(t_z = Ukraine|z)$  and  $Prob(t_z = Belarus|z)$  for each individual in the sample. Using the reweighted sample, I then calculate the counterfactual measures of income and expenditure levels, and use kernel density estimates to draw their counterfactual densities. These counterfactual density functions show the expenditure density that would have prevailed in Belarus if the distribution of demographic and other characteristics<sup>25</sup> there was as in Ukraine.

Figure 11 here.

The first graph compares the actual distribution of expenditure of Belarusians with the counterfactual distribution (“if Belarusians were Ukrainians”). The counterfactual density has lower mean<sup>26</sup> and higher dispersion, meaning that if Belarusians were Ukrainians, they would be poorer and have higher expenditure inequality.

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<sup>24</sup>The logit model I use is of the form  $p(Ukraine = 1) = \exp(\beta_0 + \beta_z Z) / (1 + \exp(\beta_0 + \beta_z Z))$ . The reweight is created by multiplying the sample weight by  $p/(1 - p)$ , where  $p$  is the predicted probability from the logit model.

<sup>25</sup>I use age, gender, place people live (capital/city/town/village), land plot ownership, number of children, education, employment status and socio-economic category.

<sup>26</sup>However, this comparison of means in real terms is not fully convincing, for the reasons discussed in Section 4.3.

The second graph compares the same two distributions, but excluding the dummy variable for employed/unemployed status from the logit model. The counterfactual density is almost the same, but the “spikes” are somehow “smoothed”, meaning that the employment status is clearly not the main reason of the differences in the two distributions.

The differences in inequality between Belarus and Ukraine should be attributed to different policies of their governments, not to different characteristics of their people, as on average both populations have similar education, work experience, age and other characteristics. The growing share of retirement benefits in the income of Belarusians (see Section 5.3, Table 4.A, and Figure 8) would suggest that inequality in Belarus was preserved low (compared to Ukraine) by keeping many of old Soviet social security features (and government transfers) in Belarus and dismantling/reducing them in Ukraine. However, it is not clear whether the Belarusian government would be able to keep inequality low when real full-scale market reforms are eventually implemented.

## 7. Summary and conclusions

Using the data from Belarusian Household Budget Survey (BHBS), I find that inequality in Belarus was low and virtually stable in 1995-2005, but with a small rise in 1998 due to the Russian financial crisis. This result is the same whether I use Gini or Theil indices and whether I calculate them for income or expenditures.

The differences in the coefficients I’ve calculated and those from TransMONEE database, that uses data provided by the World Bank and national statistical offices, are probably due to some differences in methodologies. The overall conclusions are the same: inequality in Belarus was almost stable in 1995-2005.

The regional breakdown of Theil indices shows that changes in inequality in Belarus are mainly due to changes in Minsk city, while the rural population has the major contribution to the inequality levels.

The inequality decomposition by income sources shows that the income sources



with the highest share (wages, pensions, income from the land plots and self-employment income) have the highest contribution to the total inequality.

As for the breakdown by age cohorts, younger generations seem to benefit more from improving economic conditions and GDP growth than older ones, but the relation of relative income with age has a familiar “inverted U” shape.

The two Soviet Republics that had the lowest inequality levels in 1990 have seen very different evolution of inequality during the transition period: in Ukraine it almost doubled, in Belarus it remained very close to the pre-transition level. The application of DFL method to both countries shows that (in 2002) their populations on average have the same demographic and other characteristics, and the differences in inequality levels are due to government policies, most probably keeping many of old Soviet social security features (and government transfers) in Belarus and dismantling/reducing them in Ukraine.

The overall conclusion would be that the Belarusian government was quite successful in building an egalitarian society, as growth (6% p.a. on average during the last decade (IMF, 2006)) didn't result in significant increase of inequality among people, who remained not very rich, but equal.

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## Appendix

**Table 1. Descriptive macroeconomic statistics**

	1996	1999	2002	2005
GDP growth, % p.a.	2.8%	3.4%	5.0%	9.4%
PPI, % p.a.	29.3%	245.0%	42.7%	10.2%
CPI, % p.a.	39.3%	251.2%	34.8%	8.0%
Market exchange rate, BYR per USD, mid-year	16	542	1772	2157
Exchange rate change, % p.a.	39.7%	143.0%	23.9%	-1.2%
Average wage, USD	\$75	\$32	\$93	\$193
Registered unemployment, percentage of economically active population	3.9%	2.1%	3.0%	1.5%

Source: Institute for Privatization and Management (<http://www.research.by>); Belarusian Ministry of Statistics and Analysis; author's own calculations based on BHBS.

Note: for figures in USD market exchange rate is used.

**Table 2. Cross-country comparisons of Gini coefficients for income**

	1996	1999	2002	2005
Belarus (own calculations)	0.239	0.233	0.236	0.241
Belarus (TransMONEE)	0.244	0.235	0.246	0.238
Czech Republic	0.230	0.232	0.234	0.258
Lithuania	0.347	0.343	0.357	0.309
Poland	0.328	0.334	0.353	0.366
Russia	0.501	0.400	0.397	0.405
Ukraine	0.351	0.320	0.327	0.310

Source: TransMONEE 2007 Database, UNICEF IRC, Florence; author's own calculations based on BHBS; World Bank WDI – for Ukraine 1996 and 2005.

**Table 3. Descriptive economic statistics**

	1996		1999		2002		2005	
Total income	\$159.9	100.0%	\$62.5	100.0%	\$172.2	100.0%	\$330.9	100%
Wages	\$74.8	46.8%	\$31.8	50.9%	\$92.6	53.8%	\$192.5	58.2%
Self-employment income	\$5.4	3.4%	\$2.2	3.6%	\$5.6	3.3%	\$9.7	2.9%
Pensions and unemployment benefits	\$25.1	15.7%	\$9.2	14.7%	\$32.9	19.1%	\$62.6	18.9%
Income from small land plots	\$33.2	20.8%	\$11.5	18.3%	\$19.6	11.4%	\$24.9	7.5%
Total expenditures	\$143.5	100.0%	\$55.5	100.0%	\$154.0	100.0%	\$318.7	100.0%
Total food expenditures	\$70.8	49.3%	\$28.7	51.7%	\$67.7	43.9%	\$113.3	35.5%
Expenditures for potatoes	\$0.6	0.9%	\$0.3	1.2%	\$0.9	1.3%	\$0.9	0.8%
Expenditures for fruit and vegetables	\$5.8	8.2%	\$2.4	8.3%	\$5.9	8.7%	\$11.7	10.3%
Expenditures for construction and purchase of real estate	\$2.9	2.0%	\$0.3	0.5%	\$2.5	1.7%	\$3.5	1.1%
Expenditures for cars (purchase and maintenance)	\$3.4	2.4%	\$1.5	2.6%	\$5.9	3.9%	\$13.9	4.4%
Sample size	4850		4829		4880		4867	

Source: author's own calculations based on BHBS.

Note: For “Expenditures for fruit and vegetables” and “Expenditures for potatoes” the percentage shows the share of total food expenditures; market exchange rate was used for conversions into USD (data from the Institute for Privatization and Management <http://www.research.by>).

**Table 4.A. Share in total income**

	1996	1999	2002	2005
wages	47.2%	52.7%	54.5%	58.7%
self-employment income	3.5%	3.6%	3.2%	3.0%
dividends	0.3%	0.3%	0.2%	0.2%
pensions	16.0%	15.5%	20.9%	20.5%
unemployment benefits	0.1%	0.0%	0.1%	0.1%
income from small land plots	23.0%	20.8%	13.2%	9.0%
other	9.9%	7.1%	7.9%	8.5%
Total	100.0%	100.0%	100.0%	100.0%

**Table 4.B. Proportionate contribution to total inequality**

	1996	1999	2002	2005
wages	36.5%	47.6%	49.8%	54.8%
self-employment income	8.0%	11.0%	3.2%	4.4%
dividends	0.6%	0.6%	0.3%	0.5%
pensions	3.7%	3.5%	8.8%	7.8%
unemployment benefits	0.0%	0.1%	0.0%	0.1%
income from small land plots	11.5%	8.8%	6.0%	2.3%
other	39.7%	28.4%	31.9%	30.1%
Total	100.0%	100.0%	100.0%	100.0%

Source: author's own calculations based on BHBS.

Note: "income from small land plots" includes both sales of agricultural products and income in kind; "other" includes child allowances, other state subsidies and financial assistance received from friends and relatives, but *excludes* receipts from personal and household property sale and receipts from sale of real estate.



**Table 5.A. Decile shares of income**

	1996	1999	2002	2005
1	4.5%	3.1%	3.7%	3.1%
2	5.9%	6.1%	6.0%	5.9%
3	6.9%	7.1%	7.1%	6.9%
4	7.8%	8.0%	8.0%	7.9%
5	8.7%	8.9%	8.8%	8.8%
6	9.5%	9.8%	9.7%	9.9%
7	10.5%	10.8%	10.7%	10.9%
8	11.9%	12.1%	12.1%	12.2%
9	14.0%	14.0%	14.1%	14.2%
10	20.3%	20.1%	20.0%	20.3%

**Table 5.B. Decile shares of expenditure**

	1996	1999	2002	2005
1	3.2%	3.0%	3.2%	2.4%
2	4.9%	4.7%	5.1%	5.3%
3	6.0%	5.8%	6.2%	6.5%
4	7.0%	6.9%	7.2%	7.6%
5	8.2%	8.0%	8.3%	8.6%
6	9.2%	9.2%	9.4%	9.6%
7	10.5%	10.6%	10.7%	10.9%
8	12.3%	12.5%	12.4%	12.5%
9	15.1%	15.3%	14.9%	14.8%
10	23.5%	24.1%	22.7%	21.9%

Source: author's own calculations based on BHBS.

**Table 6. Inequality decomposition by income sources**

Income source	share		contribution	
	Ukraine	Belarus	Ukraine	Belarus
wages	50.1%	54.5%	48.0%	49.8%
self-employment income	4.0%	3.2%	4.2%	3.2%
dividends	0.0%	0.2%	0.0%	0.3%
pensions	15.0%	20.9%	9.7%	8.8%
unemployment benefits	0.5%	0.1%	0.3%	0.0%
income from land plots	20.1%	13.2%	25.2%	6.0%
other	10.3%	7.9%	12.6%	31.9%
Total	100.0%	100.0%	100.0%	100.0%

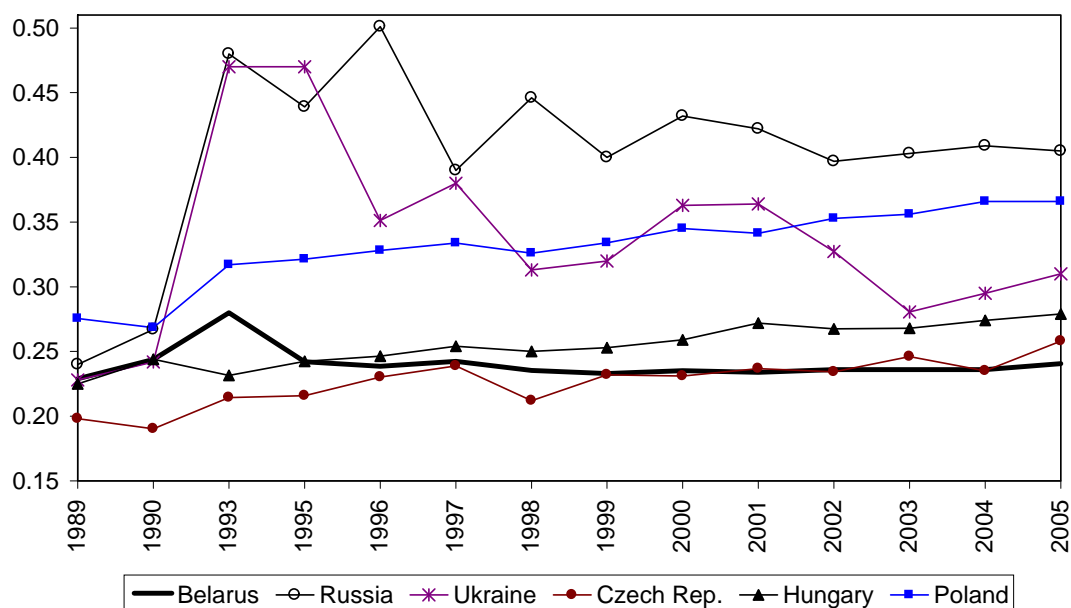
**Table 7. Decile shares of income and expenditure**

Quantile group	Income			Expenditure		
	Ukraine	Belarus	difference, p.p.	Ukraine	Belarus	difference, p.p.
1	0.9%	3.7%	-2.9	1.3%	3.2%	-1.9
2	2.9%	6.0%	-3.0	2.9%	5.1%	-2.1
3	4.2%	7.1%	-2.9	4.3%	6.2%	-1.9
4	5.6%	8.0%	-2.4	5.8%	7.2%	-1.4
5	7.0%	8.8%	-1.8	7.2%	8.3%	-1.0
6	8.8%	9.7%	-0.9	8.8%	9.4%	-0.6
7	10.9%	10.7%	0.2	10.9%	10.7%	0.2
8	13.7%	12.1%	1.7	13.6%	12.4%	1.2
9	17.6%	14.1%	3.6	17.3%	14.9%	2.4
10	28.4%	20.0%	8.4	27.9%	22.7%	5.2

Source: author's own calculations based on BHBS and UHBS.

Note: the decomposition by income sources was performed in Stata using `ineqfac` .ado module written by Stephen P. Jenkins, Institute for Social and Economic Research - University of Essex.

**Figure 1. Evolution of income inequality in selected transition countries measured by Gini Index, 1989-2005**



Source: TransMONEE 2007 Database<sup>27</sup>, UNICEF Innocenti Research Centre, Florence – unless noted otherwise; Milanovic (1998, Table 4.1) – for Belarus, Russia and Ukraine in 1989 and 1993; Kakwani (1995, Table 20) – for Belarus, Russia and Ukraine in 1990; Russian GKS<sup>28</sup> - for Russia 1997, 1999, 2002-2005; World Bank WDI<sup>29</sup> - for Ukraine 1996-1997, 2003-2005; author’s own calculations based on BHBS – for Belarus 1995-2005.

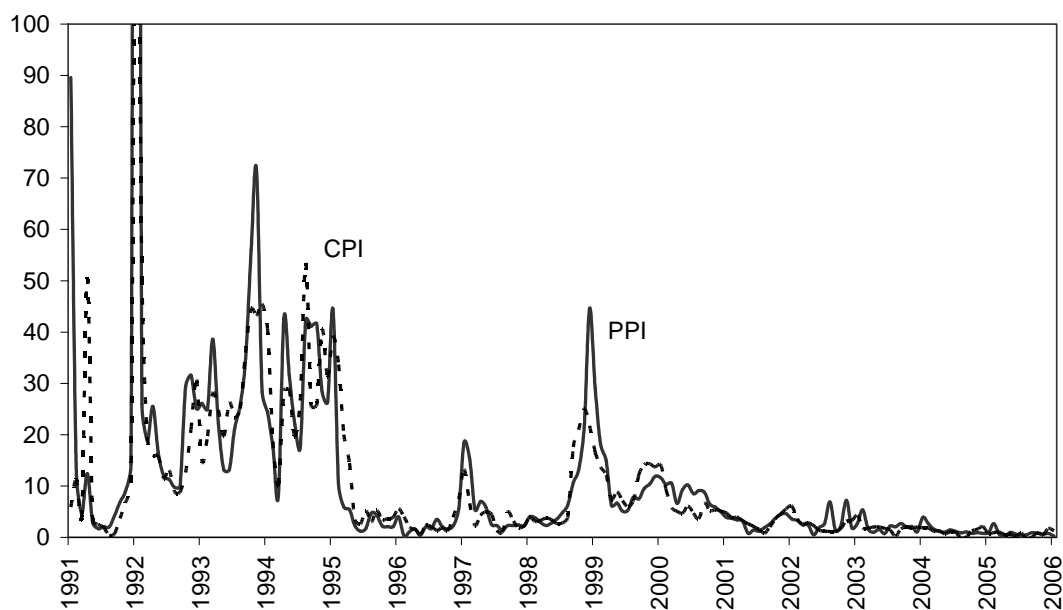
Note: The data for Belarus, Russia and Ukraine, especially pre-1995, are not very reliable. They are taken from different sources and may be not directly comparable with both previous and subsequent periods and with other countries (due primarily to the lack of data and different methodologies used).

<sup>27</sup><http://www.unicef-irc.org/databases/transmonee/>

<sup>28</sup>[http://www.gks.ru/free\\_doc/2005/b05\\_13/06-01.htm](http://www.gks.ru/free_doc/2005/b05_13/06-01.htm) and [http://www.gks.ru/free\\_doc/2006/b06\\_13/06-01.htm](http://www.gks.ru/free_doc/2006/b06_13/06-01.htm)

<sup>29</sup><http://go.worldbank.org/6HAYAHG8H0>

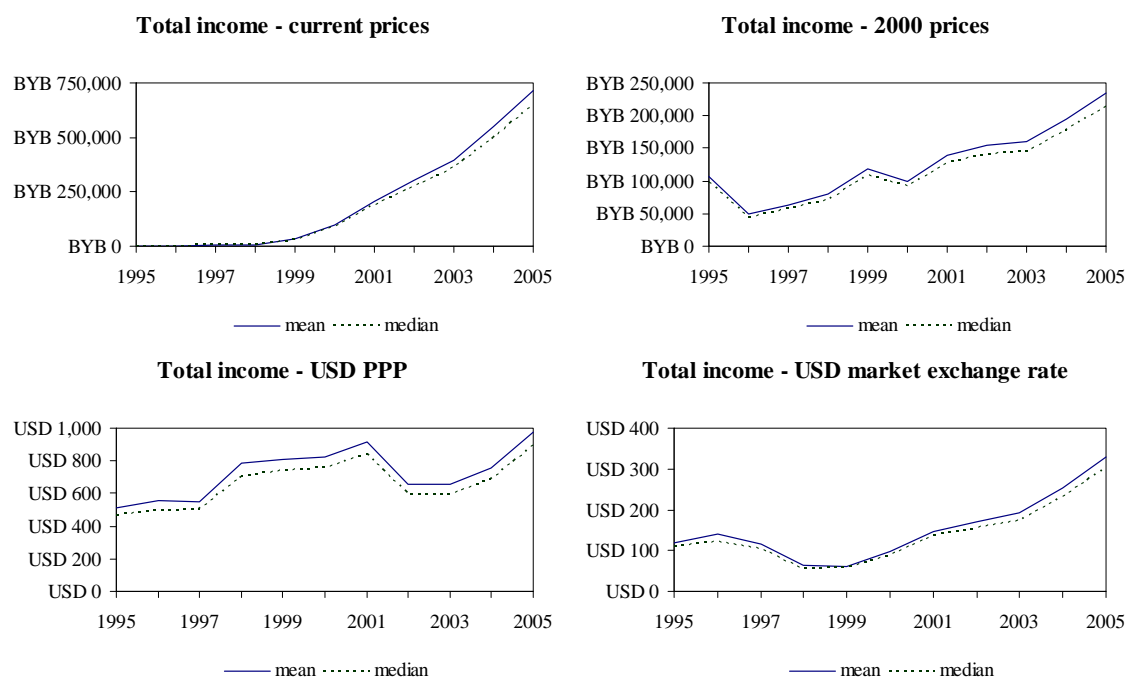
Figure 2. Monthly price indices in Belarus (in %)



Source: Institute for Privatization and Management (<http://www.research.by>).

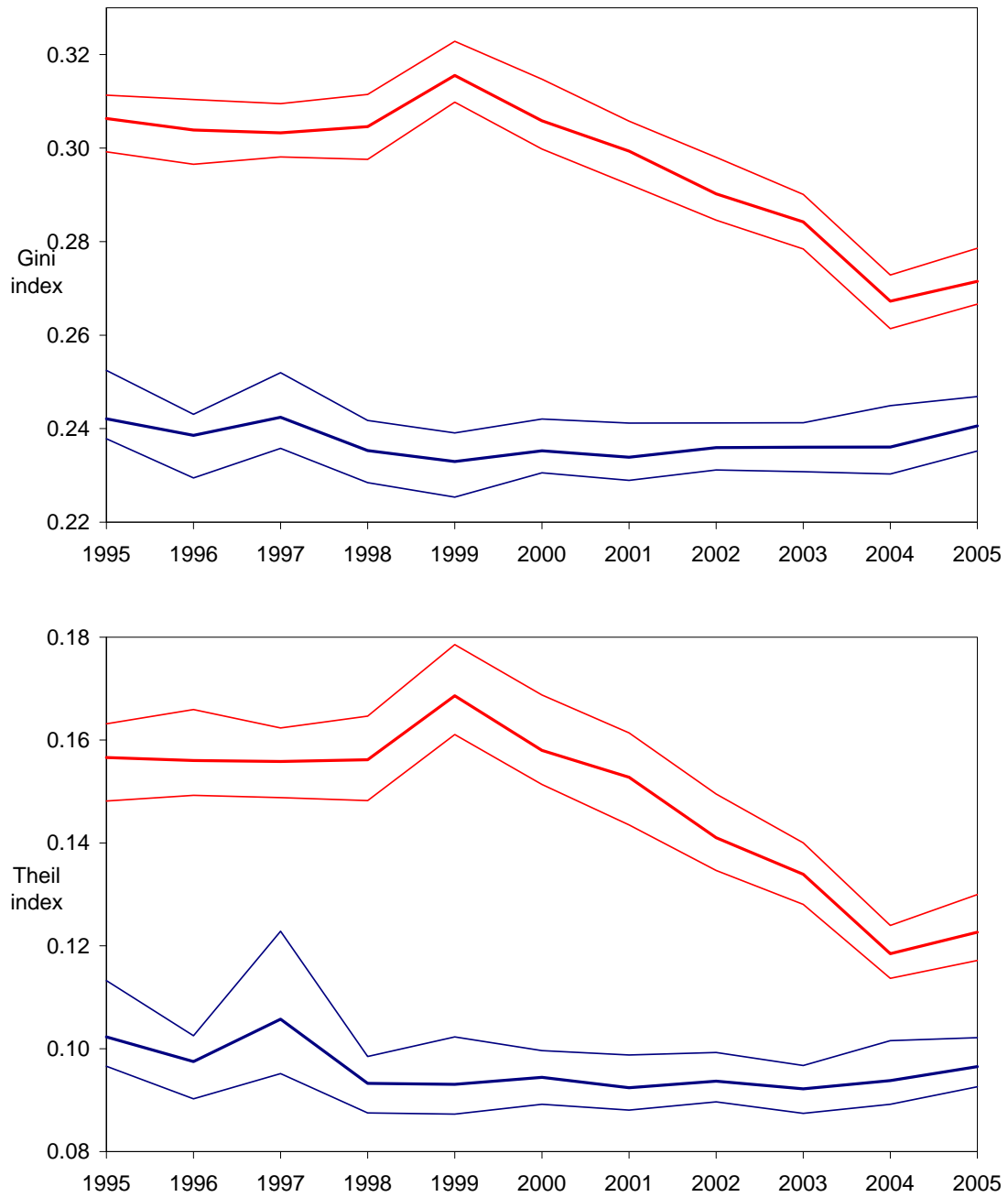
Note: In January 1992, when the major wave of price liberalization took place, CPI and PPI rose 159% and 383% (per month) respectively. This peak is not shown on the graph to keep all other peaks visible.

**Figure 3. Evolution of average total income in 1995-2005**



Source: author's own calculations based on BHBS; World Bank WDI - for BYB/USD PPP exchange rate; Belarusian Ministry of Statistics and Analysis.

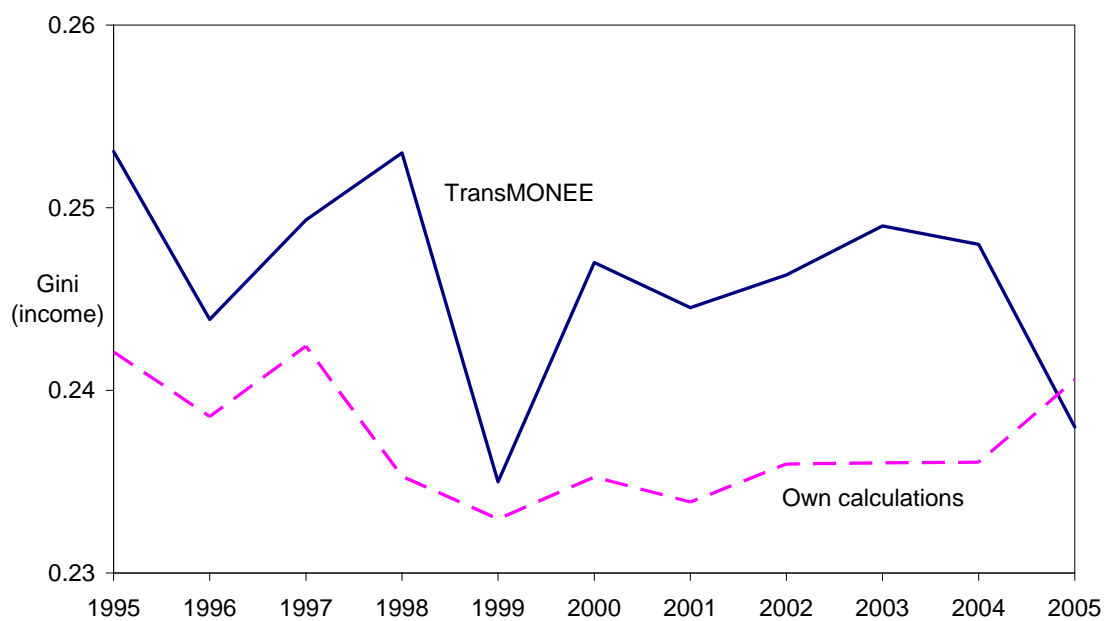
Figure 4. Gini and Theil indexes



Source: author's own calculations based on BHBS.

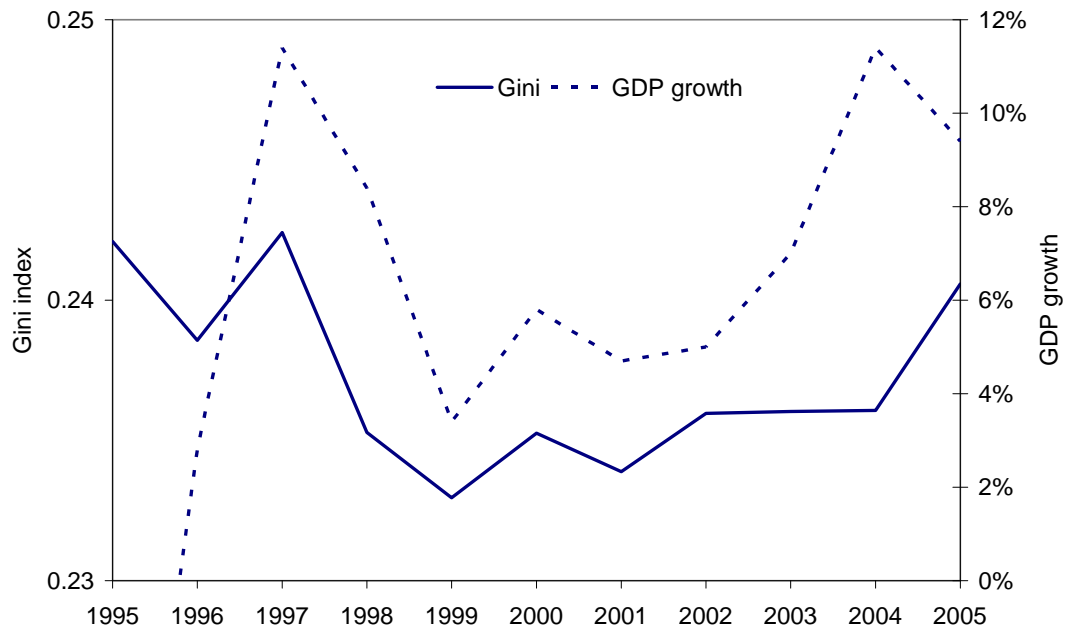
Notes: thin lines show 95% confidence intervals calculated with bootstrapping (100 repetitions). Constructed in Stata using the `ineqerr` ado-module written by Dean Jolliffe and Bohdan Krushelnytsky, CERGE-EI.

**Figure 5. Comparison of TransMONEE data with author's own estimates**



Source: TransMONEE 2007 Database, UNICEF IRC, Florence; author's own calculations based on BHBS.

**Figure 6. Inequality and GDP growth**

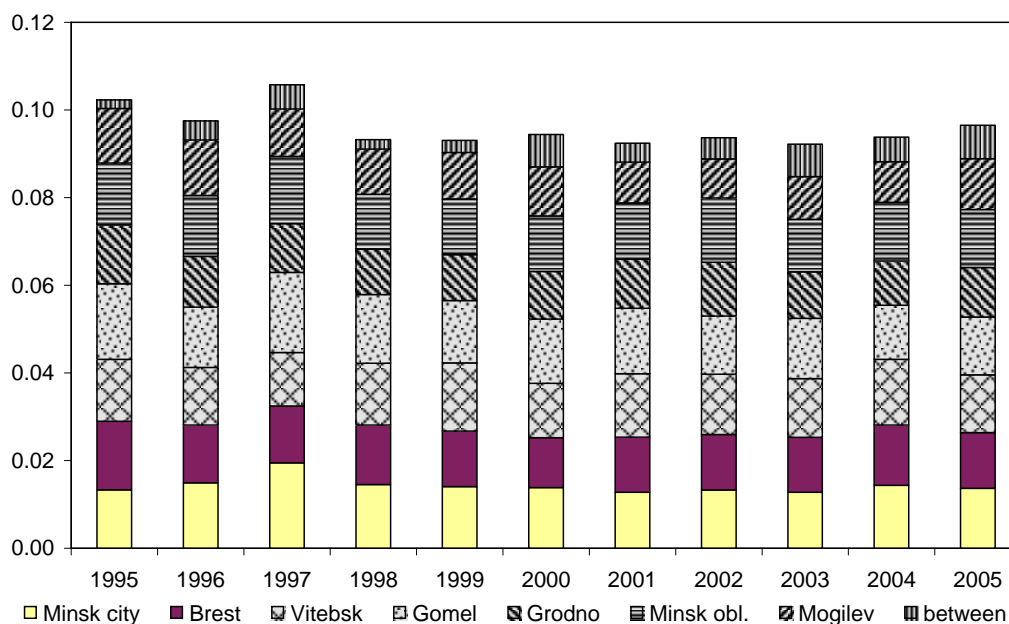


Source: Belarusian Ministry of Statistics and Analysis (GDP growth); author's own calculations based on BHBS (Gini index).

Note: GDP growth was negative in 1995.



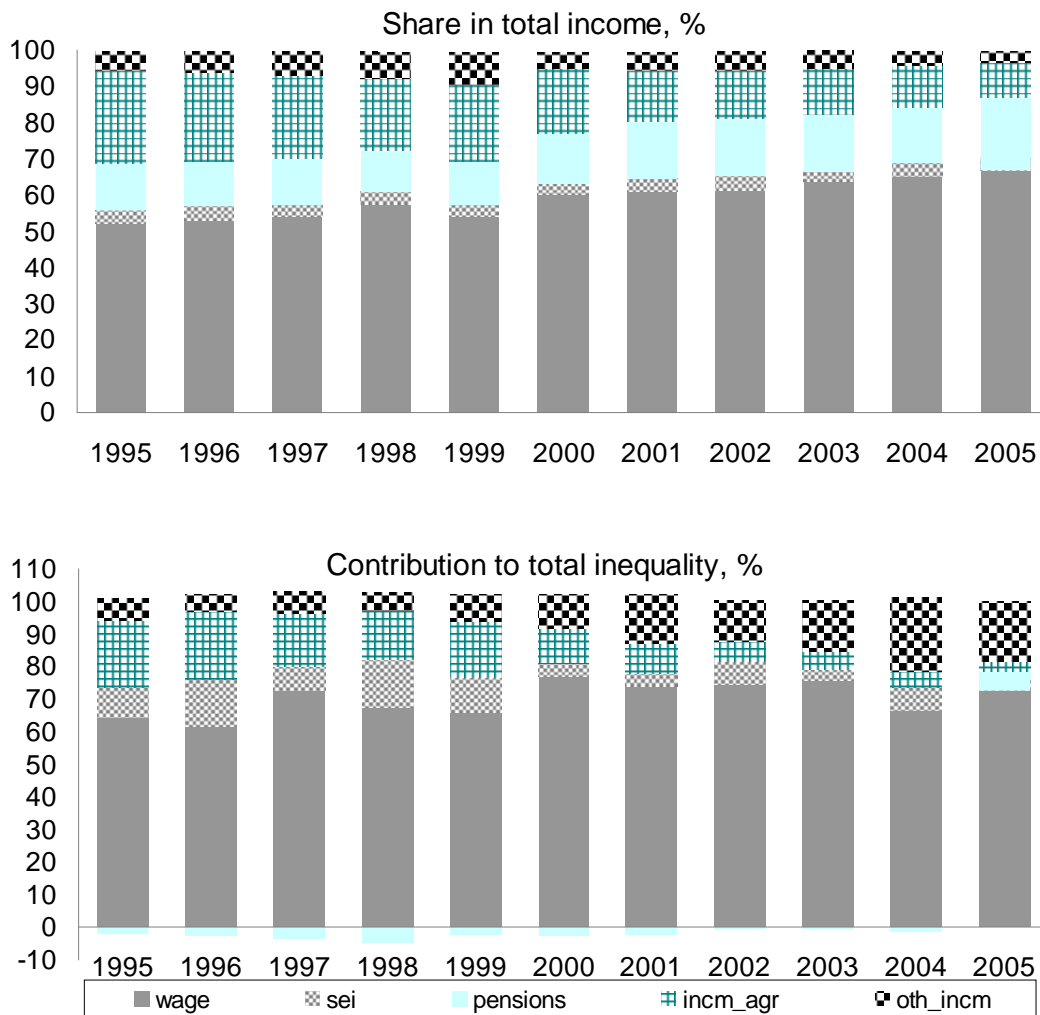
**Figure 7. Regional inequality over years measured by Theil index**



Source: author's own calculations based on BHBS.

Note: Theil index is used instead of Gini index, because by construction, Gini does not allow for direct breaking down by categories/sources of inequality (various indirect methods of decomposition should be used), but Theil is additively decomposable inequality index.

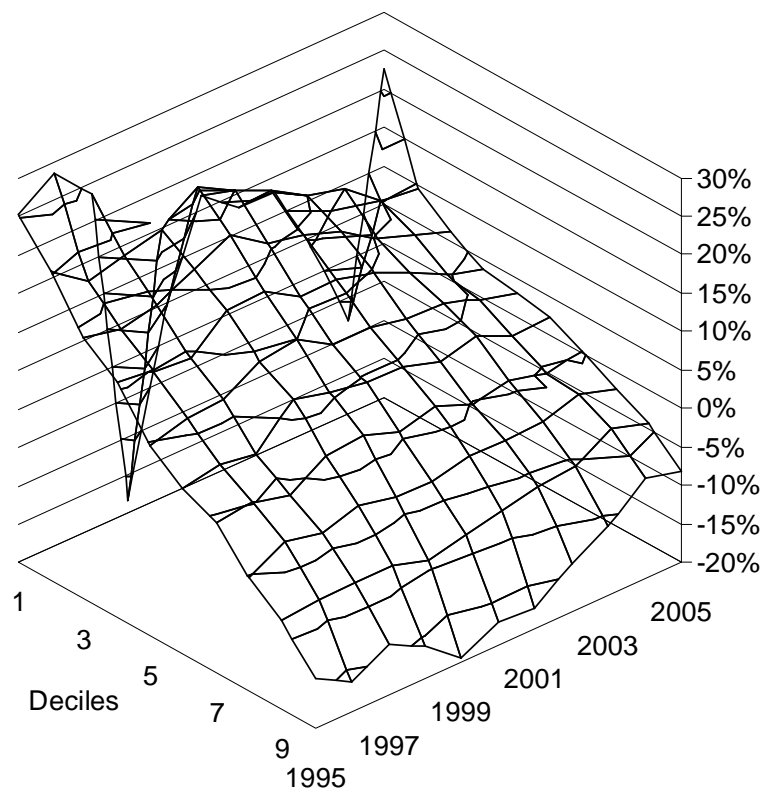
Figure 8. Inequality decomposition by income sources



Source: author's own calculations based on BHBS.

Notes: the decomposition by income sources was performed in Stata using `ineqfac` ado-module written by Stephen P. Jenkins, Institute for Social and Economic Research - University of Essex; `sei` = self-employment income; `incm_agr` = income from sale of agricultural products from small land plots plus income in kind; `div` = dividends; `une` = unemployment benefits; `oth_incm` includes child allowances, other state subsidies, financial assistance received from friends and relatives. The contribution of pensions is negative except for 2005.

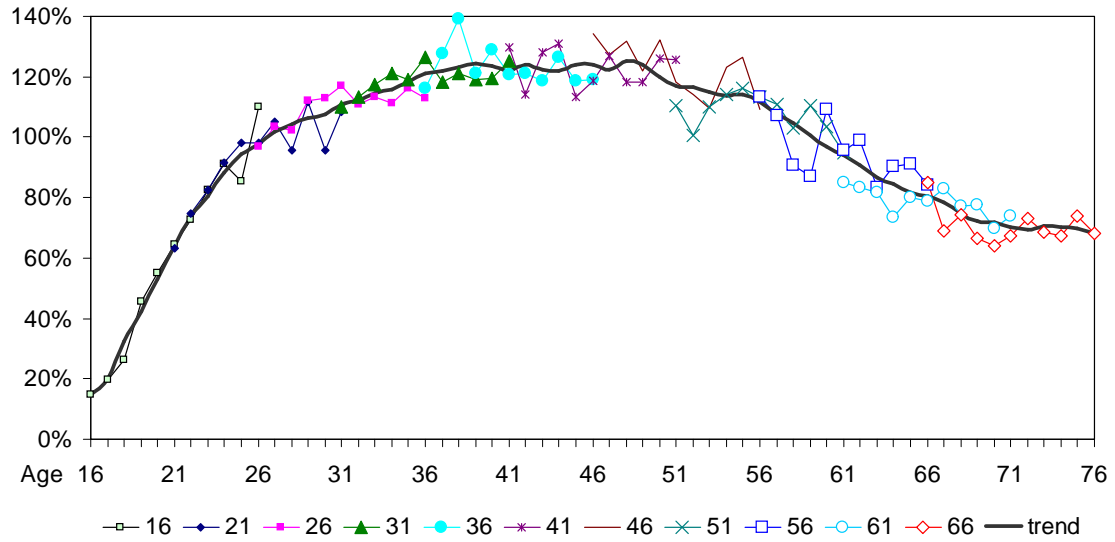
**Figure 9. Relative difference between income shares and expenditure shares**



Source: author's own calculations based on BHBS.

Note: positive values mean that income share is higher than expenditure share for a given decile.

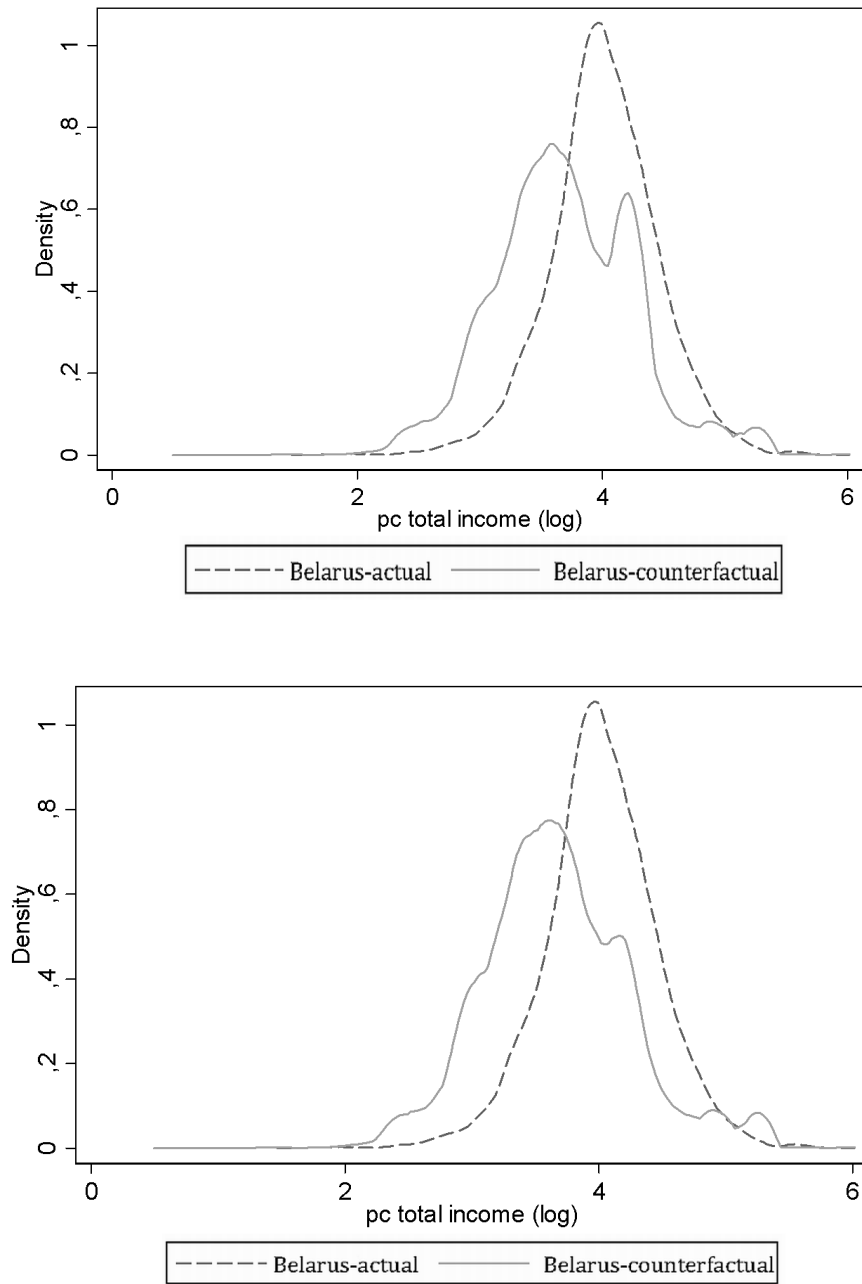
**Figure 10. Evolution of income of age cohorts (relative to country average) over time**



Source: author's own calculations based on BHBS.

Notes: The age cohorts are constructed for 1995 and followed until 2005. 100% is the average income for the whole population

Figure 11. DFL Counterfactual Kernel Densities estimation



Source: author's own calculations based on BHBS.

Note: Constructed in Stata using the `df1` ado-module written by de Azevedo, University of Newcastle.

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