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Income Inequality Decomposition, Russia 1992-2002: Method and Application

Wim Jansen*, Jos Dessens & Willem-Jan Verhoeven

Abstract

Decomposition methods for income inequality measures, such as the Gini index and the members of the Generalised Entropy family, are widely applied. Most methods decompose income inequality into a between (explained) and a within (unexplained) part, according to two or more population subgroups or income sources. In this article, we use a regression analysis for a lognormal distribution of personal income, modelling both the mean and the variance, decomposing the variance as a measure of income inequality, and apply the method to survey data from Russia spanning the first decade of market transition (1992-2002). For the first years of the transition, only a small part of the income inequality could be explained. Thereafter, between 1996 and 1999, a larger part (up to 40%) could be explained, and 'winner' and 'loser' categories of the transition could be spotted. Moving to the upper end of the income distribution, the self-employed won from the transition. The unemployed were among the losers.

Keywords: income inequality, decomposition, Russia, market transition.

Introduction

In describing the income inequality of societies, a range of indices is used by economists and social scientists. The most popular are the Gini coefficient, the members of the Generalised Entropy (GE) class of indices (such as the Theil and Atkinson coefficients and the Mean Logarithmic Deviation), and the percentile ratios P90/P10 and P75/P25. The values of the coefficients tell us about the overall inequality at a certain point in time, or – by displaying a time series of coefficients – about trends in overall inequality. One of the central issues in studying income inequality concerns the underlying factors and processes. Most studies focus on mechanisms of individual income attainment and assume that differences in individual income can be aggregated to macro-level income inequality (e.g. Verhoeven, 2007). This is problematic because mechanisms at the individual level can be counteracted by mechanisms at the macro-level, like governmental policies and market reforms. In understanding changes in income distribution, it is important to study the factors and processes that influence income inequality directly. The decomposition of income inequality may shed light on these factors and processes. The decomposition of overall income inequality by population subgroups and by income sources was introduced in the early 1980s in publications by Bourguignon (1979) and by Shorrocks (1980, 1982, 1984). They showed that a number of inequality measures could be additively decomposed, but not all of them. Since then, a large number of socio-economic studies have shown standard decompositions of income inequality.

Several problems occur in using these standard decomposition techniques. In a decomposition, only categorical variables can be used as grouping variables, and it is not possible to incorporate continuous variables in the analyses. Furthermore, only one population grouping variable can be

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used, as is the case in many economic studies (e.g. Gustafsson, Li & Sicular, 2008). Several grouping variables could be combined, but this will lead to an increasingly large number of categories. The same argument holds for categorising continuous variables. Finally, trends in the decomposition parts of the inequality index may be attributable to differential changes in the group means, changes in the within-group inequalities, and changes in the group composition, which cannot be identified in the existing decomposition methods.

In this article, we use a non-standard decomposition method that provides a solution for most of these problems. Analysing individual level survey data, we predict respondents' income based on a set of categorical and continuous explanatory variables in a regression analysis, assuming a lognormal distribution for the dependent variable, and modelling both the mean and the between-group variance of the income variable. In this way, we use the variance as an obvious indicator of income inequality and solve the categorical variable problem of the standard decomposition techniques. The between-group variance is the part of income inequality that is explained by a set of predictor variables. Deleting variables from the set of predictors gives the opportunity to evaluate whether these variables explain a substantial part of the inequality and the trend in the explained part.

Central and Eastern European countries showed increasing income inequalities during the period of transition from a socialist state to a market economy. In Czechoslovakia (Czech Republic), the Gini coefficient of per capita household income increased from 20 in 1988 to 28 in 1996, in Hungary from 21 in 1989 to 25 in 1998, in Poland from 27 in 1988 to 33 in 1997, and in Russia from 23 in 1990 to 40 in 2000 (Frolova, 1998; Flemming & Micklewright, 2000; UNU-WIDER, 2000; Keane & Prasad, 2002; Kalugina & Najman, 2002; Trans/MONEE, 2004; Mitra & Yemtsov, 2006). We apply our decomposition method to data from Russian surveys, covering the period of 1992-2002, the first decade of Russia's transition to a market economy. As shown by the figures above, the transition period showed a dramatic increase in Russia's income inequality, together with a worsening in all kinds of socio-economic and socio-demographic indicators, such as an increasing unemployment rate and a decreasing life expectancy. By decomposing the macro-level income inequality for each year during the period 1992-2002, it will be possible to link the transition process and policy measures with outcomes on the individual level. Workers may become unemployed, pensioners may experience sudden decreases in the amount of money they get, while others may see unique chances for self-employment. We suppose that events like these were more prominent in Russia during the first decade of the transition than in the other Central and Eastern European countries. Russia is therefore, in our opinion, the most interesting test case to evaluate the profits of our method of decomposing income inequality.

Application: Russia

Market Transition Theory as context

In the previous century, Central and Eastern European (CEE) countries have experienced at least two large-scale experiments in social stratification. First, state socialism was a large-scale experiment in destratifying the society by way of political intervention (Ganzeboom, 1998). Contrary to the idea that stratification necessarily follows from the division of labour in every society, socialist regimes, inspired by a Marxist political ideology, aimed to reduce social inequality through the proliferation and implementation of an egalitarian ideology and a redistributive system. According to Mikhalev (2003, p. 3), essential characteristics of redistributive systems are (1) state ownership of the means of production, (2) full employment, (3) labour wages earned at state enterprises as a principal source of

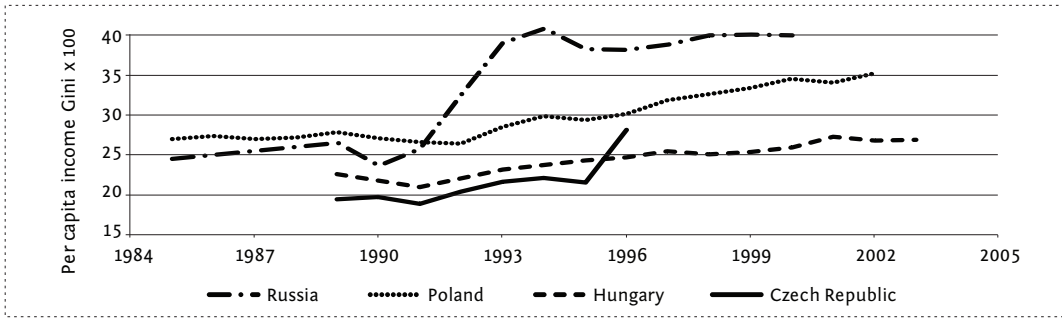

Figure 1: Income inequality in Russia, Poland, Hungary, and the Czech Republic, 1985-2003
Source: Gini coefficients taken from various sources: Russian data from Frolova (1998), UNU/WIDER (2000) and Kalugina & Najman (2002); Polish data from Keane & Prasad (2002) and Trans/MONEE (2004); Hungarian data from UNU/WIDER (2000) and Mitra & Yemtsov (2006); Czech data from UNU/WIDER (2000).

income, (4) an income-levelling policy that does not encourage the accumulation of individual wealth, and (5) a pervasive system of public transfers providing everybody with basic social services and benefits. Implementing these essentials will lead to an egalitarian structure of income distribution with low levels of inequality.

At the end of the 20th century, the second large-scale experiment was the transformation of the command economies of the socialist states into market economies. Even before the 1989 reforms, most CEE countries had adopted some market reforms. However, the combination of the 'velvet' revolutions and the fall of the Berlin Wall, followed by the overthrow of the Communist regimes, really paved the way for introducing market mechanisms in the planned economies of Central and Eastern Europe. The transformation from planned to market economies in this region offered a unique opportunity to study the effects of institutional changes on stratification outcomes and to find possible explanations for changing outcomes. Stratification researchers did not hesitate to study the patterns of social stratification emerging from the new social order (e.g. Nee, 1989). Since then, numerous studies can be found under the heading *Market Transition Theory* (Verhoeven, Jansen & Dessens, 2005). In this context, market transition means (1) the elimination of price controls, (2) the transfer of property from the state to private individuals, and (3) the liberalisation of labour markets, exchange rates and foreign trade regimes.

In all transition countries, market transition had several consequences. First, one could observe a sharp rise in the concentration of larger property and capital income, and a moderate one in self-employment income. Second, there was an increase in wage differentials and in the appearance of unemployment and underemployment. Third, earnings differentiation in skills, sector and occupation occurred (Atkinson & Micklewright 1992), reflecting those observed in a market economy.

All three consequences of market transition caused higher levels of inequality (Atkinson & Micklewright, 1992; Dessens, Jansen & Nelissen, 1998). Figure 1, displaying per capita income Gini coefficients for Russia, Poland, Hungary, and the Czech Republic (Czechoslovakia) shows gradually increasing trends in income inequality for Poland, Hungary, and the Czech Republic. In Russia, income inequality was relatively stable in the period of 1986-1991 (the Soviet and Russian Federation periods), at about the same level as in Poland, but higher than in Hungary and Czechoslovakia. Between 1991 and 1994, all income inequality measures for Russia showed a steep rise; for some measures, the increase was almost 100%. From 1995, inequality remained stable at the higher level.

Russia's transformation process

Yeltsin and the young radical economic reformers Yegor Gaidar, Anatoly Chubais (the initiator of the voucher plan), and Boris Nemtsov used a shock therapy[1] approach after the collapse of the Soviet Union in 1991. In January 1992, they launched a comprehensive economic program to transform the Soviet command system into a market economy, including the following measures:

(1) A rapid liberalisation of prices and the deregulation of enterprise activities to get prices right and to encourage increases in production in response to higher prices;

(2) restrictive fiscal and monetary policies to bring inflation under control and to impose stricter budgetary constraints on enterprises;

(3) speedy privatisation to break the links between business and government and to encourage enterprise restructuring, making it easier to enforce and sustain stabilisation policies;

(4) opening the economy via foreign trade and capital account liberalisation.

The transition to a market economy, headed by the 'kamikaze' cabinet of Gaidar, has been characterised as a form of 'market bolshevism' – a symmetry between the communist bolsheviks and the free market liberals, in that they both accepted short-run sacrifices for the sake of long-term benefits (Silverman & Yanowitch, 2000, p. 6). These long-term benefits could be either Karl Marx's communist paradise, in which the proletariat has shaken off their chains, or the Western-type free market with Coca Cola and Big Macs for all.

By the summer of 1993, insiders had acquired majority shares in two-thirds of Russia's privatised and privatising firms (McFaul, 1995, p. 210). So, the shock therapy of 1992 could explain the rise in income inequality in the period of 1992-1994.

In the June 1996 presidential elections, Boris Yeltsin was re-elected, and the economic crisis set in with large inflation figures (a fourfold devaluation of the rouble). In August/September 1998, the new rouble was introduced. In 1998/1999, the unemployment rate reached its highest level: from 0% in 1991 to 12.6% in 1999, followed by some decline to 8.9% in 2001. The share of social transfers in %GDP shows an upward trend from 1990: 1987-1989 8%; 1990-1992 6%; 1993-1998 9%; 1999-2003 14.6%. These figures and the inequality trend make Russia a case for further analysis.

Hypotheses

Obviously, the period of market transition has its 'winners' and 'losers' in Russia. Results from earlier research on the determinants of income in market transition countries can be used to indicate possible 'losers' and 'winners' categories. A meta-analysis of 90 studies on the Market Transition Theory (Verhoeven et al., 2005) indicated that the main effects of years of education, work experience, employment status, and gender on income could be found. Based on original research, Verhoeven (2007) reported different trends for five CEE countries. The income returns to education increased more quickly in Hungary and Russia than in the Czech Republic, Poland, and Slovakia. The income returns to experience increased more quickly in the Czech Republic, Hungary, and Slovakia than in Poland and Russia. Differences in the personal income between men and women decreased in Hungary and Poland, did not change significantly in the Czech Republic and Slovakia, and increased in Russia. The income of the unemployed, retired, and disabled having few resources changed during the transformation process, but not necessarily for the worse. Only in Russia, a deterioration of the income situation among these groups of social benefit holders with few resources could be found. Based on this finding and the trends in unemployment and social transfer data, the following results from a decomposition analysis on Russian data, having gender, years of education, and employment status as predictors, could be expected: (1) as the higher educated will be among the 'winners',

1 Gerber and Hout (1998) labeled the Russian transition *More Shock than Therapy*.

education will have an increasing effect on income inequality during the first decade of market transition; (2) as the income differences between men and women increased, *gender will have an increasing effect on income inequality*; (3) *the self-employed are among the 'winners' during the period of 1922-1999; the unemployed and retired among the 'losers' from the start of the economic crisis in 1998*.

Decomposition of income inequality

The Mean Logarithmic Deviation (MLD) and all other members of the Generalised Entropy (GE) class, such as the Theil coefficient,[2] can be additively decomposed by subgroup into a within-group inequality and a between-group inequality part. The between-group inequality can provide 'explained' inequality profiles at a given time point, and trends in 'explained' inequality by population subgroup using data from several points in time.

The Gini coefficient,[3] not being a member of the GE class, cannot be properly decomposed into a within and between part, due to an overlap part:

$$\text{Gini(total)} = \text{Gini(within)} + \text{Gini(between)} + \text{Gini(overlap)}$$

In this expression, the between part accounts for the differences in mean incomes between the subgroups, and the within part depends on the inequality within each subgroup. The between part would be the only component if there was no variation in income within the subgroups. The overlap part would be zero if there was no overlap between the income ranges of the various subgroups. In general, this will not be the case.

All income inequality indices have been decomposed for a variety of population subgroups and income sources on data from numerous countries. See e.g. Albertini (2008), Wu & Perloff (2004, 2005) for decomposition of the MLD; Breen & Salazar (2010), Sicular, Yue, Gustafsson & Li (2007) for decomposition of the Theil coefficient; Lerman & Yitzhaki (1985), Milanovic (2002) for decomposition of the Gini coefficient.

For standard decompositions, such as reported in the studies above, two Stata[4] ado files can be used: (1) INEQDECO (Jenkins, 2001), estimating the full range of GE indices and providing decompositions for a subset of these indices by population subgroups, and (2) GINIDESC (Aliaga & Montoya, 1999), decomposing Gini coefficients into between, within, and overlap parts, based on the algorithm by Pyatt (1976).

Several problems occur in using these standard decomposition techniques. First, only categorical variables can be used as grouping variables. It is not possible to incorporate covariates in the analysis. Second, if we have more than one grouping variable, these variables must be combined into one 'super' grouping variable. This will lead to an unmanageable number of categories. In our application, it could result in a grouping variable with 2(female) x 3(age) x 3(educyr) x 2(sempl) x 5(empst) = 180 categories and as many inequality measures. Third, trends in the within and between parts of the inequality index may be attributed to a variety of sources: (1) differential changes in the group means, (2) changes in group inequalities, and (3) changes in group composition.

A different approach has been followed by Jansen & Wu (2012) in their decomposition of income inequality in urban China during the recent decades of China's post-1978 market reform policies. They proposed a solution that could overcome most of the above limitations. Instead of using a regression

2 $GE_T = \Sigma_i\{(1/n)(Y_i/m)(\log(Y_i/m)\}$
(T = Theil; n = number of persons; i = 1, ..., n; Y_i = income of person i; m = arithmetic mean income)

3 $\text{Gini} = \{1/(2n^2)\Sigma_i \Sigma_j |Y_i - Y_j|\}/(1/n)\Sigma_i Y_i$
(n = number of persons; i = 1, ..., n; j = 1, ..., n; $i \neq j$; Y_i = income of person i; Y_j = income of person j)

4 Stata version 11 (StataCorp LP, 2011)

equation for the logarithm of income, the *streg* module in Stata[5] is being used, a lognormal distribution for the dependent variable, which is the individual income (Y) is defined, and simultaneously the average subgroup income (E(Y|X)) and the inequality (Var(Y|X)), where the X's can be both categorical and continuous variables, will be modelled. Modelling the variance in the ln(income) as a function of a set of covariates is a unique feature of the *streg* module.

This decomposition takes into account categorical and continuous predictors, changes in the group means and in the within-group distributions, but it cannot provide a solution for changes in group composition.

As in analysis of variance, the decomposition results in a 'between' and a 'within' part. The relative between part of the decomposition can be interpreted as the percentage of inequality explained by the X variables, and the trend in the relative between part shows how the explained part changes over time. This method will be applied on data from Russia.

Data and variables

For the decomposition of income inequality, data from 15 surveys are used:

ISSP Social Inequality II (1992), ISSP Environment (1993), ISSP Family and Changing Gender Roles II (1994), Treiman/Szelenyi Social Stratification in Eastern Europe After 1989 (1994), ISSP National Identity (1995), ISJP (1996), ISSP Role of Government II (1996), ISSP Work Orientations II (1997), ISSP Religion II (1998), Survey of Employment, Income, and Attitudes in Russia (1998), ISSP Social Inequality III (1999), ISSP Environment II (2000), Survey of Education and Stratification in Russia (2000), Survey of Stratification and Migration Dynamics in Russia, 1985-2001 (2001), ISSP Family and Gender Roles III (2002).[6]

In all surveys, personal income has been measured next to employment and occupational status, educational attainment, and elementary demographics. The data sets have been harmonised, grouped by year, and stacked. In the decomposition analyses, the following variables will be used:

- *Pinc* (personal income in roubles);
- *Year* of study (1992-2002);
- *Female*, used as a control variable in the analyses;
- *Age* (min. 14 – max. 95), a proxy measure for work experience;
- *Educyr* (education in years, min. 0 – max. 35);
- *Sempl* (self-employed or not);

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5 Notice that the two sets of Stata commands:
(1) *reg* ln(income) x1 x2 covar1 covar2, and
(2) *stset* income
streg x1 x2 covar1 covar2, dist(ln)
will give identical parameter estimates, explained variance (inequality), etc. In both analyses, the dependent variable is the same ln(income). However, in streg it is possible to model σ2, using the ancillary parameter (anc) option:
streg x1 x2 covar1 covar2, dist(ln) anc(covar1 covar2).

6 *International Social Survey Programme (ISSP)* [Computer files] Cologne: Central Archive for Empirical Social Research (Zentral Archiv) [distributor)]; Szelenyi, I., Treiman, D.J., *Social Stratification in Eastern Europe After 1989: General Population Survey* [Computer file] Los Angeles, CA: Institute for Social Science Research, University of California (UCLA) [distributor]; Wegener, B., Mason, D.S., *International Social Justice Project 1991 and 1996 (ISJP)* [Computer files] Cologne: Central Archive for Empirical Social Research (Zentral Archiv) [distributor]; Gerber, T.P. *Survey of Employment, Income, and Attitudes in Russia (SEIAR)* [Computer file] Moscow, Russia: All-Russian Center for Public Opinion and Market Research (VTsIOM) [Producer] Ann Arbor, MI: Inter-university Consortium for Political and Social Research (ICPSR) [Distributor]; Gerber, T.P. *Survey of Education and Stratification in Russia (SESR)* [Computer file] Madison, WI: Department of Sociology, University of Wisconsin-Madison [Distributor]; Gerber, T.P. *Survey of Stratification and Migration Dynamics in Russia, 1985-2001 (SMDR)* [Computer file] Moscow, Russia: All-Russian Center for Public Opinion and Market Research (VTsIOM) [Producer] Ann Arbor, MI: Inter-university Consortium for Political and Social Research (ICPSR) [Distributor].

- *Empst* (employment status categories: (1) working, (2) unemployed, (3) retired, (4) disabled, (5) other).

In most surveys, educational categories are also provided. Unfortunately, the categories are not equivalent from survey to survey. Therefore, we use education in years. For those in the working category of *Empst*, information on the employment sector (public or private) is also available. Using this variable in the decompositions would restrict the income distribution to those active in the labour market. As we are interested in the overall income inequality, we decided not to use the public-private sector variable. Also, information on the occupational category is only available for active labour market participants. The descriptive statistics for the variables used, by year of study, are displayed in the appendix.

Results

The variance of personal income in a regression model with a lognormal distribution will be considered as an indicator of the income inequality. The total variance is additively decomposed into a within and between part. The relative between component of the variance indicates the part of income inequality that is explained by the explanatory variables in the regression model. In the first decomposition model, we will look at the trend in the relative between component, using the full set of predictors. In the next models, we will delete some of the predictors, according to our hypotheses, one by one. A decrease in the explained part of the income inequality indicates changes in the income inequality due to that predictor and may be linked to possible 'winners' and 'losers' in the market transition process. The first decomposition model contains all employment status categories (employed, unemployed, retired, disabled, self-employed), next to gender and the covariates education and work experience. In Russia, two periods can be detected (Figure 2; figures from the full model in Table 1). An increase in the relative between ('explained') part from 9% to 40% in the period 1992-1997, followed by a steep decrease to 17% in 1999. From 1999, the explained part shows a minor increase.

In order to evaluate the influence of human capital on income inequality, education has been deleted from the full model (model 2 in Table 1). If human capital has become more rewarding during the transition to a market economy, its effect on income inequality has to become visible in the differences between this model and the full model. Comparing the relative explained income inequality from the model without and with the number of years of education reveals an increase in the explained part in the period of 1994-1999. For each year, the difference in the relative explained part is significant, according to the R^2-change F-test. As significance is not the optimal criterion here,

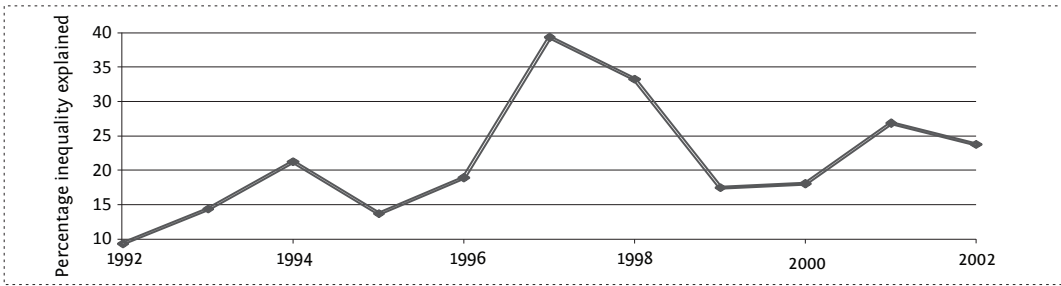

Figure 2: Inequality Decomposition Russia, 1992-2002
Source: figures from the full model, Table 1, based on the data sets introduced in the *Data and variables* section.

Table 1: Trends in the explained part of income inequality (relative between variance component) for various models, Russia 1992-2002

Year (N)	Model 1: full model	Model 2: model 1 without education	Model 3: model 1 without gender	Model 4: model 1 without the self-employed	Model 5: model 1 without the unemployed	Model 6: model 1 without the retired/ disabled
1992 (6,985)	9.3	8.2	8.7	9.2	9.2	9.3
1993 (1,931)	14.3	14.0	**10.2**	14.0	14.3	14.3
1994 (1,998)	21.2	**18.9**	**18.7**	21.1	21.2	**17.2**
1995 (1,585)	13.7	**8.8**	12.0	12.6	**10.9**	**11.7**
1996 (3,276)	18.8	17.3	17.5	**16.3**	18.5	18.1
1997 (1,998)	39.3	**35.6**	**34.2**	**36.3**	37.3	**32.8**
1998 (6,524)	33.3	31.8	31.3	33.2	**23.4**	**26.6**
1999 (1,705)	17.4	**12.0**	**12.6**	16.2	**14.2**	**15.4**
2000 (6,514)	18.0	16.0	**13.9**	16.3	**14.3**	16.9
2001 (7,167)	26.8	23.8	**22.7**	25.2	26.8	26.8
2002 (1.798)	23.7	21.6	22.4	23.7	23.7	**19.5**

Notes: Full model: gender, education in years, work experience in years, employed, self-employed, unemployed, retired, and disabled. Figures in bold: at least 10% change relative to model 1.
Source: author's compilation, based on the data sets introduced in the *Data and variables* section.

because of the large number of observations in each year, which makes everything significant, interest is in the changes relative to the full model. A 10% change relative to model 1 will be considered as substantial. From 2000, there is still an increase but to a lesser degree. The conclusion can be drawn that education had an increasing effect on income inequality in Russia.

In the decomposition analysis, trends with respect to the amount of income inequality explained could be provided. Which part of the income inequality and which part of the trend in the income inequality will be affected by the income determinant cannot be read from the decomposition analyses, however.

Aggregate regression analysis

In order to evaluate the effects of the income determinants, we complement the decomposition analyses by an aggregate regression analysis on groups formed by combining the predictor variables. The standard deviation (sd) of the ln(income) will be used as our income inequality variable in the aggregate analysis. The continuous variables of education in years and work experience in years have been categorised. So, 2(gender) x 5(employment status) x 3(education) x 3(experience) standard deviations of ln(income) will be computed for each year available, and these sd's will be used as the dependent variable in a regression analysis.[7] For the aggregate analysis, 734 groups with a valid score on the standard deviation of ln(income) are available. The regression results are displayed in Table 2.

Using the logarithm of the income variable will take into account varying inflation rates, which will be represented by changes in the intercept of the regression equation. The intercept represents the (log of the) general price level in the economy. Differences between intercepts represent real income changes.

7 Theoretically, there will be 990 (2 gender x 5 employment status x 3 education x 3 experience x 11 years) standard deviations. For the analysis, a smaller number of groups will be available because of missing combinations.

Table 2: Regression results for aggregate data (N = 734), Russia 1992-2002

	Model 1 Coeff. (s.e.)	Model 2 Coeff. (s.e.)	Model 3 Coeff. (s.e.)
Female	−0.07 (0.04)†	−0.08 (0.09)	−0.07 (0.04)†
Education low (ref.)			
Education middle	−0.04 (0.05)	−0.04 (0.05)	−0.03 (0.05)
Education high	0.01 (0.05)	0.00 (0.05)	0.00 (0.05)
Work experience low (ref)			
Work experience middle	−0.09 (0.05)†	−0.09 (0.05)	
Work experience high	−0.19 (0.05)	−0.20 (0.05) ***	
Year (1992=1,..,2002=11)	−0.11 (0.03) ***	−0.10 (0.03) ***	−0.08(0.05) †
Year squared	0.01 (0.00) ***	0.01 (0.00) ***	
Employed (ref.)			−0.20 (0.05) ***
Self-employed	0.24 (0.06) ***	0.12 (0.14)	
Unemployed	0.11 (0.06)†	0.29 (0.14)**	−0.14 (0.03) ***
Retired/disabled	−0.28 (0.07) ***	0.16 (0.16)	0.01 (0.00) ***
Year x female		0.00 (0.01)	0.23 (0.06) ***
Year x self-employed		0.02 (0.02)	0.21 (0.07) ***
Year x unemployed		−0.03 (0.02)	0.10 (0.11)
Year x retired/ disabled		−0.07 (0.02)***	
Unemployed; spline 1998			−0.08 (0.05)
Unemployed; spline 2001			−0.33 (0.23)
Retired/disabled; spline 1994			−0.04 (0.03)
Retired/disabled; spline 2000			−0.21 (0.13)
R^2	0.12	0.14	0.14

†p < 0.10; **p < 0.05; ***p < 0.01.
Source: author's compilation, based on the data sets introduced in the *Data and variables* section.

Based on the decomposition result for education, we expect a moderately positive effect of education on inequality. From Table 2, we note a non-significant effect of the number of years of education. As differences in personal income between men and women increased in Russia, a gender effect on income inequality could be hypothesised. Comparing models 3 and 1 in the decomposition Table 1 shows that this is indeed the case. Deleting gender from the full model causes a loss in the explanatory power for the income inequality. The differences in personal income between men and women, as noticed in Verhoeven (2007), have their effects on income inequality. From the negative female effect in Table 2, we conclude that the male population of Russia is better off than their female counterpart at the start of the transition period, but that the difference is constant during the period. Looking at the effects of year and year squared in Table 2, we infer a U-shaped relation that has a minimum value at year 7.5, which corresponds with 1998/99. In our decomposition results, 1997 and 1998 are the years that show the largest explained income inequality.

In order to show possible 'winners' and 'losers' categories, the employment status categories of self-employed, unemployed, and retired/disabled have been deleted – one by one- from the 'full model'. The results are given in models 4-6 in Table 1. The self-employed hardly contribute to the explained part of the income inequality.

From 1994 to 1999, notably at the end of this period, the situation for the retired and the disabled changed dramatically (compare model 6 with the full model; including the retired and disabled categories explains income inequality better). In the period of 1998-2000, unemployment explains a substantive part of the income inequality (compare model 5 with the full model). Note that this coincides with the top of the economic crisis, massive inflation, and the devaluation of the rouble, and also with the top of the unemployment rate. So, most of the action in Russia probably took place at the lower end of the income distribution, and the increased income inequality was most probably caused by the deterioration in the personal incomes of the unemployed, the retired, and the disabled.

In the aggregate analysis, we expect self-employment to have no effect, while unemployment and retirement should have significant effects on income inequality. For unemployment, we expect a change after 1997/1998 and again after 2001, which will be reflected in significant coefficients for regression splines (Marsh & Cormier, 2001). For the retired and disabled, significant regression splines are expected in 1994 and 2000. In Table 2, model 1, a significant positive effect for self-employment is found, but this effect does not change linearly over time; the interaction term in model 2 (and also in model 3) is not significant. Over the period studied, the income inequality for the self-employed is, on average, larger than for the employed. There is a significant positive effect of being unemployed (0.21; s.e. = 0.07) on income inequality, but the expected changes in 1998 and 2001 are not visible. This means that the positive mean difference in income inequality between the unemployed and the employed is constant over time. For the retired and disabled, the mean difference in income inequality with the employed increases with 0.07 standard deviations each year. From the aggregate analysis, the conclusion on the retired and the disabled as belonging to the 'losers' of the transitions could be confirmed once more.

Conclusion and discussion

Decomposing the overall variance in a regression analysis on income into a between ('explained') and a within part, assuming a lognormal distribution, and modelling the variance as a function of a set of predictor variables seems to be a useful tool to unravel the trends in income inequality and indicate possible categories of 'winners' and 'losers'. In doing so, an important issue in stratification research will be addressed; namely, the extent to which mechanisms at the level of individual income attainment contribute to income inequality at the macro level.

Especially for Russia, the initial 'shock therapy' and the 1998 economic crisis could be linked to the trend in the explained part of the income inequality. There is a low level of explained income inequality during the first years of the transition due to uncertainty and the chaotic economic processes of the period. Thereafter, between 1996 and 1999 in the heat of the economic crisis unprecedented opportunities arose for starting entrepreneurs and bleak prospects for those at the lower end of the income distribution, so a larger part (up to 40%) of the income inequality could be explained, and 'winner' and 'loser' categories of the transition could be spotted. It is interesting to see that changes in income distribution after the first years of transition can be attributed to a large extent to two groups that were virtually non existent during communism. The self-employed, moving to the upper end of the income distribution, won from the transition; those pushed to the lower ends of the distribution – the unemployed – were among the losers. This shows that the increasing opportunities for income attainment and the possibility to become jobless were important mechanisms in changing the income distribution in Russia. We note that the self-employed in Russia, as well as in other post-Soviet countries like Estonia, include individuals who are self-employed due to a lack of opportunities and they are earning just a subsistence income (Hanley, 2000; Saar & Unt, 2006). The mixed composition of the self-employed makes our finding of the self-employed as belonging to the 'winners' an underestimation

of the amount of enrichment in this category. If we could take out those forced into self-employment and earning a subsistence income, the effect of being self-employed on income would certainly be considerably larger.

This study also shows that income inequality – a macro level societal indicator – can be explained by the same characteristics as those that explain differences in individual income. In an additional aggregate regression analysis, the effects of gender, education, work experience, and employment status on income inequality itself have been the subject. For Russia, an overall positive effect of self-employment on income inequality was found, as well as a positive effect of unemployment. Trends over time could not be detected, however. For the retired and disabled compared to the employed, no difference in income inequality could be found in 1992, but there was a decreasing trend afterwards. From the decomposition as well as the aggregate analyses results, this was not so much the case during the first years of the transition, but it was certainly so starting from 2000. These effects may be understood from delays in the transformation of the social safety net in Russia. In the first period of the transition, pensions and social security transfers could compensate for the loss in income. However, from 1998 onwards the economic crisis with its massive inflation and high levels of unemployment made it impossible to maintain the compensation level, even with an increased share of social security transfers in % GDP. The conclusion can be drawn that in Russia, the self-employed may be subsumed under the 'winners' category and the unemployed under the 'losers'. The retired and disabled showed a smaller income inequality than the employed up until the final years of the period studied, most notably as a result of compensatory policy measures. These findings qualify Milanovic's (1999) categorisation of Russia as a 'non-compensator' country as being much too premature.

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Appendix 1: Descriptive statistics

	% Female	% Self employed	Employment Status		Age mean (stddev.)	Educyr mean (stddev.)	Pinc mean (stddev.)	N
1992	59	2.7	Working	76%	42.2	12.3	19,257	6985
			Unemployed	1%	(15.6)	(3.7)	(33,218)	
			Retired	14%				
			Disabled	1%				
			Other	9%				
1993	58	1.5	Working	67%	41.3	11.9	41,660	1931
			Unemployed	3%	(14.9)	(3.2)	(44,985)	
			Retired	16%				
			Disabled	1%				
			Other	12%				
1994	64	1.2	Working	67%	40.8	11.0	161,421	1998
			Unemployed	1%	(14.7)	(3.0)	(120,137)	
			Retired	18%				
			Disabled	0%				
			Other	14%				
1995	55	1.1	Working	52%	44.7	11.5	755	1585
			Unemployed	7%	(16.7)	(3.3)	(823)	
			Retired	24%				
			Disabled	4%				
			Other	13%				
1996	55	2.9	Working	52%	43.7	11.5	638	3276
			Unemployed	8%	(17.2)	(3.3)	(950)	
			Retired	19%				
			Disabled	7%				
			Other	14%				
1997	55	4.6	Working	49%	42.7	11.0	731	1698
			Unemployed	7%	(17.2)	(3.4)	(766)	
			Retired	23%				
			Disabled	3%				
			Other	17%				
1998	58	1.5	Working	55%	43.6	11.8	785	6524
			Unemployed	8%	(16.6)	(3.5)	(1422)	
			Retired	18%				
			Disabled	2%				
			Other	17%				
1999	54	3.9	Working	46%	44.8	10.7	1103	1705
			Unemployed	10%	(17.5)	(3.4)	(1030)	
			Retired	26%				
			Disabled	3%				
			Other	14%				
2000	61	2.6	Working	51%	45.3	11.3	1598	6514
			Unemployed	7%	(17.4)	(3.9)	(1982)	
			Retired	28%				
			Disabled	1%				
			Other	12%				
2001	62	3.1	Working	52%	45.5	12.1	2371	7167
			Unemployed	6%	(18.0)	(3.0)	(2344)	
			Retired	26%				
			Disabled	4%				
			Other	12%				
2002	61	3.8	Working	55%	46.9	11.6	2330	1798
			Unemployed	4%	(17.4)	(3.4)	(3443)	
			Retired	30%				
			Disabled	2%				
			Other	9%				

Source: based on the data sets introduced in the *Data and variables* section.