MAGYAR TUDOMÁNYOS AKADÉMIA
Közgazdaság- és Regionális Tudományi Kutatóközpont

MTA KRTK KTI

Centre for Economic and Regional Studies
HUNGARIAN ACADEMY OF SCIENCES

MŰHELYTANULMÁNYOK DISCUSSION PAPERS

MT-DP – 2013/20

Are more equal societies happier? Subjective well-being, income inequality, and redistribution

TAMÁS HAJDU – GÁBOR HAJDU

INSTITUTE OF ECONOMICS, CENTRE FOR ECONOMIC AND REGIONAL STUDIES,
HUNGARIAN ACADEMY OF SCIENCES BUDAPEST, 2013

Discussion papers
MT-DP – 2013/20

Institute of Economics, Centre for Economic and Regional Studies,
Hungarian Academy of Sciences

Are more equal societies happier?
Subjective well-being, income inequality, and redistribution

Authors:

Tamás Hajdu
junior research fellow
Institute of Economics
Centre for Economic and Regional Studies
Hungarian Academy of Sciences
E-mail: hajdu.tamas@krtk.mta.hu

Gábor Hajdu
junior research fellow
Institute for Sociology
Centre for Social Sciences
Hungarian Academy of Sciences
E-mail: hajdu@socio.mta.hu

July 2013

ISBN 978-615-5243-76-9
ISSN 1785 377X

Are more equal societies happier? Subjective well-being, income inequality, and redistribution

Tamás Hajdu - Gábor Hajdu

Abstract

Using four waves of the European Social Survey, we analyze the association of income inequality and redistribution with subjective well-being. Our results provide evidence that people in Europe are negatively affected by income inequality, while reduction of inequality has a positive effect on well-being. Since we simultaneously estimate the effects of inequality and its reduction, our results indicate that not only the perceived income inequality what influences subjective well-being, but also the process, the extent of redistribution, what lead to that state. These impacts are different in Eastern and Western Europe. Inequality aversion and the positive effect of redistribution seem to be stronger also for less affluent members of the societies and left-wing oriented individuals.

Keywords: subjective well-being, satisfaction, income inequality, redistribution

JEL classification: D63, I31

Acknowledgements:

We thank Gábor Kézdi for his valuable suggestions to an earlier draft of this article. Remaining errors are solely ours.

Boldogít-e az egyenlőség? Szubjektív jóllét, jövedelmi egyenlőtlenség és redisztribúció

Hajdu Tamás - Hajdu Gábor

Összefoglaló

A European Social Survey segítségével a szubjektív jóllét és a jövedelmi egyenlőtlenség, valamint a redisztribúció kapcsolatát vizsgáljuk. Eredményeink szerint az egyenlőtlenség negatívan, míg csökkentése pozitívan befolyásolja az élettel való elégedettséget Európában. Mivel az egyenlőtlenség és a redisztribúció hatását szimultán módon becsüljük, így eredményeink alapján az újraelosztást követően kialakuló jövedelmi egyenlőtlenség mértékétől függetlenül az ehhez az állapothoz vezető folyamat jellege is befolyásolja az elégedettséget. A becsült hatások eltérőek Nyugat- és Kelet-Európában. Továbbá az egyenlőtlenség iránti averzió és a redisztribúció pozitív hatása erősebbnek tűnik a társadalom szegényebb rétegei és a magukat baloldalinak vallók körében.

Tárgyszavak: szubjektív jóllét, elégedettség, jövedelmi egyenlőtlenség, redisztribúció

JEL kódok: D63, I31

I. INTRODUCTION

Numerous studies have examined the impact of income inequality on various adverse societal outcomes, and concluded that inequality is associated positively with crime (Fajnzylber et al. 2002; Choe 2008; Scorzafave – Soares 2009) and working hours (Bowles – Park 2005), negatively with health (Kaplan et al. 1996; Wilkinson – Pickett 2006), trust (Knack – Keefer 1997; Wilkinson – Pickett 2010), political engagement (Solt 2008; 2010; Horn 2011) and mobility (Wilkinson – Pickett 2009). In presence of upward social comparison, greater inequality also means greater discrepancy between aspirations and actual incomes among less wealthy individuals which impose substantial psychological cost on these people (Frank 2007).[1]

The relationship between these outcomes and subjective well-being (Frey – Stutzer 2002; Dolan et al. 2008) predicts that income inequality should relate negatively to well-being. Besides that, inequality also can shape subjective well-being directly not only through these channels. Humans are social animals, we can empathize with other people's misery, which means that high inequality can reduce our happiness even without further societal effects. Started with Morawetz et al. (1977), inequality was the topic of several empirical paper which documented this negative effect (Hagerty 2000; Alesina et al. 2004; Schwarze – Härpfer 2007; Ferrer-i-Carbonell – Ramos 2010; Grosfeld – Senik 2010; Oshio – Kobayashi 2010; Winkelmann – Winkelmann 2010; Oishi et al. 2011). Usually, people living in a more unequal environment feel themselves less happy.[2]

While the negative relationship between income inequality and subjective well-being is well documented, only a few papers deal with the question whether the reduction of inequality by taxes and transfers can undo this negative impact. To our knowledge only Schwarze and Härpfer (2007) studied explicitly how redistribution (reduction of inequality by the state) is associated with subjective well-being. Using German panel data they found that income inequality calculated on regional-level has a negative effect on individual life satisfaction, but redistribution is not a significant determinant of well-being. Some redistribution-related issues were analyzed by other papers as well. Di Tella et al. (2003) and Di Tella and MacCulloch (2008) estimated the effect of unemployment benefits (which was

[1] For a review, see Wilkinson and Pickett (2009; 2010)

[2] Note however, that the impact of income inequality can be different in some cases. In an unpredictable, volatile environment inequality can be perceived as a signal of increased opportunities and can affect satisfaction positively (Hirschman – Rotschild 1973). For empirical evidence from the Eastern European transition see Grossfeld and Senik (2010). They show that in the early transition period inequality was positively associated with satisfaction in Poland, but after a couple of years the relationship became negative. Other papers, e.g. Berg – Veenhoven (2010) and Helliwell – Huang (2008), also found positive association between income inequality and well-being, but they studied large number of countries without country or region dummies controlling for the different cultural backgrounds.

defined as the income replacement rate) on subjective well-being. Although unemployment benefits are only one component of redistribution, we can take it as a proxy variable of the reduction of inequality. These papers showed that a generous welfare state is positively correlated with satisfaction. Oishi et al. (2012) using 54 countries from the Gallup World Poll found that progressive taxation is positively associated with a global-life-evaluation index.

In this paper we aim to extend the existing knowledge about the association of inequality and especially about the association of redistribution with subjective well-being. Our analysis is based on the first four waves of the European Social Survey. Using cross-country panel setting we simultaneously estimate the effect of change of inequality and redistribution calculated on country-level. Our results suggest that people in Europe are negatively affected by income inequality, while redistribution has a positive impact on well-being. The simultaneously estimated effects of inequality and its reduction also indicate that not only the outcome (net income inequality) what influences subjective well-being, but also the process (the extent of redistribution) what has led to that state. However, there is some heterogeneity in this effect. Inequality aversion and the positive effect of redistribution seem to be stronger in Eastern Europe, among those with lower income and left-wingers.

2. DATA AND METHODS

Our main data source is the four waves of the European Social Survey (ESS, 2002-2009), which contains data for 34 European countries. ESS is a repeated cross-sectional survey from every other year.

Our analysis relies on a self-reported measure of subjective well-being. In the ESS-questionnaire every people are asked the following single-item question: "All things considered, how satisfied are you with your life as a whole nowadays?" and answer it on an 11-point scale (0 – extremely dissatisfied, 10 – extremely satisfied). This global life evaluation is our dependent variable.

We estimate a linear relationship between income inequality, redistribution and satisfaction using the following specification:

$$(1) \qquad S_{ict}=\beta_0+\beta_1 I^N_{ct}+\beta_2 R_{ct}+\beta_3 G_{ct}+\gamma P_{ict}+\mu_c+\lambda_t+\varepsilon_{ict}$$

where S_{ict} is the life satisfaction of individual *i*, who lives in country *c* in time (wave) *t*. I^N_{ct} is post-government (net) income inequality, R_{ct} is measure of redistribution, G_{ct} is natural log of per capita GDP, P_{ict} is the vector of personal characteristics of individual *i*. We also include a country fixed effect μ_c and a wave fixed effect λ_t. Finally, the equation includes the usual error term (ε_{ict}).

In line with the literature this paper measures inequality by the Gini coefficient. The source of the inequality data is the Standardized World Income Inequality Database (Version 3.0), which provides Gini indices of gross and net income inequality for more than 100 countries (Solt 2009). Data of gross and net income inequality allow us to calculate the effect of government taxes and transfers on income inequality. This index of redistribution is computed as the difference between Gini indices based on gross and net incomes divided by gross income inequality:

$$(2) \qquad R_{ct} = \frac{I^{G}_{ct} - I^{N}_{ct}}{I^{G}_{ct}} \cdot 100$$

where R_{ct} is redistribution in country *c* in time *t*, I^{G}_{ct} is the pre-government (gross) income inequality and I^{N}_{ct} is the post-government (net) income inequality. Our redistribution index shows the percentage reduction in inequality by government tax and transfer policies.

Our third country-level right-hand side variable is the welfare of the states measured by Gross Domestic Product. Data on GDP per capita come from the World Bank (PPP, constant 2005 international $). In our analysis we used it in logarithmic form because of the presumed declining marginal effect of income. Previous research has highlighted that each doubling of GDP per capita is associated with a constant increase in average well-being (Deaton 2008; Stevenson – Wolfers 2008, 2013).

The control variables in our baseline regression are the following: gender, age, age squared, education (four categories), living with partner, labor force status (seven categories), subjective health status (five categories), domicile (four categories), household size and household income. Since income comparison is an important determinant of subjective well-being (Ferrer-i-Carbonell 2005; Luttmer 2005; Clark et al. 2008) and GDP per capita already captures the effect of average wealth of the society, we include household income as the percentage of average household income in country *c* in time *t*. With this procedure we can control the relative income effect.

We exclude some countries because of missing Gini indices[3], and individuals with missing life satisfaction. The finale sample contains 187 630 individuals and 99 country-time observations.[4]

We estimate OLS regressions using ESS design weights for adjusting the unequal inclusion probabilities within countries combined with another weight which goal is to transform every sample's N equal. In this way every sample counts the same in the analysis. The standard error estimates are robust to heteroscedasticity and clustering at country level.

[3] These countries are the following: Austria, Switzerland, Israel, Turkey and Ukraine from Round 4.
[4] The list of participating countries by ESS rounds can be seen in Appendix Table A1.

In addition to the individual-level analysis, we examine the inequality/redistribution – satisfaction relationship on aggregated data as well, where observational units are countries, instead of individuals. We estimate the following first- and long-differenced equation with OLS regression:

$$(3) \qquad \Delta S_{ct}=\beta_0+\beta_1\Delta I^N_{ct}+\beta_2\Delta R_{ct}+\beta_3\Delta G_{ct}+\varepsilon_{ct}$$

where ΔS_{ct}, ΔI^N_{ct}, ΔR_{ct}, ΔG_{ct} are the changes in average satisfaction, post-government income inequality, redistribution, and log GDP per capita in country *c* between time *t* and *t-1* in the first-differenced equation, respectively. In the long-differenced model ΔS_{ct}, ΔI^N_{ct}, ΔR_{ct}, ΔG_{ct} are the changes between the last and the first observation of every country, ε_{ct} is the error term.[5]

3. RESULTS

3.1. INDIVIDUAL-LEVEL ANALYSIS

Table 1 shows our baseline result. We find that post-government income inequality and redistribution are significant determinants of satisfaction with life, but inequality only at 10 percent. As we expected, the coefficient on inequality is negative: people in Europe dislike inequality. The coefficient on redistribution has a positive sign: the inequality reducing governmental policies are correlated positively with satisfaction. The size of the coefficients means that 5 point increase in Gini index results -0.135 point lower satisfaction, while 5 percentage point increase in redistribution is associated with 0.165 point increase in well-being. Or in terms of per capita GDP change: 5 point increase in Gini index is equivalent with 7 percent decrease in GDP, while 5 percentage point increase in redistribution is equivalent with 8.6 percent increase in GDP.

It is worth to emphasize that redistribution has a significant coefficient even controlling for income inequality, which means that not only the perceived income inequality what matters, but also the process (the extent of redistribution) what has led to that particular outcome (Frey – Stutzer 2004; Frey et al. 2005).[6] As Frey and Stutzer (2005) state "people get utility from living and acting under particular institutions over and above outcomes" (p. 92.). In accordance with this, individuals living in a country where taxes and transfers reduce inequality in a greater extent may feel themselves more protected; they may get the sense that the community will help them in hardship, irrespective of the actual inequality. It is not necessary to recognize the level of gross income inequality, probably solidarity and helping

[5] Appendix Table A2 provides descriptive statistics of the main variables.

[6] If the effect of inequality and redistribution is estimated separately the size of the coefficients are only slightly higher and their significance is unchanged.

the poor is common talk in such a society, which can generate this feelings. Other studies demonstrate that spending money on other people and charity is associated with higher well-being (Dunn et al. 2008; Aknin et al. 2013). Even mandatory taxation for a good cause activates reward-related brain regions (Harbaugh et al. 2007). These results suggest that in a country with higher extent of redistribution people may also feel themselves more generous, even if the higher level of solidarity do not depend on their decision, and it may result emotional benefit for them.

Coefficients on individual control variables are corresponding with earlier findings.[7] There is a U-shaped relationship between age and satisfaction. Self-reported satisfaction is higher for those with high levels of education. The better the subjective health, the more likely people are satisfied. Living in cities has a negative effect on satisfaction. Those who are living with a partner feel themselves more satisfied. We find the usual negative relationship between life satisfaction and being unemployed, while students are more satisfied than people in paid work. Women tend to report higher level of well-being. Coefficients on household income (as the percentage of average household income) and log GDP per capita are positive.

Table 1

The effect of income inequality and redistribution on life satisfaction

	(1)
Post-government income inequality	-0.027*
	(0.014)
Redistribution	0.033***
	(0.005)
ln(GDP)	yes
Controls	yes
Country dummies	yes
Wave dummies	yes
Adjusted R^2	0.279
N	187630

Dependent variable: Life satisfaction

Robust standard errors adjusted for clustering by country are in parentheses

Controls: gender, age, age squared, education, marital status, labor force status, health, domicile, household size, household income (as the % of average income)

Dummies are included for missing control variables

* p < 0.10, ** p < 0.05, *** p < 0.01

[7] The detailed baseline regression result is in Appendix Table A3.

Robustness

In the next step we examine the robustness of the baseline result. Table 2 summarizes this analysis. Column 1 and 2 checks whether including less or more control variables change the coefficient on inequality and redistribution. In Column 1 we control only for country and wave fixed effects. In Column 2 we add controls for disability status, social capital (meeting with friends), feeling about household's income, religiousness, and minority status. In Column 3 and 4 we estimate ordered models (probit and logit) rather than an OLS specification. In Column 5 we restrict the sample to countries surveyed in at least three waves out of four (21 countries). We next explore the effect of trend (long-term path) of inequality and redistribution (Column 6). If the observed variance of Gini indices is mostly due to measurement errors and not actual change, then previous estimates are biased.[8] This bias can be mitigated by calculating the trend values of the time series which capture the long-term changes and set aside short-term fluctuation. Using inequality and redistribution data for the last two decades we compute trend components for every country with the Hodrick-Prescott filter (Hodrick – Prescott 1997), and we merge these trend values to the country-wave observations.[9]

Maybe inequality and redistribution need some time to have full effect on subjective well-being, because they do not work only directly but through many channels (crime rate, trust, political engagement, etc.). To address this possibility, in Column 7 satisfaction in time t is regressed on inequality and redistribution in time t-1. Finally, we weight the data using only design weights, which corrects for the different inclusion probabilities of individuals, making the samples more representative (Column 8), and combined design and population weights (Column 9). The latter weight ensures that every country is represented in proportion to its population size. Both weights are provided in the ESS dataset.

The overall conclusion of the robustness tests is that the association of redistribution with life satisfaction is not altered by any of this sensitivity analysis. The coefficient on redistribution is always positive and significant at the 1 percent level. On the other hand, the estimated coefficient on inequality is insignificant in some cases (for three models out of nine); nevertheless, its sign remains negative. In summary, robustness checks support the validity of our main results: we can conclude that people in Europe are negatively affected by income inequality, while reduction of inequality is associated with higher subjective well-being.

[8] Since Gini indices are calculated based on surveys, measurement error is inevitable.

[9] To extract the trend from the time series of inequality and redistribution we used the Hodrick-Prescott filter with a parameter value of 6.25 as it is proposed by Ravn and Uhlig (2002) for annual observations.

Table 2

The effect of income inequality and redistribution on life satisfaction, robustness analysis

	(1) Only wave and country dummies	(2) More controls	(3) Ordered probit	(4) Ordered logit	(5) Only countries participating at least in three waves	(6) HP filtered trends	(7) Lagged inequality and redistribution	(8) Weighted by design weights	(9) Weighted by design weights x population weights
Post-government income inequality	-0.026*	-0.029*	-0.011	-0.022*	-0.011	-0.050**	-0.034**	-0.024	-0.035**
	(0.014)	(0.015)	(0.007)	(0.013)	(0.012)	(0.023)	(0.015)	(0.014)	(0.015)
Redistribution	0.032***	0.028***	0.016***	0.028***	0.031***	0.039***	0.032***	0.034***	0.039***
	(0.005)	(0.005)	(0.003)	(0.005)	(0.003)	(0.009)	(0.008)	(0.005)	(0.007)
Adjusted R^2	0.173	0.337	0.073[a]	0.076[a]	0.252	0.279	0.280	0.275	0.240
N	187630	187630	187630	187630	150549	187630	187630	187630	187630

[a] Pseudo R^2

Dependent variable: Life satisfaction

Robust standard errors adjusted for clustering by country are in parentheses

All regressions include the same control variables as the baseline regression except Model 1 (only wave and country dummies)

More controls: disability status, social capital, feeling about household's income, religiousness, minority status

Dummies are included for missing control variables

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Heterogeneity

Previous literature reports considerable heterogeneity in preference for redistribution and inequality aversion. Inspired by these results we are interested in the effect of inequality and redistribution among different subsamples, different types of individuals. We presume that association between inequality (and its reduction) and satisfaction should be stronger in some groups (Eastern Europe vs. other countries, richer vs. poorer individuals, left-wingers vs. right-wingers, former unemployed vs. never unemployed). After creating binary indicator variables for these groups we analyze heterogeneity by regressing life satisfaction on income inequality and redistribution interacted with the relevant indicator variables. Each panel in Table 3 (from A to E) represents an OLS regression where the main effect of inequality and redistribution are excluded, but their interaction terms with the indicator variables are included.[10] For example in Panel A (Eastern Europe vs. other countries) one set of interactions measure the effect of inequality and redistribution in the post-communist countries, and another set of interactions measure the effect of inequality and redistribution in the non-post-communist countries (four interactions altogether). In this way, we can directly see the effect (and the significance) of inequality and redistribution among the examined groups of individuals. We also report the p-value on test of equal inequality/redistribution coefficients.

Individuals living in post-communist countries more likely tend to support the reduction of income inequality (Corneo – Grüner 2002; Alesina – Fuchs-Schündeln 2007), so we can conjecture that the effect of inequality and its reduction are stronger in the former communist countries. The dissimilar historical background can explain these differences (Alesina – Fuchs-Schündeln 2007). The decades of heavy state intervention might have a long-lasting impact on preferences: people in the Eastern countries may consider redistribution as more favorable and prefer a more equal society. An alternative explanation can rely on the different perceptions of opportunities. If individuals in the post-communist countries believe that existing income inequalities are not caused by effort and hard work, but luck or connections, then they "suffer" more from inequality. Panel A shows that income inequality is not a significant determinant of well-being in the Western countries[11], while its effect are strong in Eastern Europe. The coefficient on redistribution in the post-communist countries exceeds the effect of redistribution in other countries, although the estimated coefficients are statistically equal.

[10] The regressions also include the baseline control variables and the relevant indicator variables.

[11] Western countries include Israel and Turkey also, so the non-post–communist countries name would be more precise. Excluding these two countries does not alter our conclusions.

Napier and Jost (2008) present evidences that conservatives are happier than liberals partly because of their greater tolerance against inequality. Alesina et al. (2004) reports that inequality has more negative effect on the happiness of the European leftists. In line with these papers we find that inequality only significant among individuals with left-wing orientation, and the effect of redistribution is considerably stronger among them (Panel B).[12]

Self-interest naturally influences preference for redistribution: wealthier individuals support less redistribution (Alesina – La Ferrara 2005; Molnár – Kapitány 2006; Rainer – Siedler 2008; Alesina – Giuliano 2009) and are more likely unaffected by inequality (Alesina et al. 2004; Oishi et al. 2011). In Panel C we can see that individuals with above average household income are less affected by inequality and gain smaller satisfaction from redistribution than individuals with below average household income. On the other hand, not only actual income (or income rank) influences how people react to inequality and redistribution, but perceived income matters as well (Cruces et al. 2013). In Panel D we measure individual's material welfare with a subjective indicator: Does she feel that her family live comfortably on their present income? These estimates show that inequality does not have significant effect on respondents who said that they live comfortably on their present income, and the coefficient on redistribution is also slightly smaller among them. However, we cannot reject the hypothesis of equal coefficients in either of these cases.

There are evidences that people with previous misfortune are more favorable to redistribution (Alesina – La Ferrara 2005; Alesina – Giuliano 2009). Noted by e.g. Alesina – La Ferrara (2005) unemployment experience may increase risk aversion or lead to sympathizing with the poorer members of the society, which means that inequality and redistribution should have more considerable effect on individuals with such experiences. Panel E shows that individuals who have ever been unemployed for a period of more than three months are slightly more affected by inequality and redistribution than people without such unemployment experience. However the coefficients of inequality/redistribution are not statistically different from each other.

[12] We consider as a left-wing oriented individual who on an 11-point left-right scale denotes value 0-4, and as a right-wing oriented individual who denotes value 6-10. Individuals choosing value 5 are coded as central orientation. In the regression beside the reported interactions we also include the interaction of inequality/redistribution with this central orientation dummy. It turns out that centrist individuals are affected by inequality and redistribution more than right-wingers, but less than left-wingers.

Table 3

The effect of income inequality and redistribution on life satisfaction, heterogeneity

	Post-gov. income inequality	Redistribution	Adjusted R^2	N
A)				
Eastern Europe	-0.043**	0.035***	0.279	187630
	(0.017)	(0.009)		
Western Europe	-0.003	0.029***		
	(0.015)	(0.006)		
p-value on test of equal coefficients	0.089	0.590		
B)				
Left-wing orientation	-0.037**	0.037***	0.284	187630
	(0.017)	(0.005)		
Right-wing orientation	-0.021	0.028***		
	(0.017)	(0.005)		
p-value on test of equal coefficients	0.199	0.102		
C)				
Richer than country average	-0.034*	0.031***	0.280	187630
	(0.019)	(0.006)		
Poorer than country average	-0.041**	0.038***		
	(0.016)	(0.006)		
p-value on test of equal coefficients	0.472	0.172		
D)				
Lives comfortably	-0.026	0.025***	0.292	187630
	(0.018)	(0.008)		
Does not live comfortably	-0.029**	0.034***		
	(0.013)	(0.005)		
p-value on test of equal coefficients	0.809	0.232		
E)				
Has experienced unemployment	-0.030**	0.035***	0.283	187630
	(0.014)	(0.006)		
Did not experience unemployment	-0.027*	0.033***		
	(0.015)	(0.006)		
p-value on test of equal coefficients	0.676	0.664		

Dependent variable: Life satisfaction

Robust standard errors adjusted for clustering by country are in parentheses

All regressions include the same control variables as the baseline regression, plus the relevant indicator variables and their interactions with inequality and redistribution

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3.2. COUNTRY-LEVEL ANALYSIS

In the country-level analysis we examine the relationship between the change in average life satisfaction and the change in income inequality, redistribution, and log GDP per capita. Before these regression results Figure 1, 2 and 3 depict the bivariate associations. Figure 1 shows the association between the level of life satisfaction and the level of inequality/redistribution. The dots represent the 99 country-time observations. Figure 2 and Figure 3 plot the change in well-being against the change in inequality and redistribution calculated by first and long differencing, respectively.

It seems that the level of inequality (redistribution) associates negatively (positively) with life satisfaction (Figure 1). The correlation between income inequality and average satisfaction is -0.570, while between redistribution and average satisfaction is 0.565. However it is also apparent that the change of inequality (redistribution) and satisfaction is less strongly correlated, but these relationships are also negative (positive) (Figure 2 and 3). The correlation between change of inequality and change of satisfaction is -0.113 when the change is calculated by first differencing, and -0.249 when the change is calculated by long differencing. None of these are significant. The correlations are somewhat higher and significant if we consider redistribution: 0.242 (if the change is calculated by first differencing) and 0.473 (if the change is calculated by long differencing).

Figure 1

Inequality, redistribution and satisfaction

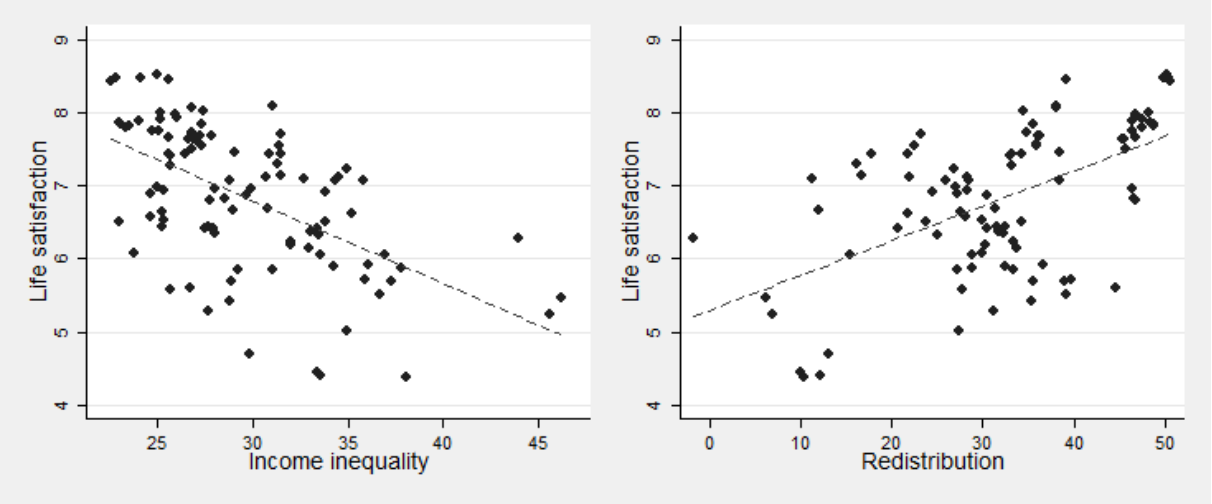

Figure 2

Change of inequality, redistribution and satisfaction, first differences

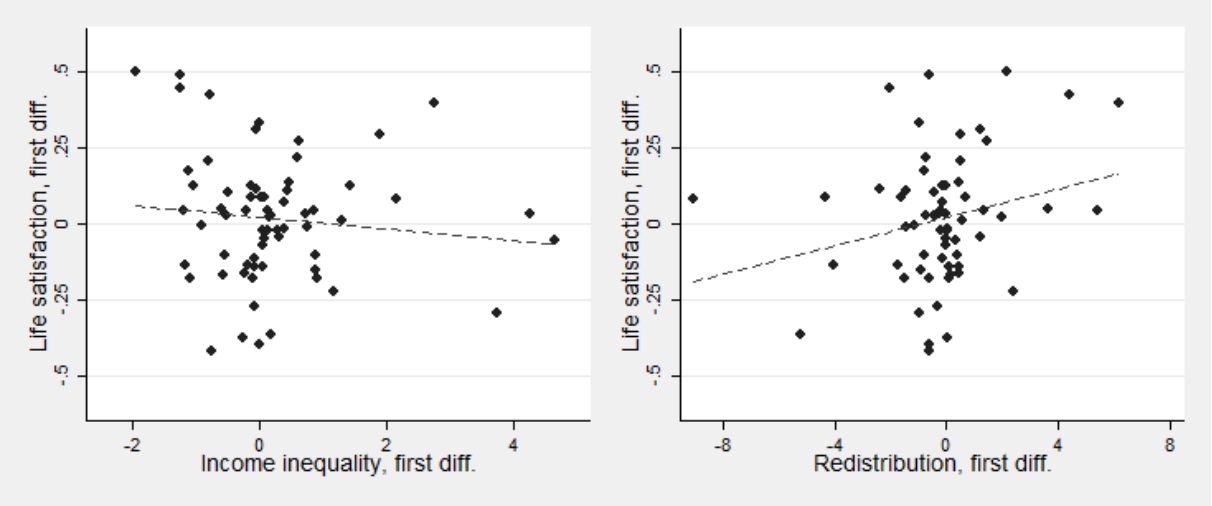

Figure 3

Change of inequality, redistribution and satisfaction, long differences

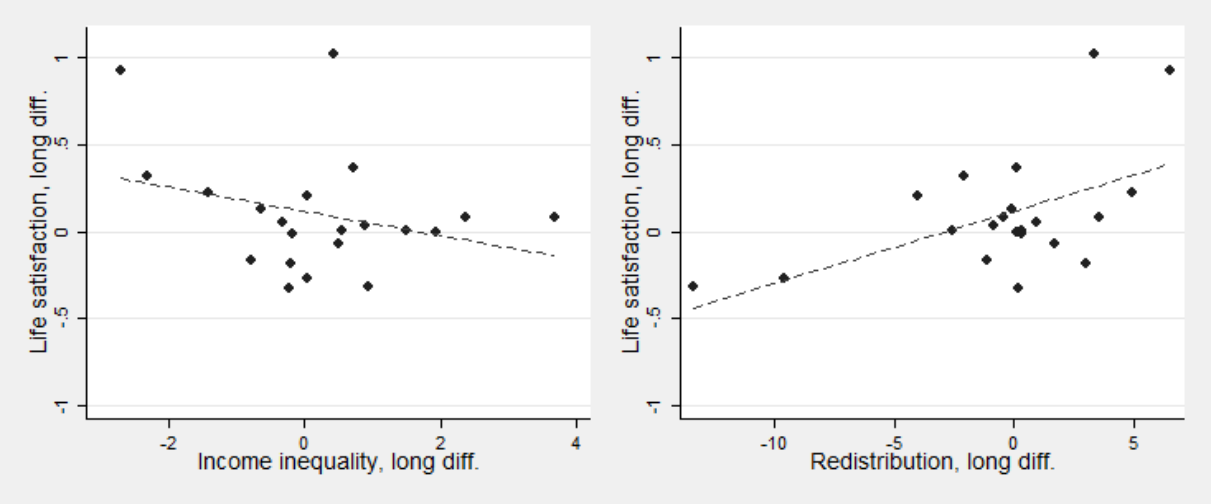

Table 4 provides the regression results, where the effect of income inequality, redistribution and GDP are taken into consideration simultaneously. Column 1 shows the estimation of the first-difference regression without country dummies. Column 2 contains the estimation of the first-difference regression including country fixed effects to allow for country-specific time trends. Column 3 presents the result of the long-difference model. In the first-difference estimations, inequality seems negatively associated with life satisfaction. The size of the coefficients is similar to the result in Table 1, but they are statistically insignificant. Redistribution is associated significantly positively with well-being only in Column 1. The estimations in Column 1 means that a 5 point increase in Gini index is equivalent with a 6.5 percent decrease in GDP per capita, while a 5 percentage point increase

in redistribution is equivalent with a 5.7 percent increase in GDP per capita.[13] In the long-difference model, inequality change has no effect on well-being, but change in redistribution has a significant positive impact (Column 3).

Table 4

The effect of income inequality and redistribution on life satisfaction, first and long differences

	(1) First diff.	(2) First diff.	(3) Long diff.
ΔPost-government income inequality	-0.026	-0.030	-0.011
	(0.017)	(0.027)	(0.017)
ΔRedistribution	0.023**	0.005	0.038***
	(0.009)	(0.015)	(0.006)
Δln(GDP)	yes	yes	yes
Country dummies		yes	
Adjusted R^2	0.396	0.486	0.672
N	65	65	29

Dependent variable: ΔLife satisfaction
Robust standard errors are in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01

Robustness

We mentioned earlier the some part of the observed variance of Gini indices (and redistribution) may be generated by measurement errors, which may lead to biased estimates. In order to mitigate and minimize this problem, we calculated the trend values of the time series of income inequality and redistribution with the Hodrick-Prescott filter. In Table 5 we regress the change of inequality on the change of these trend variables and change of log GDP per capita. The estimated coefficient on inequality is once again negative, but only significant in one case out of three. The association between reduction of inequality and life satisfaction is positive and significant in two cases.

[13] The estimated coefficient on the change of log GDP per capita is 2.076 in this specification (without country dummies).

Table 5

The effect of income inequality and redistribution on life satisfaction, first and long differences of HP trends

	(1) First diff.	(2) First diff.	(3) Long diff.
ΔPost-government income inequality	-0.062**	-0.138	-0.029
	(0.027)	(0.100)	(0.026)
ΔRedistribution	0.040***	0.049	0.038***
	(0.009)	(0.030)	(0.009)
Δln(GDP)	yes	yes	yes
Country dummies		yes	
Adjusted R^2	0.471	0.535	0.677
N	65	65	29

Dependent variable: ΔLife satisfaction
Robust standard errors are in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01

4. CONCLUSION

The objective of this paper is to examine the association of income inequality and redistribution with subjective well-being. Using the European Social Survey 1-4 waves (2002-2009) we estimate the effect of change of inequality and redistribution calculated on country-level simultaneously. Our results are in line with the former evidence that income inequality is related negatively to well-being. The novelty of our analysis is the clear evidence that reduction of income inequality has a positive effect on individual life satisfaction. Since we simultaneously estimate the effects of inequality and its reduction, our results indicate that not only the perceived income inequality what influences subjective well-being, but also the process (the extent of redistribution) what has led to that outcome. As previous papers on preference for redistribution and inequality aversion predict, these impacts are different in post-communist and in non-post-communist countries. Both inequality and redistribution have a stronger effect in the Eastern states. Poorer members of the societies and left-wing oriented individuals also seem to be more affected by inequality and redistribution.

REFERENCES

Aknin, Lara B. – Barrington-Leigh, Christopher P. – Dunn, Elizabeth W. – Helliwell, John F. – Burns, Justine – Biswas-Diener, Rober– Kemeza, Imelda – Nyende, Paul – Ashton-James, Clair E. – Norton, Michael I. (2013): Prosocial spending and well-being: Cross-cultural evidence for a psychological universal. *Journal of Personality and Social Psychology*. Vol. 104, No. 4, 635-652.

Alesina, Alberto – Di Tella, Rafael – MacCulloch, Robert (2004): Inequality and happiness: are Europeans and Americans different? *Journal of Public Economics*. Vol. 88, No. 9-10, 2009-2042.

Alesina, Alberto – Fuchs-Schündeln, Nicola (2007): Good-Bye Lenin (or not?): The effect of communism on people's preferences. *American Economic Review*. Vol. 97, No. 4, 1507-1528.

Alesina, Alberto – Giuliano, Paola (2009): Preferences for Redistribution. *IZA Discussion Paper*. 4056

Alesina, Alberto – La Ferrara, Eliana (2005): Preferences for redistribution in the land of opportunities. *Journal of Public Economics*. Vol. 89, 897-931.

Berg, Maarten – Veenhoven, Ruut (2010): Income inequality and happiness in 119 nations: In search for an optimum that does not appear to exist. In.: B. Greve: *Happiness and Social Policy in Europe*. Edward Elgar, Cheltenham, 174-194.

Bowles, Samuel – Park, Yongjin (2005): Emulation, inequality, and Work Hours: Was Thorsten Veblen right? *Economic Journal*. Vol. 115, No. 507, F397–F412.

Choe, Jongmook (2008): Income inequality and crime in the United States. *Economics Letters*. Vol. 101, 31-33.

Clark, Andrew E. – Frijters, Paul – Shields, Michael A. (2008): Relative income, happiness, and utility: An explanation for the Easterlin paradox and other puzzles. *Journal of Economic Literature*. Vol. 46, No. 1, 95-144.

Corneo, Giacomo – Grüner, Hans Peter (2002): Individual preferences for political redistribution. *Journal of Public Economics*. Vol. 83, 83-107.

Cruces, Guillermo – Perez-Truglia, Ricardo – Tetaz, Martin (2013): Biased perceptions of income distribution and preferences for redistribution: Evidence from a survey experiment. *Journal of Public Economics*. Vol. 98, 100-112.

Deaton, Angus (2008): Income, health, and well-being around the world - Evidence from the Gallup World Poll. *Journal of Economic Perspectives*. Vol. 22, No. 2, 53-72.

Di Tella, Rafael – MacCulloch, Robert (2008): Gross national happiness as an answer to the Easterlin Paradox? *Journal of Development Economics*. Vol. 86, No. 1, 22-42.

Di Tella, Rafael – MacCulloch, Robert J. – Oswald, Andrew J. (2003): The Macroeconomics of Happiness. *Review of Economics and Statistics*. Vol. 85, No. 4, 809-827.

Dolan, Paul – Peasgood, Tessa – White, Mathew (2008): Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of Economic Psychology*. Vol. 29, 94-122.

Dunn, Elizabeth W. – Aknin, Lara B. – Norton, Michael I. (2008): Spending money on others promotes happiness. *Science*. Vol. 319, 1687-1688.

Fajnzylber, Pablo – Lederman, Daniel – Loayza, Norman (2002): Inequality and Violent Crime. *Journal of Law and Economics*. Vol. 45, No. 1, 1-39.

Ferrer-i-Carbonell, Ada (2005): Income and well-being: an empirical analysis of the comparison income effect. *Journal of Public Economics*. Vol. 89, 997-1019.

Ferrer-i-Carbonell, Ada – Ramos, Xavi (2010): Inequality Aversion and Risk Attitudes. *IZA Discussion Paper*. 4703.

Frank, Robert H. (2007): *Falling Behind: How Rising Inequality Harms the Middle Class*. University of California Press, Berkeley and Los Angeles.

Frey, Bruno S. – Benz, Matthias – Stutzer, Alois (2005): Introducing procedural utility - Not only what, but also how matters. *Journal of Institutional and Theoretical Economics*. Vol. 160, No. 3, 377-401.

Frey, Bruno S. – Stutzer, Alois (2002): *Happiness and Economics: How the economy and institutions affect well-being*. Princeton University Press, Princeton and Oxford.

Frey, Bruno S. – Stutzer, Alois (2004): Beyond outcomes: measuring procedural utility. *Oxford Economic Papers*. Vol. 57, No. 1, 90-111.

Grosfeld, Irena – Senik, Claudia (2010): The emerging aversion to inequality. *Economics of Transition*. Vol. 18, No. 1, 1-26.

Hagerty, Michael R. (2000): Social comparisons of income in one's community: Evidence from national surveys of income and happiness. *Journal of Personality and Social Psychology*. Vol. 78, No. 4, 764-771.

Harbaugh, William T. – Mayr, Ulrich – Burghart, Daniel R. (2007): Neural responses to taxation and voluntary giving reveal motives for charitable donations. *Science*. Vol. 316, No. 5831, 1622-1625.

Helliwell, John F. – Huang, Haifang (2008): How's your government? International evidence linking good government and well-being. *British Journal of Political Science*. Vol. 38, No. 4, 595-619.

Hirschman, Albert O. – Rotschild, Michael (1973): The Changing Tolerance for Income Inequality in the Course of Economic Development. *Quarterly Journal of Economics*. Vol. 87, No. 4, 544-566.

Hodrick, Robert J. – Prescott, Edward C. (1997): Postwar US business cycles: An empirical investigation. *Journal of Money, Credit and Banking*. Vol. 29, No. 1, 1-16.

Horn, Daniel (2011): Income inequality and voter turnout - evidence from European national elections. *GINI Discussion Paper*. 16.

Kaplan, George A. – Pamuk, Elsie R. – WLynch, John – Cohen, Richard D. – Balfour, Jennifer L. (1996): Inequality in income and mortality in the United States: analysis of mortality and potential pathways. *British Medical Journal*. Vol. 312, 999-1003.

Knack, Stephen – Keefer, Philip (1997): Does Social Capital Have an Economic Payoff? A Cross-Country Investigation. *Quarterly Journal of Economics*. Vol. 112, No. 4, 1251-1288.

Luttmer, Erzo F. P. (2005): Neighbors as negatives: Relative earnings and well-being. *Quarterly Journal of Economics*. Vol. 120, No. 3, 963-1002.

Molnár, György – Kapitány, Zsuzsa (2006): Uncertainty and the demand for redistribution. *IEHAS Discussion Papers*. 2006/8.

Morawetz, David – Atia, Ety – Bin-Nun, Gabi – Felous, Lazaros – Gariplerden, Yuda – Harris, Ella – Soustiel, Sami – Tombros, George – Zarfaty, Yossi (1977): Income Distribution and Self-Rated Happiness: Some Empirical Evidence. *Economic Journal*. Vol. 87, No. 347, 511-522.

Napier, Jamie L. – Jost, John T. (2008): Why are conservatives happier than liberals? *Psychological Science*. Vol. 19, No. 6, 565-572.

Oishi, Shigehiro – Kesebir, Selin – Diener, Ed (2011): Income Inequality and Happiness. *Psychological Science*. Vol. 22, No. 9, 1095-1100.

Oishi, Shigehiro – Schimmack, Ulrich – Diener, Ed (2012): Progressive Taxation and the Subjective Well-Being of Nations. *Psychological Science*. Vol. 23, No. 1, 86-92.

Oshio, Takashi – Kobayashi, Miki (2010): Area-Level Income Inequality and Individual Happiness: Evidence from Japan. *Journal of Happiness Studies*. Vol. 12, No. 4, 633-649.

Rainer, Helmut – Siedler, Thomas (2008): Subjective income and employement expectations and preferences for redistribution. *Economics Letters*. Vol. 99, 449-453.

Ravn, Morten O. – Uhlig, Harald (2002): On adjusting the Hodrick–Prescott filter for the frequency of observations. *Review of Economics and Statistics*. Vol. 84, No. 2, 371-376.

Schwarze, Johannes – Härpfer, Marco (2007): Are people inequality averse, and do they prefer redistribution by the state?: Evidence from German longitudinal data on life satisfaction. *Journal of Socio-Economics*. Vol. 36, No. 2, 233-249.

Scorzafave, Luiz Guilherme – Soares, Milena Karla (2009): Income inequality and pecuniary crimes. *Economics Letters*. Vol. 104, 40-42.

Solt, Frederick (2008): Economic inequality and democratic political engagement. *American Journal of Political Science*. Vol. 52, No. 1, 48–60.

Solt, Frederick (2009): Standardizing the World Income Inequality Database. *Social Science Quarterly*. Vol. 90, No. 2, 231-242.

Solt, Frederick (2010): Does economic inequality depress electoral participation? Testing the Schattschneider hypothesis. *Political Behavior*. Vol. 32, No. 2, 285-301.

Stevenson, Betsey – Wolfers, Justin (2008): Economic growth and subjective well-being: Reassessing the Easterlin paradox. *Brookings Papers on Economic Activity*. No. Spirng 2008, 1-87.

Stevenson, Betsey – Wolfers, Justin (2013): Subjective Well-Being and Income: Is There Any Evidence of Satiation? *American Economic Review*. Vol. 103, No. 3, 598-604.

Wilkinson, Richard G. – Pickett, Kate E. (2006): Income inequality and population health: A review and explanation of the evidence. *Social Science & Medicine*. Vol. 62, No. 7, 1768-1784.

Wilkinson, Richard G. – Pickett, Kate E. (2009): Income Inequality and Social Dysfunction. *Annual Review of Sociology*. Vol. 35, 493-511.

Wilkinson, Richard – Pickett, Kate (2010): *The Spirit Level: Why Greater Equality Makes Societies Stronger*. Bloomsbury Press, New York - Berlin - London.

Winkelmann, Liliana – Winkelmann, Rainer (2010): Does Inequality Harm the Middle Class? *Kyklos*. Vol. 63, No. 2, 301-316.

APPENDIX

Table A1

Countries in the analysis by ESS round

Country	Round 1	Round 2	Round 3	Round 4
Austria	x	x	x	
Belgium	x	x	x	x
Bulgaria			x	x
Switzerland	x	x	x	
Cyprus			x	x
Czech Republic	x	x		x
Germany	x	x	x	x
Denmark	x	x	x	x
Estonia		x	x	x
Spain	x	x	x	x
Finland	x	x	x	x
France	x	x	x	x
United Kingdom	x	x	x	x
Greece	x	x		x
Croatia				x
Hungary	x	x	x	x
Ireland	x	x	x	x
Israel	x			
Iceland		x		
Italy	x	x		
Lithuania				x
Luxembourg	x	x		
Latvia			x	x
Netherlands	x	x	x	x
Norway	x	x	x	x
Poland	x	x	x	x
Portugal	x	x	x	x
Romania			x	x
Russia			x	x
Sweden	x	x	x	x
Slovenia	x	x	x	x
Slovakia		x	x	x
Turkey		x		
Ukraine		x	x	

Table A2

Summary statistics

Variable	N	Mean	SD	Min	Max
Life satisfaction	187630	6,85	2,33	0	10
Post-government income inequality	187630	29,54	4,89	22,61	46,19
Redistribution	187630	32,49	11,55	-1,71	50,55
ΔLife satisfaction (first diff.)	65	0,02	0,21	-0,42	0,50
ΔPost-government income inequality (first diff.)	65	0,25	1,21	-1,93	4,66
ΔRedistribution (first diff.)	65	-0,17	2,15	-9,04	6,16
ΔLife satisfaction (long diff.)	29	0,04	0,33	-0,40	1,02
ΔPost-government income inequality (long diff.)	29	0,55	1,65	-2,70	4,66
ΔRedistribution (long diff.)	29	-0,38	3,80	-13,40	6,54

Table A3

The effect of income inequality and redistribution on life satisfaction, detailed baseline regression

	Coefficient	SE
Post-government income inequality	-0.027*	(0.014)
Redistribution	0.033***	(0.005)
Ln(GDP per capita)	2.005***	(0.593)
Age	-0.066***	(0.006)
Age squared/100	0.071***	(0.006)
Female	-0.136***	(0.017)
Education: ISCED 2	0.066	(0.044)
Education: ISCED 3-4	0.105**	(0.051)
Education: ISCED 5-6	0.252***	(0.071)
Main activity: education	0.304***	(0.046)
Main activity: unemployed, looking for job	-1.075***	(0.067)
Main activity: unemployed, not looking for job	-0.739***	(0.088)
Main activity: retired	0.127***	(0.033)
Main activity: housework, looking after children	0.009	(0.029)
Main activity: other	-0.172***	(0.036)
Living with partner	0.488***	(0.024)
Health: very good	3.179***	(0.098)
Health: good	2.687***	(0.085)
Health: fair	2.000***	(0.074)
Health: bad	1.034***	(0.072)
Big city	-0.131***	(0.034)
Suburbs or outskirts of big city	-0.156***	(0.026)
Town or small city	-0.096***	(0.019)
Household income (% of the average income)	0.182***	(0.023)
Household size	-0.002	(0.008)
Country dummies	yes	
Wave dummies	yes	
Adjusted R^2	0.279	
N	187630	

Dependent variable: Life satisfaction

Robust standard errors adjusted for clustering by country are in parentheses

Dummies are included for missing control variables

Reference categories: Education level: ISCED 0-1, Main activity: paid work, Health: very bad, Domicile: village/farm or home in countryside

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$