Reduction of income inequality and subjective well-being in Europe

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Abstract
Using four waves of the European Social Survey (179,273 individuals from 29 countries), we analyze the association of reduction of income inequality (redistribution) with subjective well-being. Our results provide evidence that people in Europe are negatively affected by income inequality, whereas reduction of inequality has a positive effect on well-being. Since we simultaneously estimate the effects of income inequality and its reduction, our results indicate that not only the outcome (inequality), but also the procedure (redistribution) that leads to the outcome influences subjective well-being. We argue that living in a country where taxes and transfers reduce income inequality to a greater extent, the poor may feel more protected, and the rich may also feel more generous, which may result in an emotional benefit for them. It is also possible that well-being is associated not only with actual, but also with perceived inequality. The positive effect of redistribution seems to be stronger for less affluent members of the societies and left-wing oriented individuals. The estimations are different in Eastern and Western Europe: in post-communist countries people appear to be harder hit by inequality, whereas the impact of inequality reduction on well-being is higher in the East than in the West.

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1. Introduction

Inequality and redistribution are important topics in social sciences. Numerous studies have examined the impact of income inequality on various adverse societal outcomes, and concluded that inequality is positively associated with crime (Choe 2008; Fajnzylber et al. 2002; Scorzafave and Soares 2009) and working hours (Bowles and Park 2005), negatively with health (Kaplan et al. 1996; Wilkinson and Pickett 2006), trust (Gustavsson and Jordahl 2008; Knack and Keefer 1997), political engagement (Horn 2011; Solt 2008, 2010) and mobility (Corak 2013; Wilkinson and Pickett 2009). In the presence of upward social comparison, greater inequality also means greater discrepancy between the aspirations and actual incomes of less wealthy individuals, which imposes substantial psychological cost on these people (Frank 2007).[1]

The relationship between these outcomes and subjective well-being (Dolan et al. 2008; Frey and Stutzer 2002) predicts that income inequality should relate negatively to well-being. Besides, inequality may also 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 may reduce our happiness even without further societal effects. Besides, the negative effect of inequality may result from the envy of the poor.[2]

Starting with Morawetz et al. (1977), inequality has been the topic of several empirical papers. Studies using panel, time-series and within-country data document mostly negative effects (Alesina et al. 2004; Ferrer-i-Carbonell and Ramos 2010; Grosfeld and Senik 2010; Hagerty 2000; Oishi et al. 2011; Oshio and Kobayashi 2010; Schwarze and Härpfer 2007; Winkelmann and Winkelmann 2010).[3] Usually, people living in a more unequal environment seem to feel less happy.[4] Contrary to these results, using information from 85 countries between 1981 and 2008 Rözer and Kraaykamp (2013) found that inequality increases well-being. However, the effect varies with the sample: in Europe income inequality negatively affects well-being.

Determinants of preferences for redistribution are discussed in detail in the literature. There are several factors that have been shown to play an important role: self-interest (income and expected social mobility), risk-aversion (history of misfortune), altruism, culture and ideology, social impact of inequality, acceptable level of inequality, perception of fairness (Alesina and Giuliano 2011; Alesina and La Ferrara 2005; Corneo and Grüner 2002; Fong 2001; Luttmer and Singhal 2011).

Although societal impacts of inequality, determinants of preferences for redistribution, and the relationship between income inequality and subjective well-being are thoroughly studied,

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

[2] However, a recent empirical paper found that the relationship between preference for a more equal society and envy is very weak (Kemp and Bolle 2013).

[3] Cross-sectional cross-country or pooled cross-sectional analyses without controlling for the cultural background of countries are inconclusive. Berg and Veenhoven (2010) and Helliwell and Huang (2008) found a positive association between income inequality and well-being, whereas in an analysis of European countries Fahey and Smyth (2004) reported a negative relationship.

[4] Note however, that the impact of income inequality may be different in some cases. In an unpredictable, volatile environment inequality may be perceived as a signal of increased opportunities and may affect satisfaction positively (Hirschman and 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.

there is little empirical evidence about the impact of inequality reduction (redistribution)[5] on well-being. Only one paper deals explicitly with the question whether the reduction of inequality by taxes and transfers can undo this negative impact. Schwarze and Härpfer (2007) studied how inequality and redistribution (reduction of inequality by the state) is associated with subjective well-being in Germany. Using the German Socio-Economic Panel they found that income inequality calculated on the 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. Di Tella et al. (2003) and Di Tella and MacCulloch (2008) estimate the effect of unemployment benefits (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 show that a generous welfare state is positively correlated with satisfaction. Oishi et al. (2012) using 54 countries from the Gallup World Poll have found that progressive taxation is positively associated with a global-life-evaluation index.

In this paper we enrich the existing knowledge about the association of inequality reduction with subjective well-being. The novelty of our paper is that it is the first to estimate the effect of inequality and the reduction of inequality simultaneously, not limited to an individual country, but using data from several European countries. The analysis is based on the first four waves of the European Social Survey. We simultaneously analyze how inequality and redistribution affect life satisfaction. Our results corroborate the findings of previous literature that – controlling for personal characteristics of the respondents, GDP, unemployment and inflation rate, country fixed effects and year fixed effects – people in Europe are negatively affected by income inequality, whereas provide new evidence that inequality reduction has a positive impact on well-being. Moreover, the simultaneously estimated effects of inequality and its reduction indicate that it is not only outcome (net income inequality) that influences subjective well-being but also the procedure (redistribution) that leads to the outcome has a relevant impact. We suggest that the poor may feel more protected, whereas the rich may feel more generous because of higher level of inequality reduction by taxes and transfers, which may result in an emotional benefit for them. It is also possible that not only actual but also perceived inequality is associated with well-being. Another explanation might be that the reduction of income inequality correlates with the generosity of the welfare services provided by the state, and the high level of our redistribution variable might capture a low level of other dimensions of social inequality possibly increasing life satisfaction.

However, there is some heterogeneity in this effect. In line with the previous literature on determinants of preferences for redistribution, we find that the positive effect of redistribution and inequality aversion seem to be stronger in Eastern Europe, among people with lower income, and left-wingers.

Our paper is structured as follows. The next section describes the data and the estimation methods we used. Section 3.1 provides a descriptive analysis of our redistribution variable and the relationship between redistribution and subjective well-being, and Section 3.2. shows the estimation of OLS models. Section 4 concludes.

2. Data and methods

[5]In this paper we regard 'inequality reduction' and 'redistribution' as identical. Unless noted otherwise, redistribution refers to the reduction of income inequality by government tax and transfer policies.

Our main data source is the four waves of the European Social Survey (ESS). ESS is a repeated cross-sectional survey from every other year. The first wave started in 2002, the fourth wave was launched in 2008. We include in our analysis only those 29 countries that participated in more than one round.[6]

Our analysis relies on a self-reported measure of subjective well-being. In the ESS-questionnaire everyone is asked the following single-item question: "All things considered, how satisfied are you with your life as a whole nowadays?" They answer the question 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 inequality reduction and satisfaction, using the following specification:

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

Where S_{ict} is the life satisfaction of individual *i*, who lives in country *c* in time (wave) *t*. R_{ct} is the measure of inequality reduction, I_{ct}^N is post-government (net) income inequality, C_{ct} is the vector of country-level variables, P_{ict} is the vector of personal characteristics of individual *i*. We also include a country fixed effect μ_i 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 income 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 inequality reduction is computed as the difference between Gini indices based on gross and net incomes divided by gross income inequality:

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

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

Since Gini indices are calculated on the basis of surveys, measurement error is inevitable. If the variance of Gini indices and inequality reduction is mostly due to measurement errors rather than actual change, then our estimates would be biased. We try to mitigate this bias by calculating the trend values of the time series which capture long-term changes and set aside short-term fluctuation (and maybe some part of the measurement errors). Using inequality reduction and income inequality data for the last two decades, we compute trend components

[6] The list of participating countries by ESS rounds is given in Table A1 in the Appendix.

of inequality and its reduction for every country with the Hodrick-Prescott filter (Hodrick and Prescott 1997), and we merge these trend values to the country-wave observations.[7]

The Gini index is highest in Russia, while lowest in Sweden and Denmark. The reduction of inequality (redistribution) is high in the Scandinavian countries, Germany, and Austria and low in Russia, Ukraine, and Bulgaria.[8]

Our other country-level right-hand side variables are the welfare of the states measured by Gross Domestic Product, unemployment rate, and inflation. 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 (Stevenson and Wolfers 2008, 2013). Data on unemployment and inflation rate come from the World Bank as well.

The control variables in our baseline regression are the following: gender, age, age squared, education (four categories), living with a partner, labor force status (seven categories), subjective health status (five categories), domicile (four categories), household size and equivalent household income. Since income comparison is an important determinant of subjective well-being (Clark et al. 2008) and GDP per capita already captures the effect of the society's average wealth, we include equivalent household income as the percentage of average equivalent household income in country *c* in time *t*. With this procedure we can control the relative income effect.

We exclude some countries from the fourth wave because of missing Gini indices[9], and individuals with missing life satisfaction. The final sample contains 179,273 individuals and 94 country-time observations.

We estimate OLS regressions using ESS design weights for adjusting the unequal inclusion probabilities within countries combined with another weight whose goal is to transform every sample's N equal. In this way each cross-sectional sample counts as the same in the analysis. The standard error estimates are robust to heteroscedasticity and clustered at the country-wave level.[10]

3. Results

Table 1 shows our baseline result. We find that redistribution and post-government income inequality are significant determinants of satisfaction with life. As we expected, the coefficient on inequality is negative: people in Europe dislike inequality. The coefficient on inequality reduction has a positive sign: Inequality reducing governmental policies are correlated positively with satisfaction. The size of the coefficients means that a 1 point increase in inequality reduction is associated with an 0.051 point increase in well-being, while a 1 percentage point increase in the Gini index results in a -0.036 point lower satisfaction. Or in terms of per capita GDP change: a 1 percentage point increase in redistribution is equivalent to a 2.7 percent increase in GDP, whereas a 1 point increase in the Gini index is equivalent to a 3.8 percent decrease in GDP.

[7] 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 proposed by Ravn and Uhlig (2002) for annual observations.
[8] Table A2 in the Appendix provides descriptive statistics by country.
[9] These countries are Austria, Switzerland and Ukraine.
[10] Table A3 in the Appendix provides descriptive statistics of the main variables.

It is worth emphasizing that inequality reduction has a significant coefficient even controlling for income inequality. The first explanation for this result might be that it is not only the level of income inequality that matters, but also the process (the extent of redistribution) may lead to the particular outcome (Frey et al. 2005; Frey and Stutzer 2004).[11] 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 (especially the poor) may feel more protected due to higher level of inequality reduction by taxes and transfers; 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 the poor is common talk in such a society, which may generate these feelings. Moreover, envying the rich may be less strong, thus trust among members of the society might be also higher.

Another possible explanation for the positive coefficient on redistribution is that it is not - or not only- actual but also perceived income inequality is associated with well-being (Oshio and Urakawa 2013). If perceived inequality is correlated negatively with the extent of inequality reduction, then this relationship is reflected in the coefficient on redistribution.

Third, the higher the income inequality reduction the more generous the welfare services provided by the state might be. Thus, high level of our redistribution variable might capture low levels of other dimensions of social inequality or stronger safety net. If not only income inequality but other dimensions of inequality are also associated with well-being, then this effect is reflected by the positive coefficient on the redistribution variable.

Finally, another explanation relies on generosity and altruism. Recent studies demonstrate that spending money on other people and charity is associated with higher well-being (Aknin et al. 2013; Dunn et al. 2008). Even mandatory taxation for a good cause activates reward-related brain regions (Harbaugh et al. 2007). These results suggest that people may feel more generous because of a higher extent of redistribution, which may result in an emotional benefit for them, even if the higher level of solidarity does not depend on their decision.

Coefficients on individual control variables correspond with earlier findings.[12] There is a U-shaped relationship between age and satisfaction. Self-reported satisfaction is higher for those with more education. The better people's subjective health, the more likely they are to be satisfied. Living in cities has a negative effect on satisfaction. Those who live with a partner tend to feel more satisfied. We find the usual negative relationship between life satisfaction and being unemployed, whereas students are more satisfied than people in paid work. Women tend to report higher levels of well-being. Coefficients on equivalent household income (as the percentage of average household income) and log GDP per capita are positive.

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

[12] The detailed baseline regression result is in Table A4 in the Appendix.

Table 1

Income inequality, inequality reduction and life satisfaction

	(1)
Inequality reduction	0.036***
	(0.006)
Post-government income inequality	-0.051***
	(0.019)
Country-level controls	yes
Individual-level controls	yes
Country dummies	yes
Wave dummies	yes
Adjusted R^2	0.281
N	179,273

Dependent variable: Life satisfaction
Robust standard errors adjusted for clustering by country-wave are in parentheses.
Country-level controls: ln(GDP), unemployment rate, inflation.
Individual-level controls: gender, age, age squared, education, marital status, labor force status, health, domicile, household size, equivalent household income (as the % of average income).
Dummies are included for missing control variables.
* p< 0.10, ** p < 0.05, *** p < 0.01

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 changes the coefficient on inequality reduction and inequality. 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 Columns 3 we estimate ordered probit model rather than an OLS specification. In Column 4 we restrict the sample to countries surveyed in at least three waves out of four (21 countries). Maybe redistribution and inequality need some time to have their 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 5 satisfaction in time *t* is regressed on inequality and its reduction 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 6), and combined design and population weights (Column 7). 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 models is that the association of inequality reduction with life satisfaction is not altered by any of these sensitivity analyses. The coefficient on inequality reduction is always positive and significant at the 1 percent level. On the other hand, the estimated coefficient on income inequality is insignificant in one case and only marginally significant in another one (out of six); nevertheless, its sign always remains negative.[13] In

[13]A composition effect may explain the insignificance of coefficient on inequality in Column 4: most Eastern European countries are excluded from this sample because of participating in less than three waves. As we show in the next section, inequality has a positive effect in Eastern but no effect in Western European countries.

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.

Table 2

Income inequality, inequality reduction and life satisfaction, robustness analysis

	(1) Only wave and country dummies	(2) More individual controls	(3) Ordered probit	(4) Only countries participating at least in three waves	(5) Lagged inequality and redistribution	(6) Weighted by design weights	(7) Weighted by design weights * population weights
Inequality reduction	0.045***	0.030***	0.018***	0.028***	0.031***	0.036***	0.037***
	(0.011)	(0.006)	(0.003)	(0.004)	(0.005)	(0.006)	(0.008)
Post-government income inequality	-0.052**	-0.046**	-0.023**	-0.018	-0.036***	-0.046**	-0.029*
	(0.026)	(0.020)	(0.009)	(0.013)	(0.012)	(0.018)	(0.016)
Adjusted R^2	0.171	0.339	0.073[a]	0.252	0.281	0.279	0.248
N	179,273	179,273	179,273	150,549	179,273	179,273	179,273

[a]Pseudo R^2

Dependent variable: Life satisfaction

Robust standard errors adjusted for clustering by country-wave 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

In addition to the individual-level robustness tests, we examine the inequality reduction – satisfaction relationship on the country level (where observational units are countries, rather than individuals). In the country-level analysis we are able to examine the relationship between the change in average life satisfaction and the change in redistribution, income inequality, log GDP per capita, unemployment rate, and inflation. We estimate first- and long-differenced equations with OLS regression.[14]

Table 3 provides the regression results, where the effects of redistribution, income inequality, and GDP are simultaneously taken into consideration. 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 or higher (in absolute term) than the result shown in Table 1, but some are statistically insignificant. Inequality reduction is associated significantly positively with well-being in Column 1 and marginally significantly in Column 2. The estimations in Column 1 mean that a 1 point increase in the Gini index is equivalent to a 3.4 percent decrease in GDP per capita, while a 1 percentage point increase in redistribution is equivalent to a 2.0 percent increase in GDP per capita.[15] 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 3

Income inequality, inequality reduction and life satisfaction, first and long differences

	(1) First diff.	(2) First diff.	(3) Long diff.
Δ Inequality reduction	0.040***	0.068*	0.035***
	(0.010)	(0.035)	(0.008)
ΔPost-government income inequality	-0.067**	-0.108	-0.032
	(0.032)	(0.102)	(0.028)
Country-level controls	yes	yes	yes
Country dummies		yes	
Adjusted R^2	0.472	0.580	0.656
N	65	65	29

Dependent variable: ΔLife satisfaction
Robust standard errors are in parentheses
Country-level controls: Δln(GDP), Δunemployment rate, Δinflation
* 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 reduction and income inequality among different subsamples and different types of individuals. We presume that association between inequality reduction and satisfaction should

[14] In the long-differenced model the changes are calculated as the difference between the last and the first observation of every country.

[15] The estimated coefficient on the change of log GDP per capita is 1.979 in this specification (without country dummies).

be stronger in some groups (Eastern Europe vs. other countries, richer vs. poorer individuals, left-wingers vs. right-wingers, the formerly unemployed vs. the never unemployed). After creating binary indicator variables for these groups, we analyze heterogeneity by regressing life satisfaction on redistribution and income inequality interacted with the relevant indicator variables. Each panel in Table 4 (from A to E) represents an OLS regression where the main effects of inequality and inequality reduction are excluded, but their interaction terms with the indicator variables are included.[16] For example, in Panel A (Eastern Europe vs. other countries) one set of interactions measures the effect of inequality and its reduction in post-communist countries, and another set of interactions measures the effect of inequality and its reduction in non-post-communist countries (four interactions altogether). In this way, we can directly see the effect (and the significance) of redistribution and inequality among the examined groups of individuals. We also report the p-value on the test of equal redistribution/inequality coefficients.[17]

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

Napier and Jost (2008) present evidence that conservatives are happier than liberals partly because of their greater tolerance against inequality. Alesina et al. (2004) report that inequality has a more negative effect on the happiness of European leftists. In line with these papers, we find that the effect of redistribution is considerably weaker among individuals with right-wing orientation. Income inequality has a somewhat weaker effect on satisfaction among them; however, the estimated coefficient on inequality is statistically equal to that of individuals with left-wing orientation (Panel B).[18]

Self-interest naturally influences preference for redistribution: wealthier individuals support less redistribution (Alesina and Giuliano 2011; Alesina and La Ferrara 2005; Molnár and Kapitány 2006; Rainer and Siedler 2008) and are more likely to be unaffected by inequality (Alesina et al. 2004; Oishi et al. 2011). In Panel C we see that those with above average household incomes gain smaller satisfaction from inequality reduction than individuals with

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

[17] The difference between the two coefficients is identical to the coefficient on the interaction term that would be estimated if the main effect (e.g. inequality reduction) and an interaction term (e.g. inequality reduction interacted with Eastern Europe in Panel A) would be included in the model. The p-value is identical to the p-value on the interaction term in such a model.

[18] 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/inequality reduction 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.

below average household incomes, whereas the estimated coefficients on inequality are not different statistically between the two groups. On the other hand, it is not only actual income (or income rank) that influences how people react to inequality and redistribution, but perceived income matters as well (Cruces et al. 2013). In Panel D we measure individuals' material welfare with a subjective indicator: Do they feel that their family lives comfortably on their present income? These estimates show that inequality reduction has a weaker effect on respondents who said that they live comfortably on their present income than on those with lower standards of living, whereas we cannot reject the hypothesis of equal income inequality coefficients. The positive coefficients on inequality reduction in Panel C and Panel D are in line with the hypothesis that the poor might feel more protected and the rich might feel more generous when inequality reduction happens to be higher.

There is evidence that people with previous misfortune are more favorable to redistribution (Alesina and Giuliano 2011; Alesina and La Ferrara 2005). As noted by e.g. Alesina and La Ferrara (2005) the experience of unemployment may increase risk aversion or lead to sympathizing with poorer members of society, which means that inequality and redistribution should have a more considerable effect on individuals with such experiences. Panel E shows, however, individuals who have ever been unemployed for a period of more than three months are equally affected by inequality and inequality reduction, compared to those without such unemployment experience.

Table 4

Income inequality, inequality reduction and life satisfaction, heterogeneity

	Inequality reduction	Post-gov. income inequality	Adjusted R^2	N
A)				
Eastern Europe	0.051***	-0.075***	0.281	179,273
	(0.014)	(0.024)		
Western Europe	0.027***	-0.020		
	(0.006)	(0.020)		
p-value on test of equal coefficients	0.101	0.125		
B)				
Left-wing orientation	0.037***	-0.060***	0.285	179,273
	(0.006)	(0.021)		
Right-wing orientation	0.030***	-0.049**		
	(0.006)	(0.020)		
p-value on test of equal coefficients	0.044	0.254		
C)				
Richer than country average	0.032***	-0.052**	0.282	179,273
	(0.007)	(0.021)		
Poorer than country average	0.040***	-0.056***		
	(0.006)	(0.018)		
p-value on test of equal coefficients	0.018	0.627		
D)				
Lives comfortably	0.029***	-0.049**	0.293	179,273
	(0.007)	(0.020)		
Does not live comfortably	0.037***	-0.052***		
	(0.006)	(0.018)		
p-value on test of equal coefficients	0.059	0.751		
E)				
Has experienced unemployment	0.040***	-0.053***	0.285	179,273
	(0.007)	(0.018)		
Did not experience unemployment	0.037***	-0.053***		
	(0.007)	(0.019)		
p-value on test of equal coefficients	0.287	0.972		

Dependent variable: Life satisfaction
Robust standard errors adjusted for clustering by country-wave 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

4. Conclusion

The objective of this paper has been to examine the association of income inequality and its reduction by government taxes and transfers (redistribution) with individual's subjective well-being. Using 1-4 waves of the European Social Survey (2002-2009), we have estimated the association of inequality and inequality reduction with life satisfaction. Our results are in line with the former evidence that income inequality is negatively related to well-being. The

novelty of our analysis is the clear evidence that income inequality reduction has a positive effect on individual life satisfaction. This result contradicts the findings of Schwarze and Härpfer (2007), who found no relationship between regional-level redistribution and individual's well-being in Germany. This discrepancy might be caused by the different samples and the differences of the measurement-level of the Gini index and redistribution.

As previous papers on preference for redistribution and inequality aversion predict, the effect of inequality and its reduction is different in post-communist and in non-post-communist countries. Inequality has a somewhat stronger effect in Eastern Europe, whereas poorer members of societies, citizens of Eastern Europe and left-wing oriented individuals seem to be more affected by inequality reduction.

Since we have simultaneously estimated the effects of inequality and its reduction, our results suggest that subjective well-being is influenced not only by the outcome (income inequality), but also by the procedure (redistribution) leading to the outcome. Individuals (especially the poor) may feel more protected because of higher level of inequality reduction by taxes and transfers; they may get the sense that the community will help them in hardship, irrespective of the actual inequality. We have listed three other hypotheses to explain this result. It is possible that it is not (or not only) actual but also perceived income inequality is associated with well-being. If perceived inequality is negatively correlated with extent of redistribution, then this relationship might be reflected in the positive coefficient on inequality reduction. A positive correlation between inequality reduction and the generosity of the welfare services provided by the state might mean that high level of our redistribution variable might capture low level of other dimensions of social inequality. This could increase life satisfaction. Finally, people may also feel themselves more generous because of a higher extent of inequality reduction, which may result emotional benefit for them. Further researches are needed to verify or falsify these explanations.

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
Hungary	x	x	x	x
Ireland	x	x	x	x
Italy	x	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
Ukraine		x	x	

Table A2

Countries in the analysis by ESS round

Country	Number of waves	Mean LSF	Mean GINI	Mean REDIST	Min LSF	Min GINI	Min REDIST	Max LSF	Max GINI	Max REDIST
Austria	3	7.59	26.67	45.44	7.50	26.57	44.97	7.64	26.73	45.71
Belgium	4	7.39	25.92	33.40	7.27	25.52	32.76	7.44	26.56	34.86
Bulgaria	2	4.56	31.12	13.04	4.41	29.30	12.88	4.70	32.95	13.21
Cyprus	2	7.27	29.00	38.38	7.08	28.82	38.38	7.46	29.18	38.38
Czech Republic	3	6.54	25.31	29.18	6.45	25.27	27.04	6.65	25.39	30.68
Denmark	4	8.47	23.66	50.31	8.44	22.62	50.17	8.52	24.95	50.67
Estonia	3	6.15	33.08	31.60	5.89	32.02	30.81	6.38	34.12	32.16
Finland	4	7.96	25.66	47.06	7.91	25.04	46.41	8.00	26.20	47.47
France	4	6.41	27.78	31.33	6.35	27.57	30.29	6.44	28.02	32.44
Germany	4	6.88	28.53	46.53	6.79	27.60	46.33	6.96	29.73	46.68
Greece	3	6.27	33.44	21.55	6.06	33.36	14.54	6.42	33.58	27.09
Hungary	4	5.50	28.03	36.25	5.29	27.52	30.93	5.69	28.30	41.07
Ireland	4	7.45	31.13	22.34	7.12	30.89	21.71	7.72	31.26	22.70
Italy	2	6.71	33.77	24.16	6.51	33.77	24.08	6.91	33.77	24.23
Latvia	2	5.97	37.67	28.41	5.88	37.49	28.04	6.06	37.84	28.78
Luxembourg	2	7.78	27.19	35.99	7.73	27.12	35.78	7.83	27.27	36.20
Netherlands	4	7.63	27.30	36.01	7.55	26.51	35.70	7.69	27.85	36.57
Norway	4	7.77	24.82	46.43	7.66	24.28	46.30	7.89	25.19	46.53
Poland	4	6.41	30.32	30.33	5.85	29.75	27.29	6.87	30.73	31.79
Portugal	4	5.71	36.44	38.55	5.52	36.17	36.76	5.91	36.71	39.92
Romania	2	6.00	31.96	33.44	5.85	30.83	33.28	6.14	33.09	33.60
Russian Federation	2	5.36	45.72	5.57	5.25	45.24	5.03	5.47	46.21	6.11

Country	Number of waves	Mean LSF	Mean GINI	Mean REDIST	Min LSF	Min GINI	Min REDIST	Max LSF	Max GINI	Max REDIST
Slovak Republic	3	6.06	24.24	30.29	5.58	22.95	28.27	6.51	25.49	32.80
Slovenia	4	6.84	24.83	27.65	6.57	24.62	27.38	6.97	25.22	27.94
Spain	4	7.24	31.78	16.42	7.08	31.20	14.06	7.44	32.61	17.90
Sweden	4	7.83	23.46	48.34	7.80	23.30	47.85	7.86	23.62	48.63
Switzerland	3	8.06	28.48	37.02	8.01	27.60	35.59	8.10	29.35	38.17
Ukraine	2	4.41	34.34	11.08	4.39	33.98	10.27	4.44	34.70	11.89
United Kingdom	4	7.12	34.91	27.31	7.07	34.40	25.97	7.23	35.66	28.31

LFS: Life Satisfaction, GINI: Post-governmental income inequality, REDIST: Inequality reduction

Table A3

Summary statistics

Variable	N	Mean	SD	Min	Max
Life satisfaction	179,273	6.9	2.3	0	10
Inequality reduction	179,273	33.2	10.9	5.0	50.7
Post-government income inequality	179,273	29.3	4.6	22.6	46.2
Ln(GDP)	179,273	10.1	0.4	8.6	11.1
Unemployment rate	179,273	7.26	3.38	2.60	19.90
Inflation	179,273	3.29	2.73	-4.48	14.11
Age	178,208	46.0	18.2	15	100
Female	179,044	0.47	0.50	0	1
Equivalent household income percentage of the average income)	140,725	1.00	0.95	0.01	52.73
Household size	179,099	3.03	1.45	1	8
Education: ISCED 0-1	178,337	0.14	0.34	0	1
Education: ISCED 2	178,337	0.20	0.40	0	1
Education: ISCED 3-4	178,337	0.42	0.49	0	1
Education: ISCED 5-6	178,337	0.24	0.43	0	1
Main activity: paid work	178,094	0.51	0.50	0	1
Main activity: education	178,094	0.10	0.29	0	1
Main activity: unemployed, looking for a job	178,094	0.03	0.18	0	1
Main activity: unemployed, not looking for a job	178,094	0.02	0.13	0	1
Main activity: retired	178,094	0.21	0.41	0	1
Main activity: housework, looking after children	178,094	0.10	0.30	0	1
Main activity: other	178,094	0.04	0.19	0	1
Health: very good	179,079	0.22	0.42	0	1
Health: good	179,079	0.43	0.49	0	1
Health: fair	179,079	0.26	0.44	0	1
Health: bad	179,079	0.07	0.25	0	1
Health: very bad	179,079	0.01	0.12	0	1
Living with a partner	177,873	0.63	0.48	0	1
Big city	178,689	0.19	0.40	0	1
Suburbs or outskirts of big city	178,689	0.12	0.32	0	1
Town or small city	178,689	0.30	0.46	0	1
Village	178,689	0.39	0.49	0	1

Table A4

Income inequality, inequality reduction and life satisfaction, detailed results

	Coefficient	SE
Inequality reduction	0.036***	(0.006)
Post-government income inequality	-0.051***	(0.019)
Ln(GDP per capita)	1.385***	(0.362)
Unemployment rate	-0.020*	(0.010)
Inflation	-0.011	(0.008)
Age	-0.066***	(0.004)
Age squared/100	0.072***	(0.004)
Female	-0.136***	(0.013)
Education: ISCED 2	0.075**	(0.034)
Education: ISCED 3-4	0.116***	(0.036)
Education: ISCED 5-6	0.269***	(0.046)
Main activity: education	0.312***	(0.035)
Main activity: unemployed, looking for job	-1.075***	(0.051)
Main activity: unemployed, not looking for job	-0.778***	(0.066)
Main activity: retired	0.124***	(0.024)
Main activity: housework, looking after children	-0.003	(0.025)
Main activity: other	-0.190***	(0.034)
Living with partner	0.499***	(0.019)
Health: very good	3.172***	(0.078)
Health: good	2.681***	(0.072)
Health: fair	2.006***	(0.067)
Health: bad	1.034***	(0.070)
Big city	-0.134***	(0.026)
Suburbs or outskirts of big city	-0.151***	(0.022)
Town or small city	-0.093***	(0.017)
Equivalent household income (% of the average income)	0.170***	(0.019)
Household size	0.027***	(0.007)
Country dummies	Yes	
Wave dummies	Yes	
Adjusted R2	0.281	
N	179,273	

Dependent variable: Life satisfaction
Robust standard errors adjusted for clustering by country-wave 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

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