

GED Study

Perceptions of Inequality Survey 2015 / 2016

Author

Dr. Elisabeth Bublitz, Hamburg Institute of International Economics

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Content

1	Introduction	5
2	Previous findings	8
3	Methodology and data	10
3.1	Country sample	10
3.2	Survey design	12
3.3	Main variables	13
4	Results	17
4.1	Overview of biases by countries	17
4.1.1	Position bias	17
4.1.2	Perceived and ideal income inequality	20
4.1.3	Labor market bias	21
4.1.4	Interrelations between biases	24
4.2	Reasons for the income position bias	24
4.2.1	Group differences in the income position bias	24
4.2.2	Multivariate analyses of the estimated income position	28
4.3	Consequences of correcting misperceptions of income	30
5	Conclusions and implications	35
6	Literature	37
7	Annex	39
7.1	Example of treatment	39
7.2	Tables and figures	40
	Imprint	47

1 Introduction

Over the past few decades, inequality has increased in various countries (OECD 2015). Standard theory suggests that growing inequality as measured by a widening gap between the average and the median income should raise support for redistribution policies because politicians react to the preferences of the median voter (application of the median-voter model by Meltzer, Richard 1981). However, the data does not provide clean support for the hypothesized relationship between inequality and redistribution. For instance, in the US, despite increasing inequality the top income tax rates have fallen (Piketty et al. 2014). Various studies have investigated reasons for this seeming contradiction between theory and data, including, among others, the prospect of upward mobility (Alesina, La Ferrara 2005; Benabou, Ok 2001), systematic differences in demand for redistribution by subgroups of the population (Ashok et al. 2015) or a lack of connecting a problem like inequality with public policy (Bartels 2005). Another way to reconcile these ostensibly conflicting findings is that individuals misperceive the true state of inequality and that policies are based on perceived inequalities, which differ from the true state. Cross-country evidence already shows that important misperceptions of inequality persist and that indicators for perceived inequality are a better predictor for redistributive preferences than objective measures such as a standard Gini coefficient (e.g., Gimpelson, Treisman 2015; Kuhn 2015; Engelhardt, Wagener 2014; Niehues 2014; Kuhn 2011), thereby providing support once again for the median-voter model on the basis of subjective inequality. Against this background the following questions come to mind: Do perceived inequalities differ from the inequality measured with more objective indicators? What can explain differences in perceptions of inequalities among the population? How do such perceptions influence personal attitudes towards matters related to inequality?

Initial evidence on the existence and causal effects of misperceptions on political attitudes or other preferences has been collected and it offers promising results. The

misperceptions of inequalities are defined as a bias which is simply understood as a deviation from the true value, regardless of the reasons for this deviation. Positive biases mean that individuals overestimate and negative biases imply that individuals underestimate the true value (see Box 1 for details). Cruces et al. (2013) show that in Argentina a significant share of poorer people place themselves in higher ranks of the income distribution than is truly the case, while a significant share of richer people underestimate their income position. For Sweden, Karadja et al. (2014) provide evidence for a negative bias for 63 percent of the population. In both countries, correcting the misin-

Defining misperceptions

To identify misperceptions, we need information on the perceived value as guessed by individuals and on the true value as the best (statistical) estimate. The difference between both values informs about the size of existing misperceptions. An overestimation of the true value corresponds with a positive bias (higher than the true value) and an underestimation refers to a negative bias (lower than the true value). We thus assume that the estimate as it is given by official data sources is more reliable than the respondent's guess.

Whether biases can be understood as misperceptions of inequality depends on the collected variables. Many standard inequality measures are based on more than one variable, which poses difficulties when constructing subjective indices on an individual level. The present study provides an account of the size of existing biases, focusing on income position biases, but being careful in interpreting the results in relation to misperception of country-specific inequality.

formation leads to changes in the demand for redistribution. For instance, individuals with a positive bias decrease their demand for redistribution while individuals with a negative bias increase their demand. However, this relationship is not always statistically significant and further differs by country or group attributes of respondents such as, for instance, education levels. Using data for the US, Kuziemko et al. (2015) find support that informing individuals extensively about income inequality and taxes sharply increases the share of respondents who view inequality as a serious problem but hardly translates into changes in the demand for redistribution. The latter is potentially due to, among other things, a lack of trust in governments.

The chosen examples illustrate that cross-country differences in misperceptions and in their effects persist. This might, for instance, relate to differences in welfare states which play an important role for addressing inequality (e.g., for US versus Europe see Ashok et al. 2015; Alesina et al. 2004; Alesina et al. 2001) but also to the general influence of culture on the taste for redistribution (Luttmer, Singhal 2011). While the present results confirm the existence of important biases, correcting biased perceptions does not always directly translate into changes in political attitudes. However, other research has confirmed the important influence of the subjective status on demand for redistribution (Karadja et al. 2014). In sum, we still lack a thorough understanding of the influence of biases on demand for redistribution, but the previous evidence indicates that this topic is a fruitful avenue for research.

Since the important variables in this context—namely, an indicator like inequality but also public policy like social expenditures—vary on a national level, a cross-country comparison appears to be a suitable method to understand the mechanisms behind misperceptions of inequality. Hence, building on the previous evidence, the objective of this study is to provide comparable information on differences in biases across several countries, on causes of these biases, and on their effects on personal attitudes and opinions. So far, no comprehensive data source has been available to address these topics (e.g., Gimpelson, Treisman 2015), which is why we conduct our own randomized survey experiment. Unlike earlier studies, our data allows us to identify the effect of country characteristics on the distribution of biases and on changes in personal attitudes or views. The data is collected in the following eight countries: Brazil, France, Germany, Russia, Spain, Sweden, the United Kingdom, and the United States. The selection criteria were, among others, to include countries with different degrees of inequality and varying degrees of redistribution. In the

randomized survey experiment, a subgroup of our participants is informed in a “treatment” about the true degree of income inequality in their country, revealing to them a potential misperception of inequality. This methodology enables us to identify, among other things, the causal relationship between the degree of inequality and redistribution or other personal beliefs.

The empirical results confirm that our country samples differ systematically in how the average individual perceives his or her own income position, incomes of other individuals, and the unemployment rate. With the exception of Brazil, in all other country samples the majority of participants has a negative income position bias, implying an underestimation of their own rank in the income distribution. Moreover, the unemployment rate is usually largely overestimated, indicating that individuals overestimate the difficulties of finding a job and earning a living. Important differences exist in how the income position bias is distributed across income quintiles, social classes, and education levels. In terms of their own estimated income position, individuals in the second quintile of the income distribution show almost no income position bias, while individuals in the first income quintile have a positive income position bias and individuals in higher income quintiles have a negative income position bias. Calculating the size and distribution of the income position bias by education levels or social classes does not show such a clear pattern and instead, the size of the income position bias is often fairly similar across groups. Important country differences exist when explaining the estimated income position with these group variables. In the samples of the UK and Sweden, respondents with higher education levels report higher estimated income positions while the Russian sample shows the opposite relationship. In the German and Swedish samples, higher social classes correlate positively with higher estimated income positions. In the other country samples, the coefficients are not consistently significant, suggesting that other variables, which we did not include, could be more important in determining the estimated income position. Finally, the analysis shifts to the effect of the treatment (information on true income inequality) and the country samples now exclude Sweden and the UK. In the German sample, the treatment significantly decreases the demand for government intervention and increases support for larger income differentials. This suggests that the German treatment group prefers individuals to be more responsible for themselves and might view greater income differences as either an incentive or an acceptable consequence thereof. In addition, views on these two issues tend to converge across country samples in the treatment group in the

following ways: Differences between the samples from Germany, Russia, Spain, Brazil, and France become smaller when looking at preferences for income differentials and disregarding the US. As for the demand for government intervention, the country samples of Germany, Russia, Brazil, and France converge while Spain and the US move in opposite directions. In sum, although the treatment did not significantly alter views within the other country samples (with the exception of the German sample), differences between the country samples change within the treatment and control group. Hence, while the respondents in the US (in both cases) and Spain (in one case) show a different development, the views of the remaining country samples tend to move towards each other. Depending on the country sample, this can be the result of an upward or downward movement, illustrating that, on average, individual responses differ by country sample. In addition, respondents react differently depending on their income position bias. Individuals who learn that they are better positioned than they thought demand less redistribution. This appears to explain why in the German sample we observe a decrease in the demand for redistribution.

The study is designed as follows: Chapter 2 summarizes the previous findings that were utilized to identify the research gap. In Chapter 3 we introduce the methodology of the survey and the structure of the data. Chapter 4 presents the results of the survey. Chapter 5 closes with the conclusions and implications.

2 Previous findings

The following literature on perceptions of inequality can be roughly divided into four parts. First, research has investigated the shape of the wealth or income distribution and the overall degree of inequality as they are perceived by individuals. The data analysis consists of comparing the perceived values with the true values. Second, other studies that focus on the income distribution have already confronted individuals during the survey with the true values instead of adding these values after the data collection. This procedure—also called a randomized survey experiment—makes use of the division into a control and a treatment group where the treatment group receives additional information. The data analysis then allows measuring systematic differences in the answers following the treatment between the two groups. Third, studies have left the framework of the income distribution, thereby testing whether the influence of misperceptions shows similar patterns in other contexts. Fourth, using observational data, studies have compared subjective measures of inequality with objective measures for different countries, shedding more light on the role of misperceptions across countries.

Starting with the empirical evidence on the wealth distribution, Norton and Ariely (2011) show that on average Americans tremendously underestimate the true level of wealth inequality in the US. Also, across gender, political orientation, and income groups the survey participants prefer similar ideal distributions of wealth. Although the measurement implemented by Norton and Ariely to elicit preferred distribution schemes has been challenged and discussed, the main result that Americans prefer more equitable distributions than they believe exist today continues to hold when other methods are employed (Eriksson, Simpson 2012; Norton, Ariely 2013). However, the underestimation of inequality has been challenged by Chambers et al. (2014), who show that Americans tend to overestimate true income inequality, highlighting again potential measurement problems in previous work.

Moving on to the randomized survey experiments that use income data, Cruces et al. (2013) show that in Argentina individuals at the upper end of the income distribution underestimate their position in the overall income distribution, while individuals at the lower end overestimate it. They can further show that the bias correlates with the type and composition of reference groups. When determining their relative income position, individuals make inferences from their immediate surroundings by using, for instance, their relative income position in a locality (area of residence) instead of the national reference group.¹ In addition, having friends from more diverse social backgrounds who are more likely to reflect the national social background structure reduce both over- and underestimation. In their survey, Cruces et al. confronted a randomly chosen subsample with treatment information on the true rank in the income distribution. Compared to the control group that does not receive such information, the treatment group significantly changes their demand for redistribution. Participants who overestimate their income position and who learn that they are worse off in reality than they thought demand more redistribution. Although significant, the effect remains relatively small in magnitude and, indeed, no statistically significant relationship can be found between an underestimation of the rank and the demand for redistribution. This leads Karadja et al. (2014) to ask the question whether the mechanisms of translating perceived inequality into demand for redistribution might differ across groups, leading to heterogeneous treatment effects. For Sweden, they show in a first step that the majority of the population suffers from a negative bias regarding their position in the income distribution. In fact, the degree to which individuals hold faulty beliefs decreases when age, wealth, education, and cognitive ability increase. Providing

¹ Blümle (2016) suggests that individuals are more likely to refer to the mode instead of the average or median value in the income distribution when identifying their own position. During this process they are still more likely to refer to (the mode of) their immediate surroundings.

individuals who hold a negative bias in a second step with the good news of an actually better position in the income distribution decreases their demand for redistribution. This effect is driven by the subgroup of respondents with right-of-center political preferences, while individuals on the left do not react to the information treatment. The most important difference between these two groups is their assessment of (1) whether effort or luck determines individuals' economic success and (2) the degree to which income taxes distort labor supply. In a study with US citizens, Kuziemko et al. (2015) inform participants about the changes in wage inequality over the last decades, refraining, however, from measuring the degree of misinformation on the individual level. The results show that a treatment with extensive information on increasing income inequality in the US, on the historical correlation between top income tax rates and economic growth, and on the occurrence of the estate tax significantly raises individuals' concerns about inequality. However, it triggers only small and often statistically insignificant changes as regards the demand for different redistribution mechanisms, apart from one exception: Information on the small share of the population that is impacted by the estate tax leads to a sharp increase in the support of the tax itself. An in-depth analysis of the mechanisms behind the results shows that distrust in government and a problem with relating social issues to public policies can partially explain the lack of statistically significant relationships.

Third, there exist some insightful extensions to the previous studies. Balcells et al. (2015) also conduct a randomized experiment in Spain but they inform a subsample about the true relative income of their region, hence presenting the position of the region instead of the position of the individual. Participants who learn that their region is poorer than they previously assumed demand more redistribution while individuals whose region is placed above the median region as regards income demand less inter-regional distribution. The first finding confirms that correcting misperceptions of regional income distributions, and hence providing information less connected to the individual, also affects demand for redistribution. Brown-Iannuzzi et al. (2015) provide experimental evidence from the US that by only feeling higher in status or believing to perform better than others, individuals already reduce support for redistribution. These results show that individuals' subjective feelings of their own status have an important influence on opinions towards redistribution.

Finally, the presented evidence suggests that misperceptions on inequality that can be understood as a subjective

status play an important role, but the studies using randomized survey experiments have focused on single countries, hence, holding culture and institutions constant. Important cross-country differences are known to persist regarding the demand for redistribution (e.g., Luttmer, Erzo F. P, Singhal 2011; Osberg, Smeeding 2006; Alesina, Angeletos 2005; Kuklinski et al. 2000). Indeed, there is already aggregated evidence for various countries on the importance of subjective inequality measures for demand for redistribution (among others, Gimpelson, Treisman 2015; Kuhn 2015; 2011). For instance, Engelhardt and Wagener (2014) explicitly investigate the average perceived distribution of incomes (based on an aggregation of the perceived positions in the society) in different countries, arguing that according to this measure all countries in their sample underestimate the current level of inequality. In addition, the larger the negative bias of the population is, the smaller social expenditures are. Niehues (2014) builds a different index, which is based on perceived social stratification, showing that such a subjective Gini index, instead of the standard Gini coefficient, positively correlates with the assessment of whether income differences are too large. These studies show that perceived inequality differs from true inequality across countries. Likewise, in an (unrepresentative) online survey, the OECD (2016) started collecting data on perceived income distributions. Individuals provide anonymous information on their income and are later informed about the true income distribution.

So far, the data sets allow measuring the relationship between biases and the demand for redistribution either causally on the individual level in one country or in terms of correlations on the country level across all individuals. However, there is a lack of data that allows determining the causal effect of individual biases on redistribution for different countries (Gimpelson, Treisman 2015). Therefore, the present paper builds on earlier findings by combining the existing evidence and implemented treatments on inequality into a unique approach that is implemented in a randomized survey experiment and carried out in different countries. In addition to investigating the role of individual characteristics, the goal is to measure the importance of country characteristics by comparing different countries to better understand what causes different biases and how misperceptions influence the demand for redistribution.

3 Methodology and data

Since existing data sets fall short of providing the information needed to answer our research questions, we implemented a tailor-made survey that was specifically designed to fill the gap. The following section presents information on the country selection, introduces the survey design, and gives an overview of the main variables in the analysis.

3.1 Country sample

As sketched above, countries are well known to differ regarding their acceptance of inequality levels as well as their demand for redistribution. For instance, the US as a country with a large degree of inequality and relatively low levels of redistribution is often contrasted with Europe, where the degree of inequality before taxes is lower than in the US and the level of redistribution is higher. Within Europe, notable differences exist between, for instance, the UK, which shows a higher resemblance to the US, and Sweden, known to be more egalitarian than many other countries. In the analysis it thus makes sense to include countries from different backgrounds to investigate the impact of, for instance, the overall degree of inequality.

Our study looks at Brazil, France, Germany, Russia, Spain, Sweden, the United Kingdom, and the United States. Table 1 provides an overview of several characteristics that can be considered important in the context of this research. For an understanding of the existing inequalities, there is information on economic variables and, as background for redistribution, public social expenditures are included. An evaluation of government effectiveness sheds light on potential challenges that the population identifies with regard to, for instance, the quality of policy formulation and implementation. Finally, looking at satisfaction rates can help to understand a prevailing country-specific mood.

As regards economic characteristics, we can see that Sweden and the US had the highest GDP per capita in 2014,

with values higher than US\$ 50,000, while Brazil and Russia showed the lowest levels, both around US\$ 12,000. Germany, the UK, and France reached values of more than US\$ 40,000, while Spain remained at around US\$ 30,000. GDP growth in 2014 shows a different ranking with growth rates clearly above 2 percent for the UK, the US, and Sweden, with values above 1 percent for Germany and Spain, followed by relatively low values for Russia, France, and Brazil. Looking at the Gini coefficient as a measure for inequality, we find Sweden to be most equally distributed, followed by Germany, France, Spain, the UK, the US, Russia, and Brazil. In fact, Brazil shows values twice as large as Sweden, hinting at large differences between these countries in terms of inequality. Naturally, this could already influence perceptions of income inequality among the population due to whether they focus on the current GDP per capita, the GDP growth rate or the Gini coefficient and whether they choose a better or worse-looking country as a reference group. For instance, in our sample France has a relatively high GDP per capita, comparatively low GDP growth but also a low Gini coefficient, illustrating that the rank of the country depends on the chosen variable. Likewise, both Russia and Brazil are of particular importance for the analysis because they are clearly different from other countries in the sample as can be seen from the higher Gini coefficients and lower GDP per capita.

Moving to characteristics more closely related to public policy, the total unemployment rate according to the definition of the International Labor Organization (ILO) is lowest in Germany, Russia, the UK, and the US, with values between 4.7 percent and 5.9 percent. Unemployment rates in Brazil and Sweden rank between 7.1 percent and 8.1 percent, followed by France with 10 percent. An exceptionally high rate is found in Spain with 23.6 percent. To what degree governments attempt to level out economic differences and, for instance, provide unemployment benefits, can be proxied with the public social expenditure as a percentage of GDP. Numbers range between 14.4 percent and 33 percent

resulting in the following order of countries, starting with the lowest value: Brazil, Russia, the US, the UK, Germany, Sweden, Spain, and France. This already indicates that the country ranking by degree of inequality, as measured by the Gini coefficient, cannot be exactly mirrored with the ranking of the level of public social expenditures in the way suggested by the median-voter model.

The government effectiveness rank, provided by the World Bank, is constructed from information of other data on perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. In a broader view, this measure may be interpreted as the degree to which government is (considered to be) capable of addressing challenges such as high levels of inequality. Sweden nearly arrives with 99 at the maximum value of 100, while Russia reaches only 43, the lowest value in the group. Germany, the US, the UK and France rank around 90 while Spain has a value of around 83 and Brazil of 51. This information can be helpful when

interpreting the degree to which respondents would want government to redistribute in light of the true level of inequality.

It appears plausible that low satisfaction rates correlate with the degree to which individuals might want to change something about a specific situation. For instance, if individuals are not satisfied with their own income, it is likely that they want to change their income situation. Sweden shows the highest share of individuals who report being highly satisfied with the financial situation of their household, followed by the UK and Brazil. Clearly lower but similar shares are reported for France, the US, Germany, Russia, and Spain. When asked about their satisfaction with life, the picture changes. Brazil has a share of 24 percent (share of population that answers as being highly satisfied), which is followed by Sweden with 12 percent and the UK with 11 percent, illustrating the large gap. Russia shows a share of 9 percent while the remaining countries have shares between 5.8 percent and 6.8 percent. Considering how Brazil fares in terms of the economic indicators, the high satisfaction rates are surprising and already raise

Table 1: Overview of country characteristics

Indicator	Brazil BRA	France FRA	Germany GER	Russia RUS	Spain SPA	Sweden SWE	United Kingdom UK	United States USA
GDP per capita (current US\$) (2014)*	11,612.50	42,736.20	47,627.40	12,735.90	30,262.20	58,887.30	45,603.30	54,629.50
GDP growth (annual %) (2014)*	0.10	0.20	1.60	0.60	1.40	2.30	2.60	2.40
Gini coefficient (2010 or latest available year)**	0.55	0.30	0.29	0.40	0.34	0.27	0.34	0.38
Unemployment rate (% of total labor force, modeled ILO estimate, 2014)*	7.10	10.00	4.70	5.30	23.60	8.10	5.90	5.90
Public social expenditure (as % of GDP) (2013)**	14.40	33.00	26.20	15.70	27.40	28.60	23.80	20.00
Government Effectiveness, Rank (2013)*	51.20	89.47	91.39	43.06	82.78	98.56	89.95	90.91
Satisfaction with the financial situation of household (share of highly satisfied)***	9.60	4.20	3.50	3.30	2.10	15.70	11.90	4.00
Satisfaction with your life (share of highly satisfied)***	24.30	6.70	6.80	8.70	5.80	11.60	10.90	6.70

Notes: * World Bank. ** OECD Factbook. *** World Values Survey Wave 5.

questions, for instance, about whether Brazilians have a different perception of reality.

In sum, this descriptive overview illustrates the important differences between countries in terms of inequality and redistribution that are essential for the analysis. At first sight, it is still unclear which population could be more negatively or positively biased, and if an important average bias even exists at all. Hence, considering that countries are characterized by a mixture of various aspects and since no *ex ante* groupings come to mind against the background of our research questions, the empirical analysis will consider each country as a unique environment.

3.2 Survey design

In August 2015, the data was collected in each country via an online platform using the sampling variables gender, age, education, and region (see Table A 7 for variable distributions by country). The survey was administered by the survey organization YouGov.² In each country, at least 1,000 respondents started filling out the questionnaire, returning an initial total sample of more than 8,000 observations. However, since not all respondents answered all questions (for instance regarding own income), the sample size in different parts of the analyses is reduced, which implies a potential loss of representativeness. To mitigate potential biases, we also run multivariate regressions where we control, among other variables, for gender, age, education, and country.

The survey started with the questions on the sampling variables and followed up with a module on social classes. Next, respondents answered questions regarding income. At the end of this module, 50 percent of a country's population was randomly chosen to receive information on the true income distribution in the country, which will be described in the next paragraph. The randomization procedure ensured that the subgroups still matched the sampling quotas. Next, all respondents were directed to modules with outcome variables where one would expect a change after the information treatment on income inequality, for instance, in their answers to questions on the demand for redistribution. The survey closed with two more questions on the respondents' background.

2 The questionnaire can be made available upon request. YouGov is a market research institution that provides panels for online research. Respondents register and receive regular invitations to surveys that match their characteristics. They are rewarded via vouchers. To avoid having the structure of the database bias our results, each country sample had to match representative quotas for the variables (see Table A 7 for details).

For the randomized treatment, information on income was taken from the European Union Survey on Income and Living Conditions (EU-SILC: France, Germany, Spain, Sweden, UK) and the Luxembourg Income Study Database (LIS: Brazil, Russia, US). The goal was to provide respondents with comparable information on income. Due to the difficulties in obtaining data access via national statistical agencies, we looked for harmonized income data that included as many countries as possible for the most recent years. We had to work with two data sources because no single data set fulfilled all necessary requirements. Income data were available for 2013, at the earliest, with the exception of Brazil in which case we deflated data from 2011. The design of the treatment is a combination of the treatments from the previous literature (Kuziemko et al. 2015; Norton, Ariely 2011; Eriksson, Simpson 2012; Cruces et al. 2013; Karadja et al. 2014). In the treatment group, respondents saw a figure displaying the country's income distribution with income groups on the x-axis and the percentage of the population on the y-axis. There was a short introduction on how to read the figure and on what inequality is in relation to the figure. Below the graph respondents were shown their answers to questions on the income of different groups (average household income of poorest and richest 10 percent as well as median household income) as well as on what percentage of individuals have an income lower than their own. Next to their guesses they saw the true values as calculated from the LIS and EU-SILC (see Section 7.1 for an example of the treatment).³ Due to missing values for some participants, we cannot calculate the size of the bias for all respondents; however, we do not lose additional observations in the treatment group because everyone could be informed with the true values regardless of whether estimated numbers were provided by the respondents.

Following Karadja et al. (2014), questions regarding income referred to gross household market income because this variable does not include any public redistribution such as subsidies or transfers. Asking for the household income takes into account that preferences are more likely to be shaped by the financial resources available on the household level instead of the personal level. To ensure that all respondents had the same working definition of income they read the following information: "All of the following questions refer to total yearly market income, which is defined as total yearly income before taxes from all household members (as you listed them above), such as income from labor (including paid and self-employment income)

3 When no personal information on the income variables was provided or the share earning less than the participant was zero, the cells were left blank.

Income data

For the European countries in our sample—France, Germany, Spain, Sweden, and the UK—we use income data from the European Union Survey on Income and Living Conditions 2013 (EU-SILC), which provides comparative statistics on the income distribution and social inclusion in the European Union. The data collection is based on a common framework, which implies that target variables to be provided by countries to Eurostat are based on harmonized lists, and that there are common guidelines and procedures as well as concepts and classifications. National statistical institutes are in charge of data collection. The minimum size for the complete cross-sectional data with all countries is about 130,000 private households and 270,000 persons aged 16 and older (reduced sample: France 7,250/13,500; Germany 8,250/14,500; Spain 6,500/16,000; Sweden 4,500/7,500; UK 7,500/13,750). The data was made available to the authors as anonymized micro-data after an approval process.¹

Information on income for the remaining countries—Brazil, Russia, and the US—is taken from the Luxembourg Income Study Database 20132 (LIS), which offers the largest available database of harmonized microdata on income for upper- and middle-income countries. Data is provided by the countries and then harmonized ex-post by staff at the LIS. Data sources are as follows: Brazil “National Household Sample Survey” (Pesquisa Nacional por Amostra de Domicílios, PNAD provided by the Brazilian Institute for Geography and Statistics, IBGE), Russia “Russia Longitudinal Monitoring Survey—Higher School of Economics” (RLMS-HSE provided by the Carolina Population Center at UNC-Chapel Hill and the National Research University—Higher School of Economics, HSE), and the US “Current Population Survey” (Annual Social and Economic Supplement, ASEC, provided by the US Census Bureau). After an official registration, data access was possible via a remote-execution system.³

To ensure data comparability of both data sets, the definition of market income follows the suggestions by the LIS, comprising the following variables: labor income generated from paid employment and self-employment as well as capital income generated from interests, dividends, voluntary individual pensions, rental income, and royalties. Variables from the EU-SILC were selected to match this description. It is acknowledged that on a national level there may be alternative data sets that have advantages over the sources accessed for this study. However, in light of the cross-country comparisons, the selected data sources are known to provide highly reliable and comparable information on income, which is why they have already been widely used in research.

- 1 Detailed information on the EU-SILC is available here <http://ec.europa.eu/eurostat/web/income-and-living-conditions/overview>.
- 2 Only in the case of Brazil did we need to use data from 2011, which we deflated.
- 3 Detailed information on the LIS is available here <http://www.lisdatacenter.org/our-data/>.

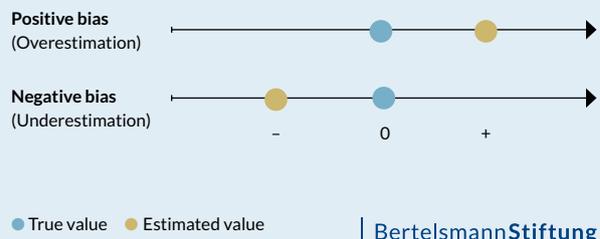
and income from capital (including interest and dividends; voluntary individual pensions; rental income; royalties). Please leave out any transfer income or subsidies (including work-related insurance transfers, universal benefits, assistance benefits).” In what follows, gross household market income will be abbreviated to income. The calculation for income was based on the suggestions for variables from the LIS for factor income and then mirrored in the EU-SILC data. Since selected country data is top- or bottom-coded, we uniformly implemented across all countries the identical bottom-coding (no negative incomes) and top-coding (maximum value of 10 times the median) to facilitate the interpretation of cross-country differences in the results.

It is noted that the type of income that might be primarily communicated to the population in relation to inequality might differ from the definition implemented in the survey. For instance, it might be of higher interest to communicate the degree of inequality (i.e., income distribution) after redistribution because it will be lower than before such actions were undertaken. If respondents referred to this number it would imply that, despite repeatedly showing our definition, they might continue to think of net income, for instance.⁴ Also, we can assume that more than one data set exists per country and depending on the sampling variables, the income percentiles may (slightly) differ. To dampen the impact of such misunderstandings, misperceptions are only classified as such when the estimated value differs to a pre-defined degree from the true value (see Section 3.3). In sum, a great deal of effort was put into creating reliable and comparable income data sets by country; however, we acknowledge that, when focusing on a single country, data from other sources, for instance, national statistical offices may provide even more accurate estimates.

Our treatment was designed to be neutral, allowing participants to make their own normative judgments, because one of our goals was to test whether individuals are content with the status quo. For this reason, we did not present any statements on the degree to which the income distribution could be considered (un-) equal, but instead we provided participants with the tools to reach their own conclusions.

⁴ In general, one may expect that redistribution leads to a more compressed income distribution where individuals in lower categories move up and individuals in higher categories move down within the distribution. In addition, the distance between median and mean income decreases. If the results of Cruces et al. (2013) hold, then the overestimation of individuals at the lower end and the underestimation of individuals at the upper end would decrease because in both cases they should move closer to the middle of the distribution. In such a case, our estimates would provide upper bounds, potentially overestimating the existing bias. We attempt to capture part of this problem by allowing for a measuring error of 10 percentage points.

Figure 1: Measurement of the type of bias



3.3 Main variables

Following the previous literature, central variables for our study show the degree of misinformation on an individual level. Misinformation is labeled as a bias and Figure 1 provides an overview of how biases are classified. To avoid misunderstandings, please note that a bias is understood as a false estimation or misjudgment, hence referring to cognitive biases (for instance, Tversky, Kahneman 1974) and not to, for instance, prejudices against a group or person.

To illustrate the point, think of a person who perceives the world in terms of the income distribution to be more equal than it truly is. Using the example of their own position in the income distribution, the value estimated by the individual is larger than the true value, leading to a positive bias or overestimation. On the other side of the scale you can find a person who reports an estimated value of their own income position that is lower than the true value, and hence we would consider this a negative bias or an underestimation. In addition to the person’s own position in the income distribution, the definition of a perception bias is also applied to the estimated unemployment rate. Please note that a higher income position can be regarded as something positive while a higher unemployment rate needs to be interpreted as something negative. This changes the interpretation of the results where an overestimation of the income position makes people look better off than they truly are while an overestimation of the unemployment rate makes them look worse off than they really are.

When calculating the size of such a bias, we measure the deviations from the true value for the income position and the unemployment rate. In both cases, we allow for a certain measurement error on the side of the individuals, assuming that knowing the exact true value is very difficult. The following biases will be analyzed:

- **Position bias:** Participants were asked to estimate the percentage of individuals with a lower income than their own (cf. Cruces et al. 2013; Karadja et al. 2014). The income position bias is determined by subtracting the estimated position from the actual position in the income distribution. The actual income position is calculated with the information on the respondents' income.⁵ On the side of the respondent, we allowed for a measurement error of 10 percentage points (following Karadja et al. 2014), categorizing an overestimation (underestimation) of more than 10 percentage points as a positive (negative) bias.
- **Unemployment bias:** Participants were asked how many people out of every 100 people of working age in their country are currently unemployed and looking for work (see European Social Survey 2008). This variable has proved to be useful in analyzing labor market tightness (cf. Cardoso et al. 2015), a variable important to measure the ease with which a person's own income from labor can be generated. We subtract from the estimated value the true unemployment rate. The true value is taken from the database of the ILO for the year 2014 (see Table 1). A deviation of no more than +/-3 percentage points is classified as "no bias."⁶ Values above this threshold are regarded as a negative or positive bias, depending on the direction of the deviation. In many countries, the deviation is set to be relatively large in comparison to the unemployment rate but this ensures that different estimates of the unemployment rate (e.g., due to different definitions or times of measurement) fall within the range of no bias. Our estimates therefore provide a lower bound.

Please note that in the case of the unemployment rate we did not inform individuals about the true values as compared to the other income categories. In addition, the question was asked after the treatment. All income variables in the analysis are calculated in euros to facilitate the comparison.

- 5 It is acknowledged that survey data can suffer from misreporting on sensitive variables such as income. To diminish this problem, we allowed individuals to skip questions. In addition, we are not aware of evidence for systematic differences across countries as regards misreporting of income and hence the differences between countries should be highly similar regardless of any misreporting.
- 6 As a cross-check we made an attempt to find national statistics of the unemployment rate, which we compared to the ILO estimates. If no national data could be found, we opted for alternative international data providers. On average, there are differences of around 0.15 (2014) or -0.17 (2015) percentage points. The largest deviation is found for Brazil with -2.3 percentage points, which is still below the measurement error of 3 percentage points that we classify in our data.

The survey asked individuals twice about the income of the following groups in society: the income of households in the middle of the income distribution (median income), the average income of poorest 10 percent and of richest 10 percent of households. The first question inquired about the actual income of these groups as perceived by the respondents (perceived income). The second question referred to the ideal income of these groups, that is, what these groups should earn. However, this was asked after the treatment and, hence, a subsample was informed about the true income. It is therefore possible that the answers to the second question differ by control and treatment group. Our question builds on the methodological suggestions by Eriksson and Simpson (2012), but we adapt the question to collect information about the average household income (instead of wealth) of the poorest/richest 10 percent (instead of 20 percent). The first change is due to our focus on income and the second change is implemented to account for the fact that the average values are more extreme at the tails of the distribution; hence, they might be more important for income inequality. Thus, our findings are not directly comparable to the previous studies. The information is used to calculate the perceived and ideal level of income inequality by calculating the ratio between the poorest and the richest 10 percent.

Dawtry et al. (2015) show that wealthier people tend to report higher wealth levels for their social network, suggesting that there exist important differences in reference groups which could shape a position bias. The survey therefore includes questions on social classes that allow respondents to classify themselves as being part of the working class, lower-middle class, middle class, upper-middle class, or upper class (see World Values Survey 2010-2012).

Karadja et al. (2014) provide evidence for systematic population differences in the position bias with regard to age, income, or education, underlining the importance of collecting and considering this type of information in the analyses. Education levels are summarized as low education (ISCED level 0 to 2), medium education (ISCED level 3 to 4), and high education (ISCED level 5 to 6).⁷ Additionally, the number of household members is included, based on the modified OECD scale according to which members who

- 7 The ISCED classification reads as follows: Primary education: Elementary School (grade 1-6) [ISCED level 1], Middle education: Junior High School, Middle School (grades 7-9) [ISCED level 2], Secondary education: Senior High School, 4-Year-High School (grades 10-12) [ISCED level 3], Vocational / Technical Institute [ISCED level 4], Bachelor's degree program, Master's degree program [ISCED level 5], Doctorate [ISCED level 6].

Table 2: Questions on demand for redistribution

Income differentials											
Incomes should be made more equal.	1	2	3	4	5	6	7	8	9	10	We need larger income differences as incentives for individual effort.
Distribution of responsibility											
Government should take more responsibility to ensure that everyone is provided for.	1	2	3	4	5	6	7	8	9	10	People should take more responsibility to provide for themselves.

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are 15 years and older are giving a weight of 0.5 and children under 15 years are giving a weight of 0.3. Further control variables are included for the job status, distinguishing between the following categories: public employed, private employed, own business, student, unemployed, not in the labor force (retired, full-time parent), never had a job, and other.

The outcome variables for which we can determine causal effects are as follows. In line with Kuziemko et al. (2015), participants are asked for their assessment of inequality as a problem. Since we did not label the current state of inequality as problematic, it is interesting to see whether perceptions on this topic changed between control and treatment group. As a core of the research question, the focus then shifts to the demand for redistribution, which is measured via two questions where participants place their views on a scale with two opposing statements on each side (see World Values Survey 2010–2012). The questions are displayed in Table 2 and have been used in various research as proxies for the demand for redistribution (for instance, Kuhn 2015). Summary statistics for the analyses are included in the Annex (Table A 9 and Table A 11).

Please note that the country samples do not show similar shares of respondents in each income decile as defined by the external data sources (EU-SILC, LIS; see Figure A 1). Although we implemented quotas and use survey weights, these are not designed to match the income distribution of other data sources. This would be necessary to rule out that none of the identified results are driven by larger or smaller shares of respondents in certain deciles. While Spain is relatively well distributed, in most other countries we observe a clustering in the middle of the income distribution. Exceptions are Brazil and the US, where a large share is found at the upper end of the distribution. Any of the (descriptive) results must therefore be interpreted with

caution as they may be driven by a certain income group that is over-/ underrepresented. In the multivariate analyses we control for potential confounders to minimize the risk that our results are driven by sample differences. Nonetheless, the results cannot necessarily be extended to the entire population of each country.

4 Results

The empirical evidence is presented in three steps. The first part investigates whether a notable misinformation actually exists in terms of the way that individuals assess reality. The second part digs deeper into potential explanations for an existing income position bias. In the third part we address how having biased perceptions might change views on different topics.

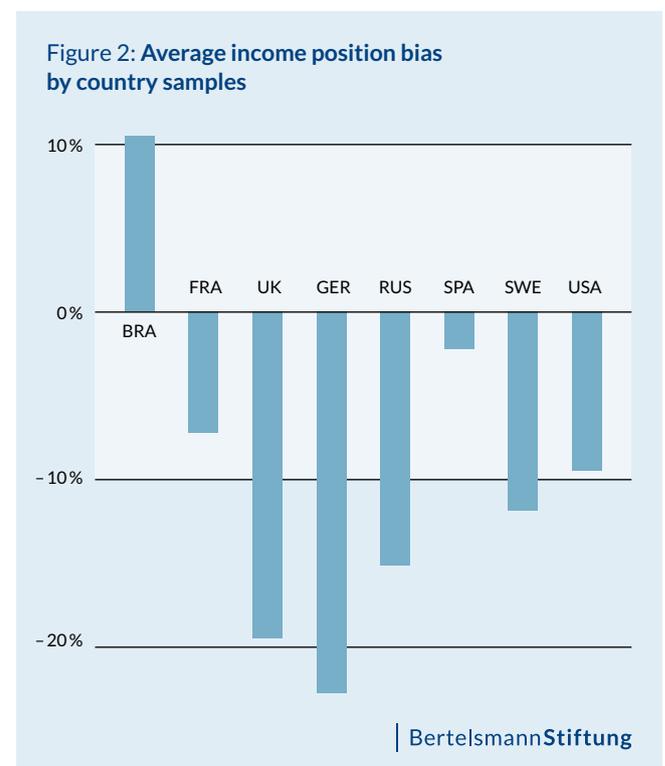
4.1 Overview of biases by countries

The following sections give an overview of how differently individuals across countries view their own position in the income distribution, the shape of the income distribution, and the unemployment rate. As regards the unemployment rate, the corresponding question was actually asked after the treatment; therefore, we only look at the results for the control group.⁸

4.1.1 Position bias

Figure 2 shows the average bias in how individuals perceive to be ranked in their country (for the number of observations per country, see Table A 1). The only country sample showing on average a positive value is Brazil. The smallest average negative income position bias is found for the Spanish sample, while the German sample has on average the largest negative income position bias. The German sample is followed by the UK sample that still shows on average a relative large negative income position bias. Next come the Russian, Swedish, US, and French samples. Please note that according to our definition, the average person in the samples from Spain, France, the US and (barely) Brazil has a value of ten or less and, hence, can be considered as

⁸ The results are always based on all observations for which information for the chosen variable was available; hence, the sample size differs between the different types of biases that are reported below. See the Annex for the number of observations.



unbiased (as indicated by the grey area in the figure). Sweden also comes very close to this value. This leaves Germany, the UK, Russia, and Sweden as the country samples with a noticeable average (negative) position bias.

Figure 3 provides a more detailed picture by country sample, showing the density of the income position bias. The grey area in the middle indicates where individuals with no income position bias would be located. The flattest distribution is found in the Brazilian sample, implying that we still observe a relatively large share of individuals with large positive and negative income position biases. Thus for the sample from Brazil, the average positive value for the income position bias, as reported before, results from rel-

atively many individuals with comparatively large positive income position biases. The samples of both Russia and Spain show a more concentrated distribution but continue to have a high share of individuals with larger biases. This puts, for instance, the small average bias for the Spanish sample in perspective, as it results from a fairly equally distributed income position bias, in terms of positive and negative values, and not from a large share of individuals with no bias. The remaining country samples show similar shapes regarding the highest bar, which reaches a share of around 20 percent. Important differences then persist with regard to the location of the spike in the distribution. While the spike of the distributions of Sweden, the USA, or France is relatively close to zero, this is not the case for Germany and the UK. Hence, the large average negative values for samples of Germany and the UK result from a large group of individuals with a negative misperception.

Figure 4 is a simplification of the previous distribution, allowing readers to see the share of individuals with no bias, a positive bias, or a negative bias. No bias is defined as a deviation of no more than 10 percentage points below or above the true value. Any estimated value that surpasses this threshold is defined as a positive (>10) or negative (<-10) bias. The percentages are reported in the Annex in Table A 1. The fairly even distribution in Brazil and Spain stand out from all the other country samples. Again, these are also the country samples with, on average, either a positive or very small negative income position bias. As expected from the previous figure, remarkably small shares of individuals with positive income position biases are found for the samples from Germany and the UK. The country samples with the highest shares without any bias are Sweden, the US, and France. Indeed, all these country samples show similar shares for each bias type. The Russian

Figure 3: Overview of individual income position bias (distribution)

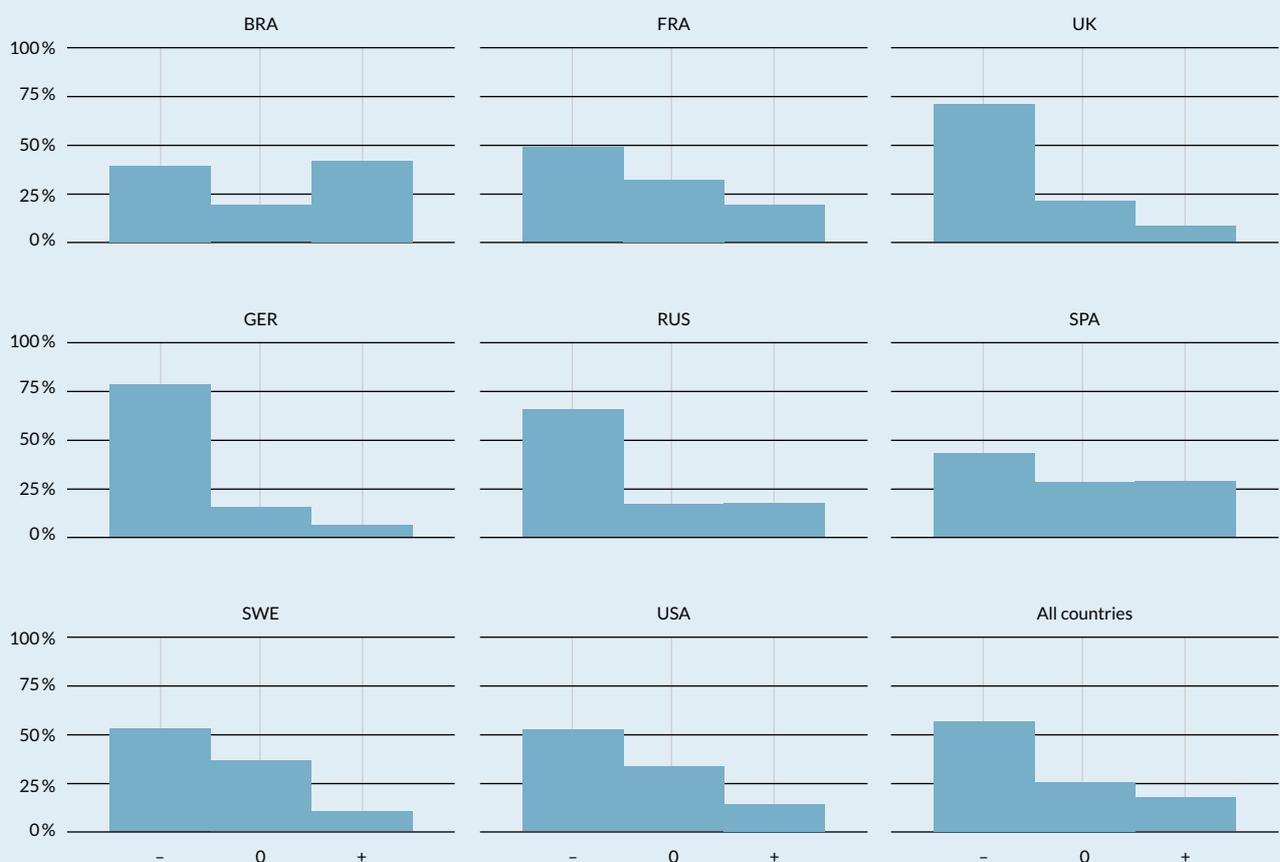


sample shows more resemblance to the samples of Germany and the UK, but with a higher share of individuals with a positive income position bias.

Taken together, the evidence shows that the Brazilian sample, as the only country sample from South America, clearly differs from the rest of the countries. As shown by Cruces et al. (2013) for Argentina, and hence another South American country, there is also a more equal distribution and a larger share of people with a positive bias. It would probably require further cross-country analyses of other countries in that region to better understand why they differ so tremendously. It might, for instance, be related to the high life satisfaction rates found for Brazil (see Table 1). The country samples with the largest share of individuals without an income position bias are Sweden, the US, and France. Indeed, the similarities in the distribution between the

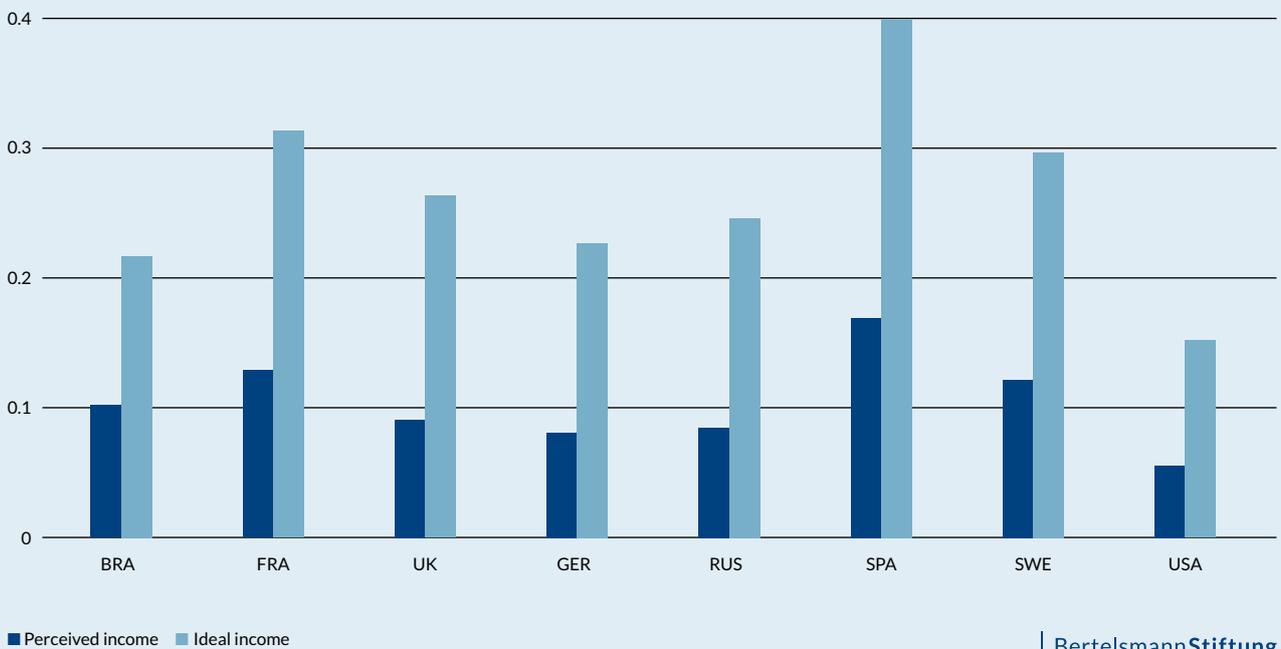
samples of the US and France are striking and raise questions regarding the relationship between the income position bias and the very different redistribution schemes that are currently implemented in each country. Nonetheless, for a definitive answer, one would need to take into account differences in the sample as regards the income distribution. The German sample, on the contrary, has the smallest share of individuals with no income position bias, the largest share for the group with a negative income position bias, and therefore the smallest share of individuals with a positive income position bias. This suggests that the German respondents are on average more pessimistic than in any other country sample regarding their own financial situation when comparing it to the rest of the population. Potential reasons for an existing position bias will be analyzed in detail in Chapter 4.2.

Figure 4: Overview of individual income position bias (by type of bias)



Notes: 0 = no bias (+/- 10 deviations); - = negative bias (<-10 deviations); + = positive bias (>10 deviations)

Figure 5: Changes in inequality between perceived and ideal income for countries measured as a ratio between poor and rich (only control group)



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4.1.2 Perceived and ideal income inequality

The goal to reduce inequality can be one motivation for demanding more redistribution. Differences in the degree of inequality in the perceived and the ideal incomes can be an indirect measure of whether inequality is currently considered a problem by individuals. To this end, we measure the ratio between the income of the poorest and richest 10 percent for the perceived and the ideal income. Since the intervention took place in between the questions regarding perceived and ideal income, the following results are only reported for the control group. However, a robustness check confirmed that the same patterns are found in the treatment group. Due to the few income categories that were collected in the survey, the calculated inequality measure can only be interpreted within this study and is not directly comparable to indexes from other sources. Moreover, out of all the survey questions these were the most complex ones, which lead to relatively large numbers of missing values and, hence, the results have to be interpreted with caution (see Table A 2).

Figure 5 reports the ratio between poor and rich where a value of 0.3 implies that the poorest 10 percent earn 30 percent of the income of the richest 10 percent. Hence, a high

value means lower (perceived/ideal) inequality. Across all countries, the ideal income ratio clearly takes on higher values than the perceived income, showing that in all countries respondents prefer on average a lower degree of inequality in an ideal income distribution than they believe currently exists. The ordering of the countries remains similar as, for instance, the US sample shows the lowest ratios and the Spanish sample the highest ratios for both perceived and ideal income. Also, the samples of Germany, Russia, the UK, and Brazil show roughly similar ratios as do Sweden and France.

Keeping in mind the crude nature of our ratio index, the order of the country samples changes, however, when using the ratio instead of the Gini coefficient (see Table 1). It is interesting to note that a country sample like Brazil shows a higher ratio for perceived and ideal income than a country sample like the US, suggesting that respondents in Brazil believe inequality to be lower than respondents in the US, although Brazil has a clearly higher Gini coefficient. This finding may be connected to the income position bias which is, on average, positive in Brazil and negative in the US. However, we would need more data to calculate a Gini coefficient for respondents to make a direct comparison and relate it to the income position bias.

Figure 6: Changes in inequality between perceived and ideal income for income quintiles measured as a ratio between poor and rich (control group only)

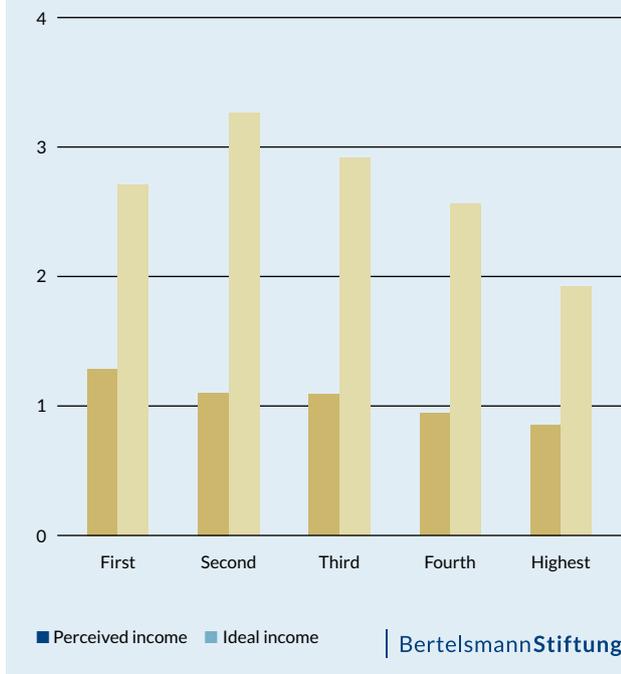


Figure 6 illustrates the distribution of perceived and ideal income by income quintiles. It becomes visible that the estimated degree of inequality for perceived income increases with increasing income quintiles. The preferred degree of inequality, as measured by the ideal income, decreases from the first to the second quintile before it continuously increases. These results suggest that respondents with higher incomes also accept larger degrees of inequality. Due to the group composition, the same patterns of decreasing inequality levels can be confirmed for increasing age and education levels. Due to the small number of observations this analysis cannot be carried out separately for country samples.

4.1.3 Labor market bias

The majority of individuals earns their main income from labor. Therefore, it seems fruitful to investigate how participants assess chances of finding a job or, put differently, to which degree individuals are aware of the share of individuals who are currently unemployed. The gap between the perceived and the actual unemployment rate can be interpreted as the degree of misperception of labor market tightness (Cardoso et al. 2015). An underestimation implies that indi-

Figure 7: Average unemployment bias by country samples



viduals think that the job search is easier than it actually is; an overestimation means that respondents feel that finding a job is more difficult than it truly is. Correspondingly, their views might differ on the degree to which government might need to intervene, for instance, in the form of redistribution. Please note that an overestimation of the unemployment rate (positive bias) implies a more pessimistic view, contrary to an overestimation of the income position (positive bias) which implies a more optimistic view. Previous research already provides evidence of a remarkable degree of misperception on the unemployment rate, that is, a large overestimation (Cardoso et al. 2015, Ipsos MORI 2014).

Figure 7 shows the average unemployment bias for all country samples (for the number of observations, see Table A 3). Since the question was asked after the intervention, the data is only analyzed for the control group to prevent the treatment from affecting this variable. The bars show the difference between the perceived unemployment rate and the true unemployment rate, where the latter is taken from data from the ILO (2014) to use a reliable and standardized source. An overview of the true values is found in Table 3. The challenge of this question was that the survey did not provide any anchors, e.g., in the form of categories, but allowed individuals to type in any number between 0 and 100.

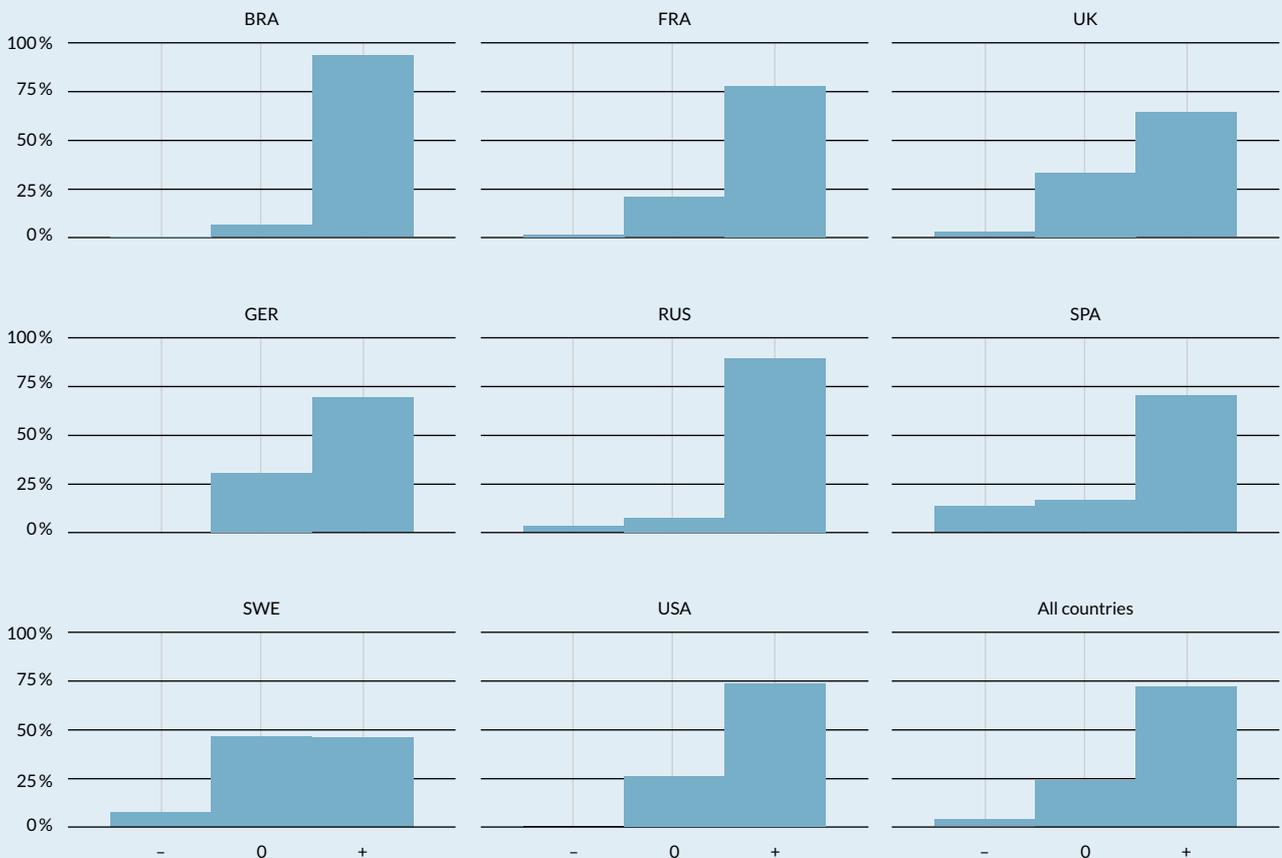
According to our definition (deviation of 3 percentage points regarded as no bias), all countries can be considered to have a positive bias on average. In the sample from Brazil, the average unemployment bias reaches values of almost 50 percentage points, which implies that more than half of the population should be unemployed. The true value is actually 7.1 percent. The smallest values are found for the samples of Sweden, Germany, and the UK. The next group with similar values consists of the samples from the US, Spain, and France, in ascending order. Russian respondents also display a large positive unemployment bias with above 30 percentage points.

Figure 8 once again uses the classifications: no bias, negative bias, or positive bias (see also Table A 3). Due to the large deviation from the true value that we allow and to the comparatively low unemployment rates, the share of

individuals who underestimate the unemployment rate is always very low and often negligible. It is therefore more interesting to focus on the group with and without a positive bias. The Swedish sample, which is where individuals have the lowest average bias, also shows the highest share of individuals without a bias (47 percent). The samples of Germany and UK come next, followed by the US, France, Spain, Russia, and Brazil (6 percent). The largest positive bias is found in the samples of Brazil (94 percent), followed by Russia, France, the US, Spain, Germany, the UK, and Sweden (46 percent).

Figure 9 provides the average unemployment bias by income quintiles for all country samples. It becomes very clear that respondents with larger incomes have lower biases. This might be driven by the different reference groups, where respondents in lower income groups observe

Figure 8: Overview of unemployment bias by country samples

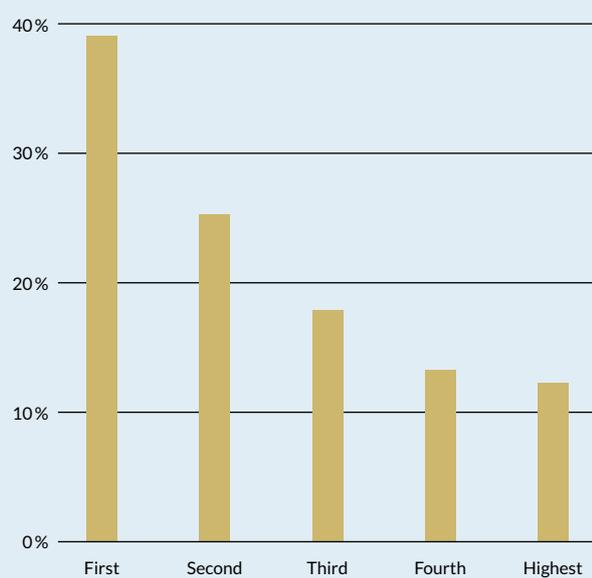


Notes: 0 = no bias (+/- 10 deviations); - = negative bias (<- 10 deviations); + = positive bias (> 10 deviations)

more unemployed individuals than respondents in higher income groups. Again, the group composition allows showing that the unemployment bias decreases with age and education levels. As the study does not focus on the unemployment bias, detailed analyses on reasons for biases will only be carried out for the position bias which directly relates to the treatment.

As mentioned earlier, the unemployment question was asked after the split into the treatment and control group.

Figure 9: Average unemployment bias by income quintiles



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Although there might be no reason to believe that the intervention affected how labor market tightness is perceived, it is useful to test for significant differences between the two groups. Table 3 shows that the p-value of a mean-comparison test stays clearly above conventional thresholds, suggesting that no significant differences can be observed between the groups in terms of their unemployment biases. Hence, across all respondents, the treatment did not significantly alter labor market perceptions. It proves interesting, however, to compare the average unemployment bias with the true unemployment rate. Please note that the average estimated unemployed rate is the sum of the actual unemployment rate and the average unemployment bias. The true values mainly range between above 4 percent and 10 percent; only the Spanish sample has an exceptionally high rate of 24 percent. In comparison to that, the average estimated unemployment bias clearly shows more variation across country samples, suggesting that there are notable cross-country differences in terms of misperceptions.

From these empirical findings we can conclude that giving an estimate of the unemployment rate—a number that can be assumed to be regularly communicated in the media and that should actually be more easily estimated than a person's own position in the income distribution—shows larger average biases than the estimated income position. Although the categorization of the labor market bias variable allows individuals to make mistakes of up to 3 percentage points, the majority of all respondents has a positive bias, overestimating the unemployment rate and, hence, showing an overly pessimistic view of labor market access. This relates to the general underestimation of the individual's own income position, which also coincides with a pessimistic approach. In other words, across almost all of the countries the majority of respondents overestimates negative matters (being

Table 3: Comparison of unemployment bias between control and treatment group

Country	Unemployment rate in %	Average bias of control group	Average bias of treatment group	P-value*
GER	4.70	11.44	10.15	0.21
USA	5.90	18.82	19.06	0.87
UK	5.90	14.88	13.97	0.50
SWE	8.10	8.72	9.18	0.67
RUS	5.30	32.55	29.71	0.29
FRA	10.00	22.72	23.24	0.75
SPA	23.60	23.65	22.28	0.41
BRA	7.10	48.73	49.79	0.66

Notes: * P-value of a t-test between the average unemployment bias of control and treatment group.

affected by unemployment) and underestimates positive matters (the individual's own income position in relation to others). However, the Swedish sample shows a pattern of having the highest share of individuals without a bias in terms of the estimated income position and the unemployment rate. In contrast to that, the Brazilian sample continues to have the largest positive biases in both variables, suggesting that respondents are generally more optimistic regarding their own position in the income distribution, but more pessimistic regarding the unemployment rate.

4.1.4 Interrelations between biases

To shed more light on potential interrelations, we additionally compare the correlations between the different bias variables as well as their relations to education level and social class (see Table A 8 in the Annex). The relationships between the income position bias and the estimated or true position in the income distribution are as expected: the larger the positive (negative) income position bias, the larger (smaller) the estimated and the smaller (larger) the true income position. Furthermore, it turns out that a positive income position bias positively correlates with a positive unemployment bias. However, no correlation can be confirmed for a negative income position and a negative unemployment bias. Nonetheless, the finding suggests that individuals who are more optimistic about their own position tend to be more optimistic about the labor market situation. Moreover, with an increasing positive income position bias individuals tend to report higher estimated and ideal ratios between poor and rich, suggesting that they tend to believe that not just they themselves but everyone is better off than they truly are. Individuals with a positive unemployment bias also expect higher average ratios between poor and rich. This suggests that the further the respondents' estimates of the unemployment rate move away from the true value, the lower they expect inequality to be. Please note, however, that the share of individuals with negative unemployment biases is small, which is why missing significant correlations have to be interpreted with care. In addition, higher unemployment biases, regardless of the direction, correspond with lower actual income positions.

In sum, it is important to remember that in most of the cases discussed above, the correlations are weak and can only be interpreted as indicative evidence. Regarding our subsequent analyses on the perception of income, we focus on the income position bias for the following reasons. Estimating incomes for specific percentiles of the income dis-

tribution is a cognitively demanding task and this might also partly explain the lower number of observations (as indicated by the ratios in Chapter 4.1.2). Considering that the goal of the treatment was to provide a corrective update on income inequality and then measure changes in personal opinions, the information on the true income position could also be more likely to affect respondents due to its personalized nature. Hence, the investigation of reasons for a bias focuses on the income position, but the analysis of the effect of biases per construction of the treatment takes into account all bias types. Please note that the treatment information did not attempt to correct the unemployment bias, which is why the unemployment bias will not be the focus of the analysis.

4.2 Reasons for the income position bias

As suggested by previous research, our perception of reality is most likely to be shaped by aspects such as our education level. To shed more light on potential group heterogeneity, we now investigate differences in the income position bias across quintiles of the income distribution, social classes, and education levels. To better understand the interrelations between these variables, we then run regressions using the estimated income position as the dependent variable. We explicitly focus on the income position bias, leaving out the labor market bias, which does not focus on income. The descriptive results by groups are reported jointly for all country samples, but in the regression analyses we report whether systematic differences persist between country samples.

The results in the following tables are restricted to those individuals for whom information is available for all variables, which are then used in the regression analyses in Chapter 4.2.2. However, it should be noted that when compared to the extended sample there are only negligible changes, if any, in the variables, leaving the order displayed in the tables identical.

4.2.1 Group differences in the income position bias

Most intuitively, one could imagine that the type of bias might differ in accordance with the person's own position in the income distribution. Table 4 and Table 5 therefore present an overview of the income position biases by quintiles of the income distribution (the number of observations can be found in Table A 4 in the Annex). Table 4 gives the average actual position as calculated by us and the aver-

Table 4: Average income positions and bias by income quintile

Quintiles of actual income position	Average actual income position	Average estimated income position	Average income position bias
First	15.19	45.25	30.06
Second	33.26	33.35	0.09
Third	50.31	38.77	- 11.54
Fourth	70.00	48.84	- 21.16
Highest	89.81	58.86	- 30.95
Total	57.97	44.93	- 13.04

Table 5: Average positive and negative income position bias by income quintile

Quintiles of actual income position	Share with positive income position bias (%)	Average positive income position bias	Share with negative income position bias (%)	Average negative income position bias
First	68.76	42.26	3.56	- 15.50
Second	29.49	34.15	42.77	- 22.06
Third	14.58	22.17	55.16	- 26.12
Fourth	5.46	18.77	69.20	- 31.33
Highest	0.74	14.20	84.81	- 36.06
Total	15.67	31.79	58.95	- 29.96

age estimated position as reported by the respondents. The last column gives the difference between these two values; that is, the average income position bias by income quintiles. As expected, the actual income position increases with each quintile by around 20 percentage points, starting with 15 percent and ending with 90 percent. Quite the opposite is found for the average estimated income position, which starts with 45 percent in the first quintile, dropping to 33 percent in the second quintile before rising again to 59 percent in the highest quintile. Looking at the average income position bias, it becomes clear that individuals at the lower end tend to overestimate while individuals at the upper end tend to underestimate their income position.⁹ This leads to a more compressed income distribution where lower and upper ends move towards the middle. Hence, a very low bias is found in the second quintile with a value of 0.09, which according to our definition implies no bias. The third quintile still shows a small bias with -12 percentage points, but the fourth quintile already reaches a value of -21 percentage points. The largest misperceptions are found for the first quintile (30 percentage points) and the fifth quintile

(- 31 percentage points). Table 5 distinguishes between a positive and negative income position bias. The average positive bias decreases with increasing quintiles in the income distribution and the share of individuals in this group decreases as well. Opposite to that, the average negative income position bias and the share of individuals in this group increase with larger quintiles. All these patterns are in line with what Cruces et al. (2013) report for the income quintiles in Argentina, showing that their results can be extended to our country sample.

The averages for the complete sample show that the actual income position lands at 58 percent but is estimated to be at 45 percent, which leads to an average income position bias of -13 percentage points. The share of respondents with a positive bias is 16 percent with an average bias of 32 percentage points. The share of respondents with a negative bias is 59 percent with an average bias of -30 percentage points. It is interesting to note the similarity in the average magnitude of the bias, regardless of the direction.

A different way of structuring the sample would be by the social classes to which the respondents report belonging. This is a subjective measure of the individual's own position

⁹ This result also holds true when the analysis is carried out separately for each country.

Table 6: Average income positions and bias by social class

Social class	Average actual income position	Average estimated income position	Average income position bias
Working class	53.87	35.86	- 18.01
Lower-middle class	52.72	39.92	- 12.81
Middle class	68.57	47.13	- 21.45
Upper-middle class	80.21	59.61	- 20.59
Upper class	75.18	60.38	- 14.80

Table 7: Average positive and negative bias by social class

Social class	Share with positive income position bias (%)	Average positive income position bias	Share with negative income position bias (%)	Average negative income position bias
Working class	22.59	32.70	53.89	- 30.22
Lower-middle class	22.28	34.01	55.32	- 29.13
Middle class	14.37	30.64	58.86	- 30.67
Upper-middle class	12.62	27.35	58.00	- 27.65
Upper class	21.28	29.13	46.81	- 37.41

in society as opposed to the objective ranking by income, implying that the understanding of these classes might differ among respondents. The results are again presented in two tables following the same structure for the income quintiles as before (see Table A 5 for the number of observations). Looking at Table 6 we now see that the average actual position of individuals in the working and lower-middle class is relatively similar but also very high with around 53 percent. It then increases for the middle (69 percent) and upper-middle class (80 percent) before dropping again slightly for the upper class (75 percent). However, focusing on the average estimated income position, we observe how the values continuously rise when moving from working to upper class, starting with a value of around 36 percent and ending with a value of 60 percent. In all groups the average income position bias is negative. Table 7 shows that with only small differences between the first two classes, the average share of individuals with a positive bias decreases until the upper-middle class and then increases for the upper class. The size of the positive bias does not show a clear pattern but stays close to around 30 percentage points in all classes. The share with a negative bias is lowest for the upper class while the remaining classes show similar values. The size of the negative bias is again largest for the upper class, which is in line with the results for the highest

income quintile. No clear pattern and only small variations can be found for the other social classes.

In sum, this suggests that the perception of which class one belongs to may not clearly relate to the true position in the income distribution. As a cross-check we compare the distribution of respondents by social classes and income quintiles (see Table A 10 in the Annex). The results show that, when calculating the average position bias across all social classes or all income quintiles, the results are highly influenced by the majority of respondents who are found in the middle social class or the third income quintile. When looking at how the income quintiles are distributed over social classes, there are observations in each cell, suggesting that, for instance, individuals belonging to the highest (lowest) income quintile still classify themselves as working (upper) class. The majorities of respondents in the working and lower-middle classes claim to belong to the third income quintile, while the majorities of the upper-middle and upper classes claim to belong to the highest income quintile. The majority of individuals in the middle class claim to belong to the fourth quintile. Hence, the self-categorization into social classes clearly differs from income quintiles and cannot only be attributed to biases, but is most likely also related to other factors. Considering that respondents in

the lower social classes consist of individuals of all income quintiles helps explain that the average position bias does not remain positive (as was the case for low income quintiles) but instead becomes negative. Indeed, the average biases by social classes are around 30 percentage points and hence similar to the total sample average. Nonetheless, the results in Table 6 suggest that the estimated income position appears to be more related to the person's own perceived class than to income quintiles, although extreme positions in the income distribution continue to be mentioned only occasionally. This suggests that individuals might use social classes as a reference point when identifying their position in the income distribution. However, it is unclear whether they first determine their social class with the help of their own income, in which case causes for the income position bias are even more intertwined.

As a final categorization of the sample, the income position bias is analyzed by education levels, investigating, for instance, whether being better educated implies a better knowledge of the income distribution (see Table A 6 for the number of observations). Table 8 shows that the average actual income position increases from 52 percent for low, to 62 percent for medium, and reaches 70 percent for high education levels. The average estimated income position is fairly similar for low and medium education levels with values around 42 percent, but larger for high education levels with 50 percent. The average income position bias is -10 percentage points for low education levels, which according to our definition is understood as no bias. The other edu-

cation levels have a negative income position bias. Table 9 shows that the share of respondents with a positive income position bias and the average positive income position bias decrease with increasing education levels. Opposite to this development, the share with a negative income position bias increases with education levels, but shows only small differences between medium and high education levels. The average negative income position bias is always around 30 percentage points. This pattern implies that education levels help explain the estimated position in the income distribution, but there is even less variation in the average biases across groups than in the social class categorization.

In sum, from the objective classification into income quintiles we can conclude that the average income position bias is lowest in the second quintile while the first quintile has the largest positive and the fifth quintile has the largest negative income position bias. Such a clear pattern is more difficult to discern when looking at the subjective classification into social classes or the objective categories of educational groups. However, the estimated average income position, hence the person's own perception of the income rank, appears to relate closely to their own perceived social rank. This suggests that the estimation of the income position is likely to be based on self-categorized social classes, leaving open how individuals classify themselves into social classes. The average income position bias by social classes shows additionally that individuals in all classes tend on average to underestimate their ranking in the income distribution.

Table 8: Average income positions and bias by education level

Education Levels	Average actual income position	Average estimated income position	Average income position bias
Low education	52.47	42.74	- 9.73
Medium education	62.17	41.43	- 20.74
High education	70.10	49.68	- 20.42

Table 9: Average positive and negative bias

Education Levels	Share with positive income position bias (%)	Average positive income position bias	Share with negative income position bias (%)	Average negative income position bias
Low education	30.64	35.89	45.65	- 29.13
Medium education	17.42	32.14	58.38	- 29.90
High education	12.21	27.10	60.02	- 30.31

4.2.2 Multivariate analyses of the estimated income position

In the multivariate analyses we want to explain how individuals arrive at their estimated income position by taking into account the relationship between the estimated income position, the actual income position and the type of income position bias. The analysis only includes variables collected before the treatment and may therefore include respondents from the control and treatment group without further distinction. The dependent variable is the estimated income position.¹⁰ Apart from information on income and the position bias, the models include variables for the social classes and education levels in a stepwise fashion, hence, all group variables from Section 4.2.1. The control variables comprise dummies for countries, gender, and job type as well as continuous variables for age and household members. The different models are estimated using ordinary least squares with robust standard errors. Due to the data structure, the results can only be interpreted as evidence for correlations because we do not know the direction of the relationship. For instance, respondents might use their self-reported social class to determine their income position but alternatively they could first think of their income to then place themselves in a social class. Summary statistics for the main variables can be found in Table A 9.

Model (1) provides evidence that the actual income position positively correlates with the estimated income position (see Table 10). A negative bias is associated with lower and a positive bias with higher estimated income positions. In addition, compared to low education levels, individuals with high education levels report higher incomes while individuals with medium education levels show no significant differences. These results are as expected. Model (2) includes variables for social classes. Using the working class as the reference group, the coefficients increase with the classes, confirming again that higher estimated income positions correlate more positively with the higher social class when compared to the working class. Only for the upper class is the coefficient slightly smaller than for the upper-middle class. The sign of the coefficients for education levels does not change, but the size of the coefficients does. Model (3) includes country dummy variables to account for systematic cross-country differences. Com-

¹⁰ We refrain from using the position bias as a dependent variable. Since the position bias can take on values between -1 (negative bias) and 1 (positive bias) where 0 implies no bias, the variable cannot be easily interpreted in a standard regression framework where the changes are measured along a continuum from -1 to 1, implying an incremental change towards either a high or low value but not towards zero. See also Cruces et al. (2013) for a discussion on this estimation strategy.

pared to Germany, respondents in the US, the UK, Spain, and Brazil report higher estimated income positions. There are no significant differences between the samples from Germany, France, and Russia. Swedish respondents report on average lower estimated income positions than respondents in Germany. In addition, women tend to report lower income positions. Age shows a positive relationship with the estimated income position but the increase in the coefficient decreases with age, as indicated by the negative coefficient of age squared. This suggests that the estimated position increases with age but at a decreasing rate, a finding that corresponds with the relationship between age and true income. The number of household members is not significant. Only the job category “unemployed” shows significantly lower estimated income positions. The education variables become insignificant, suggesting that other variables capture this variation.

To test for cross-country differences in the relationships, we also estimated all three regression models separately for each country sample (regression tables are available upon request). We will only report robust findings, which implies that they hold across all three models, naturally also disregarding any insignificant coefficients. The results show that relationships between the dependent variable perceived income position and the independent variables actual income position, positive and negative income position bias are identical in all country samples. As regards education levels, individuals with lower education levels in the samples of the UK and Sweden report a significantly lower estimated income position compared to high education levels. Russian respondents deviate from the rest because compared to low education levels, persons with higher education levels are more likely to claim lower estimated income positions. It is unclear why this might be the case. Regarding the social classes, the reported estimated income position in the samples from Germany and Sweden increases with higher social classes when compared to the working class. In the UK sample, the middle class and (barely) upper-middle class claim higher estimated income positions. In the samples of the US and Russia, only the upper-middle class reports significantly higher income positions than the working class. Further differences as regards other control variables such as gender or age occur, but since they are not part of the main analysis they will not be reported. We thus see that the results in the pooled sample with all countries are driven by significant coefficients for the countries named above. Hence, for the samples from France, Spain, and Brazil neither education levels nor social classes significantly contribute to explaining the estimated income position.

Table 10: Explaining group differences in the estimated position in the income distribution

Variables	(1)	(2)	(3)
Actual income position	0.457 *** (0.013)	0.409 *** (0.014)	0.659 *** (0.014)
Reference group: No bias			
Neg. bias	-20.734 *** (0.573)	-20.039 *** (0.563)	-23.947 *** (0.439)
Pos. bias	26.617 *** (0.888)	26.150 *** (0.892)	28.212 *** (0.785)
Reference group: Low education level			
Medium education level	-0.944 (0.762)	-1.419 * (0.749)	-1.152 (0.708)
High education level	4.937 *** (0.799)	2.385 *** (0.800)	0.677 (0.737)
Reference group: Working class			
Lower-middle class		3.714 *** (0.821)	2.428 *** (0.705)
Middle class		6.302 *** (0.725)	4.774 *** (0.641)
Upper-middle class		13.484 *** (1.114)	11.763 *** (0.974)
Upper class		11.601 *** (3.569)	6.172 * (3.189)
Reference group: Germany			
USA			2.883 *** (0.697)
UK			4.391 *** (0.740)
SWE			-23.424 *** (0.964)
RUS			-0.121 (0.987)
FRA			0.815 (0.788)
SPA			2.936 *** (0.792)
BRA			4.303 *** (1.187)
Gender			
Gender			-1.691 *** (0.459)
Age			
Age			0.331 *** (0.113)
Age^2			-0.003 *** (0.001)
Number of all household members			
Number of all household members			0.075 (0.220)
Reference group: Public employed			
Private employed			0.310 (0.660)
Own business			0.176 (1.121)
Student			-0.187 (1.301)
Unemployed			-2.036 ** (1.016)
Not in labor force			-0.586 (0.901)
I never had a job			-1.013 (4.509)
Other			-2.398 * (1.338)
Constant			
Constant	22.396 *** (0.955)	20.934 *** (1.022)	4.012 (2.892)
Observations			
Observations	4,178	4,178	4,178
R-squared			
R-squared	0.536	0.559	0.676

Notes: OLS regressions with robust standard errors in parentheses.

The dependent variable is the estimated position in the income distribution. Survey weights are included.

Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

The main results from the multivariate analyses are that group and country heterogeneity play an important role when respondents estimate their position in the income distribution. The individuals' own income (measured as the actual income position) and biases influence the estimated income position in all countries in the expected ways. In addition, the rank of the estimated position varies systematically by country samples, implying that respondents in one country select systematically higher positions than respondents in another country. For instance, the average estimated position in the sample of the US is significantly higher and in Sweden it is significantly lower than in the German sample. Social classes confirm the expected significant relationships for the samples of Germany and Sweden and education levels show the expected significant coefficients in the samples of the UK and Sweden. In all other country samples, very few if any of these variables show up significantly and robust in the expected ways. Therefore, the results confirm important cross-country differences in the own ranking in the income distribution.

4.3 Consequences of correcting misperceptions of income

Considering the diverse (mis-) perceptions that were measured across country samples, the question arises whether views or attitudes that build on this information might simultaneously suffer from such a bias. For instance, if respondents understood that the existing extent of inequality in their country differed from what they perceived it to be, their demand for government intervention, for instance, in form of redistribution might look different. The survey design allows measuring the causal effect of having a bias on any of the variables that were collected after the intervention by comparing differences between the treatment and control group. This follows from the fact that respondents were randomly assigned to one of the two groups and, hence, any differences in their answers can be assumed to result from the exposure to the information treatment in the questionnaire. As previously discussed, the treatment was implemented regardless of whether participants provided income data or estimates. Therefore, all individuals were treated with information on the true extent of income inequality in their country and as long as data on the missing variables is dispensable in the regressions, we can, for instance, include individuals with missing income information. In sum, we do not only investigate the effect of correcting an income position bias but of providing the complete picture as regards the income distribution. Due to erroneous coding in the income variable, this analysis

unfortunately cannot reliably be carried out for Sweden and the UK. To prevent these two countries from biasing the results, they have to be excluded from the following estimations. Although those countries would also have been of general interest, the remaining countries in the sample continue to comprise important country variations on the inequality and redistribution dimensions.

The first step of the analysis is the investigation of changes in the demand for redistribution. We investigate the treatment effect for each country sample, using OLS regressions with interactions between treatment and country dummies (see columns 1 and 2 in Table 11). Model 1 only includes the country and treatment variables and Model 2 adds all control variables from the multivariate estimations in Section 4.2.2 (for instance, see Model 3 in Table 10). As it turns out, the treatment significantly increases preferences towards larger income differences in the German sample in both model specifications. There are no significant treatment effects for the remaining country samples, hence, no significant differences exist within these country samples between the treatment and control group.

Nonetheless, the treatment may have significantly altered differences between country samples in the treatment and control group. Thus, similar to before, interaction effects are estimated; however, this time we focus on differences in the direction of the change a treatment might have had and level differences between country samples.¹¹ The regression results are found in the Annex in Table A 12 in Model 1 and Model 2. Model 1 focuses on the treatment and the interaction with country dummies. As before, the treatment effect for the sample from Germany is positively significant. There are also significant negative interactions with a few countries, indicating already that important country differences exist. Model 2 then includes all control variables and the margins of the interactions between treatment and country are plotted in Figure 10 to ease interpretation. The results in form of the country dummies show that in the control group all country samples report significantly higher preferences for larger income differentials than the German sample, as also illustrated in Figure 10. After the treatment, the only significant differences in terms of levels remain between the samples of Germany and the US (and barely France) that shows a higher demand for larger income differentials, indicating that preferences of the German sample con-

11 Compared to the previous estimation, we use Germany as a reference group for the interaction term (i.e., we exclude this term in the regression), allowing us to interpret the direction of the change between Germany and other countries.

Table 11: The treatment effect on demand for redistribution in each country sample

Variables	(1) Model 1 Pref. differentials	(2) Model 2 Pref. differentials	(3) Model 1 Pref. responsibility	(4) Model 2 Pref. responsibility
Treatment* GER	0.332 ** (0.159)	0.390 ** (0.155)	0.387 ** (0.171)	0.416 ** (0.169)
Treatment* USA	0.252 (0.196)	0.230 (0.195)	0.190 (0.210)	0.184 (0.209)
Treatment* RUS	-0.100 (0.257)	-0.054 (0.250)	0.130 (0.263)	0.171 (0.261)
Treatment* FRA	-0.137 (0.195)	-0.132 (0.193)	-0.157 (0.191)	-0.148 (0.189)
Treatment* SPA	-0.267 (0.174)	-0.225 (0.173)	-0.269 (0.184)	-0.255 (0.182)
Treatment* BRA	-0.421 (0.284)	-0.389 (0.279)	-0.171 (0.275)	-0.191 (0.271)
Reference group: Germany				
USA	1.013 *** (0.176)	1.239 *** (0.178)	1.122 *** (0.192)	1.327 *** (0.194)
RUS	0.521 ** (0.212)	0.628 *** (0.216)	-0.007 (0.214)	0.225 (0.220)
FRA	0.815 *** (0.175)	0.802 *** (0.177)	0.611 *** (0.180)	0.682 *** (0.181)
SPA	0.708 *** (0.165)	0.664 *** (0.171)	-0.398 ** (0.179)	-0.337 * (0.185)
BRA	0.860 *** (0.237)	0.746 *** (0.234)	0.868 *** (0.233)	1.018 *** (0.233)
Constant	4.007 *** (0.111)	4.137 *** (0.529)	4.398 *** (0.120)	3.391 *** (0.489)
Control variables	NO	YES	NO	YES
Observations	5,454	5,454	5,487	5,487
R-squared	0.013	0.042	0.037	0.059
Notes: OLS regressions with robust standard errors in parentheses. The dependent variables are in columns (1) and (2) preferences income differentials (1 = more equal, 10 = large differences) and in columns (3) and (4) preferences for responsibility (1 = government, 10 = people). Survey weights are included. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.				

verged with those of the other country samples.¹² Regarding the changes in demand between control and treatment group, a decreasing demand for larger income differences (hence an increasing demand for more equal incomes) is identified in the samples from France, Spain, and Brazil when compared to the significant positive treatment effect of the German sample. Therefore, the treatment does not significantly alter differences between treatment and control group within these country samples, but the direction of the effect significantly differs from the one found for the German sample. The US respondents show similar changes to the Germans. The sample from Russia does not significantly differ from Germany's sample either, but across all country samples it shows the flattest slope.

The treatment also changes views on whether governments should take more responsibility or, as the opposite option, people should take more responsibility for themselves. Following the steps above, the same two models are esti-

mated once again, now using preferences for responsibility as the dependent variable (see Table 11, columns 3 and 4). As before, the treatment only significantly alters the opinion of respondents in Germany, showing that the German treatment group wants people instead of government to take on more responsibility. There are no significant differences within the other remaining countries between treatment and control group.

In a second step, differences between country samples are investigated as regards the direction of changes and the resulting group levels. The results are shown in Table A 12 in Models 3 and 4, with the margins of Model 4 in Figure 11. In the control group, German respondents have a significantly lower demand for individual responsibility than in the samples from the US, France, and Brazil, implying a higher demand for government responsibility. There are no significant differences when the sample from Germany is compared to Russia and Spain. After the treatment, the German sample continues to have significantly lower demand than the US sample, but now has a significantly higher demand than the Spanish sample, as illus-

12 This was tested in a separate regression that only included observations from the control or the treatment group (based on the full model specification). Results are available upon request.

Figure 10: Predictive margins for effect on larger income differences

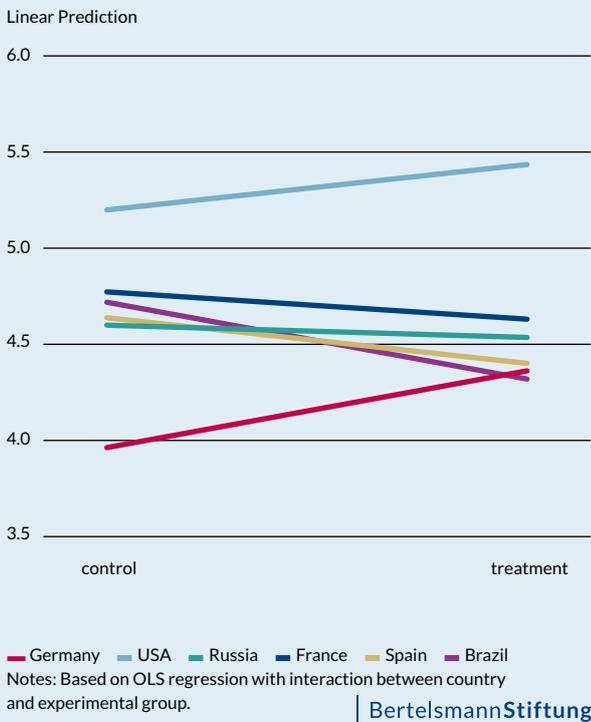
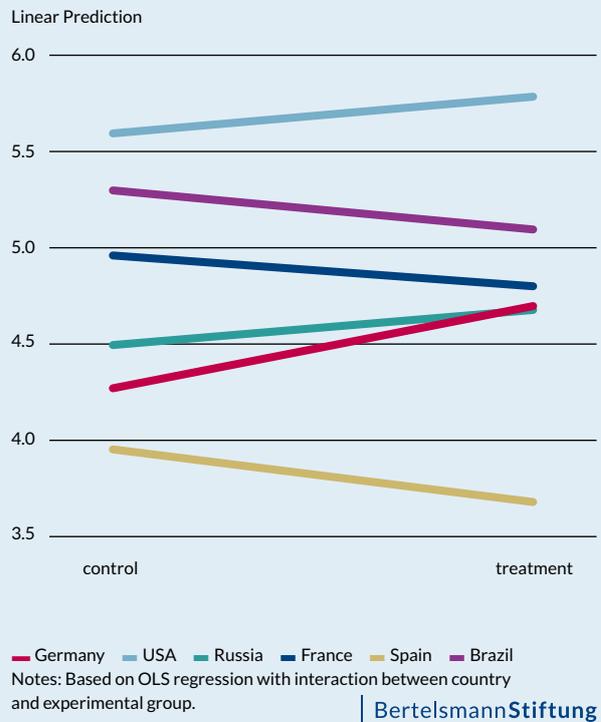


Figure 11: Predictive margins for effect on personal responsibility



trated by Figure 11. No significant differences can be found when comparing the samples of Germany to Russia, Brazil, and France, implying that German respondents moved their views significantly towards those of individuals in France and away from those in Spain.¹³ When comparing the direction of the changes between the control and treatment group by country, the samples of the US and Russia show no significant differences to Germany, which displays a positive slope. However, participants from France, Spain, and Brazil (only on the 10 percent level) differ significantly from Germany in that they prefer moving responsibility towards the government, thus showing a negative slope in Figure 11.

Taken together, the treatment led to a convergence of views across country samples with regard to preferences for higher income differentials. Only the US sample continues to differ significantly from all the other country samples. As for the demand for government intervention, the treatment group from the US continues to prefer significantly

less government intervention than all other countries. By contrast, after the treatment Spanish respondents show significantly more demand for government intervention than all other country samples. In between the other country samples, we can observe a certain convergence or a different clustering of country samples.

It is important to note that all reported treatment effects are averages taken across all individuals in one country sample. Naturally, it is likely that individuals behave differently when receiving information on income inequality depending on their income position, their type of position bias, their social class, or their education level. In the current setup, the group that forms the majority in one country sample will dominate the average treatment effect. Therefore, while the focus of the analysis has been on country-specific reactions, it appears to be a promising strategy for future research to further investigate other group heterogeneity.

To start with, we analyze the treatment effect for respondents with different income position biases. This is of particular importance because the income distribution among our respondents does not perfectly reflect the income dis-

¹³ This was tested in separate regressions that only included observations from the control or treatment group (based on the full model specification). Results are available upon request.

tribution according to the external data. Since bias types highly correlate with income, we try to tackle the problem with this approach and shed further light on potential drivers behind country differences.

Table 12 shows the results of OLS regressions, following the estimation strategy of Table 11 for the full model but using the new interaction between the treatment groups and the income position bias (see columns (1) and (2)). Please note that the number of observations decreases when compared to the country analyses because not all respondents provided information on their income. Column (1) uses preference for higher income differences as the dependent variable. While we continue to find significant country differences, none of the treatment variables show up significantly. To nonetheless have an idea of the direction of the differences, Figure 12 shows that overestimating (underestimating) the individual's own position appears to correspond to preferences for lower (higher) income differences. Further research is needed before these tendencies can be

reliably confirmed. In column (2) the dependent variable changes to whether people should take over more responsibility. Figure 13 shows the predictive margins (based on column (2)) and columns (3) to (5) report separate estimations by the type of income position bias for an easier interpretation. Underestimating the individual's own position in the income distribution implies a significant shift of responsibility towards people, but no bias or a positive bias corresponds with an (insignificant) shift of responsibility towards government. This suggests that individuals who learn that they are better off than they thought want government to take less responsibility. There are no further significant differences within the treatment group, but within the control group a negative position bias corresponds with significantly higher demand for government responsibility. Similar to the country estimations, after the treatment we observe a new ranking and a certain convergence of views of different bias groups, meaning that the distance between the minimum and maximum decreases.

Table 12: The treatment effect on demand for redistribution by income position bias

	(1) Pref. differentials	(2) Pref. responsibility	(3) Pref. responsibility Neg. bias	(4) Pref. responsibility No bias	(5) Pref. responsibility Pos. bias
Experimental group (1 = Treatment)	0.173 (0.220)	-0.192 (0.237)	0.386*** (0.147)	-0.214 (0.238)	-0.193 (0.277)
Ref: Exp. group* income bias					
Control* Neg. income bias	-0.221 (0.184)	-0.414** (0.202)			
Control* Pos. income bias	0.334 (0.258)	-0.0132 (0.257)			
Treatment* Neg. income bias	-0.263 (0.189)	0.164 (0.198)			
Treatment* Pos. income bias	-0.117 (0.268)	-0.0934 (0.267)			
Ref: Germany					
USA	1.000*** (0.170)	1.202*** (0.186)	1.158*** (0.231)	1.649*** (0.392)	0.871 (0.701)
RUS	0.302 (0.195)	-0.217 (0.206)	-0.193 (0.241)	0.842* (0.481)	-1.445** (0.709)
FRA	0.537*** (0.187)	0.521*** (0.197)	0.695*** (0.252)	0.739* (0.423)	-0.441 (0.687)
SPA	0.341** (0.170)	-0.708*** (0.181)	-0.736*** (0.224)	0.120 (0.409)	-1.696*** (0.629)
BRA	0.371 (0.231)	0.859*** (0.236)	0.601* (0.322)	1.944*** (0.538)	0.00771 (0.647)
Constant	3.441*** (0.671)	4.282*** (0.785)	4.116*** (0.826)	3.566** (1.816)	5.049*** (1.593)
Control variables	Yes	Yes	Yes	Yes	Yes
Observations	3.048	3.051	1.698	724	629
R2	0.046	0.069	0.084	0.102	0.121

Notes: Results from a OLS regression with robust standard errors in parentheses. The dependent variables are in columns (1) preferences income differentials (1=more equal, 10=large differences) and in columns (2)-(5) preferences for responsibility (1=government, 10=people). Columns (1)-(2) use the complete sample, column (3) uses the subsample of respondents with a negative income position bias, column (4) with no income position bias and column (5) with a positive income position bias. Survey weights are included. * p < 0.1, ** p < 0.05, *** p < 0.01

Figure 12: Predictive margins for effect on larger income differences by income position bias

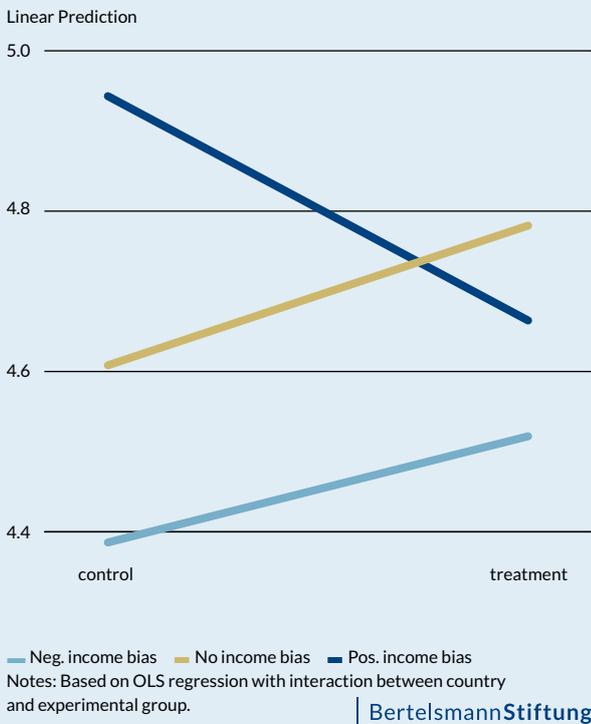
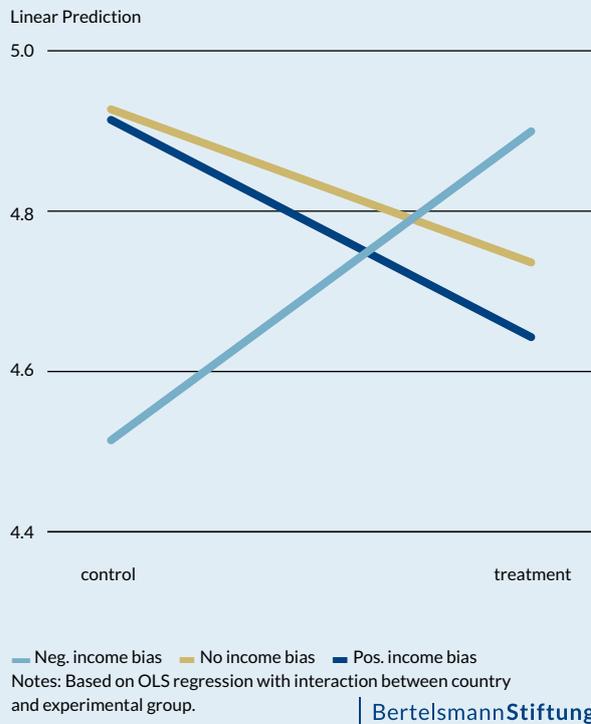


Figure 13: Predictive margins for effect on personal responsibility by income position bias



This underscores how a bias may significantly alter demand for redistribution. Indeed, considering that in our sample a clear majority of the German sample has a negative income position bias, it seems likely that this group is dominating the average country-specific treatment effect that could be identified in the earlier analyses. Unfortunately, we have to refrain from a combination of the two regression designs (estimating country-specific treatment effects for different bias groups) because the number of observations decreases tremendously, hence lowering the comparability with the average country estimation. Taken together, it seems that individuals with a negative bias tend to demand (larger income differences and) more personal responsibility after the treatment.

In sum, the findings suggest that part of the country sample differences that we observe on the demand for distribution in the control group is based on misperceptions of inequality. After providing a corrective update, we see that differences between country samples can become smaller when looking at preferences for income differentials and disregarding the US. As for the demand for government intervention, selected country samples converge while

respondents in Spain and the US move in opposite directions. Further, on its own the treatment only showed significant effects in the German sample, the country with the highest negative income position bias. After being treated, German respondents are more in favor of higher income differentials and they prefer that people take more responsibility, contributing to the convergence with other country samples. Please also note that the direction of the change caused by the treatment significantly differs by the same groups of countries, where the samples of Germany, Russia, and the US fall in one category and Spain, France, and Brazil in the other. In addition, different income position biases yield different reactions to the treatment, suggesting in our case that underestimating a person's own rank in the income distribution and learning that one is better placed than originally assumed decreases the demand for redistribution. This relationship is likely to drive the results in the German sample.

5 Conclusions and implications

The influence of misperceptions of income inequality is considered to be important for determining the demand for redistribution. If indeed individuals' opinions relied on information about income inequality that differs from the facts, then using this imperfect information in an analysis could provide useful insights into the individual demand for redistribution. In addition, it is known that culture is an important determinant of demand for redistribution, but the role of cross-country differences in misperceptions of income inequality is not well understood.

The present study contributes to the literature by analyzing the following eight countries in a randomized survey experiment: Brazil, France, Germany, Russia, Spain, Sweden, the United Kingdom, and the United States. In sum, the study clearly confirms the important role of country characteristics as indicated by cross-country comparisons. This regards differences in perceptions as well as how individuals react to a corrective update of the misinformation. For instance, their placement in the income position appears mostly related to self-assigned social classes, illustrating that social classes cannot be assumed to be equal to income quintiles. Also, the identification of the individual's own position in the income distribution does not significantly correlate with social classes in all countries. For a reduced country sample, the results further show that the treatment information leads to country-specific reactions. Only participants in Germany showed a statistically significant reaction to the treatment itself, but cross-country comparisons hint at important differences before and after the treatment. Indeed, the estimations show that, broadly speaking, views on redistribution converged after the treatment. This is due to changes in views between the control and treatment group that might not show up significantly in form of a treatment variable, but that significantly alter differences between country samples. It is also interesting to note that informing individuals about factual inequality in a neutral way and correcting more than one potential bias as regards income inequality continues to influence individ-

uals' opinions. Specifically, although our treatment did not result in direct significant changes in whether inequality is perceived as a serious problem, it did directly affect the demand for redistribution in the German sample. It is likely that the large share of respondents with a negative bias is driving these results.

As soon as the treatment leads to changes in the behavior between individuals in the control and treatment group, then it is important to provide access to such factual information to the general population. Our evidence shows that important biases exist and that they can have considerable influence in a survey, suggesting that there is a need to provide factual information updates to the general public. However, to ensure sustainable results of such updates it is important to additionally investigate the long-term effects of the interventions and to identify promising channels for the distribution of information on income inequality. For instance, it is unclear why individuals have such difficulties in naming the unemployment rate although this number is more regularly communicated than the person's own position in the income distribution. In addition, the changes in the differences between countries (regarding their demand for redistribution before and after the treatment) suggest that cross-country differences that can be identified in other data may be biased by misperceptions and need to be interpreted with great care.

The following limitations of this study must be considered. The survey provides evidence for systematic group differences in the income position bias. However, no causal reasons can be given for the drivers of these differences due to a lack of further data. Hence, no statements can be made, for instance, with regard to whether individuals build their perceptions on misinformation or whether factual information is misperceived. In a similar vein, the neutrality of the treatment information had the advantage of letting individuals decide on whether inequality could be considered as a serious problem. Nonetheless, this step required some time

and intellectual effort from the respondents and, in the end, it is unclear how the participants processed the information. Finally, in the future it would be helpful to implement additional quotas on income to more closely reflect country income distributions.

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6 Literature

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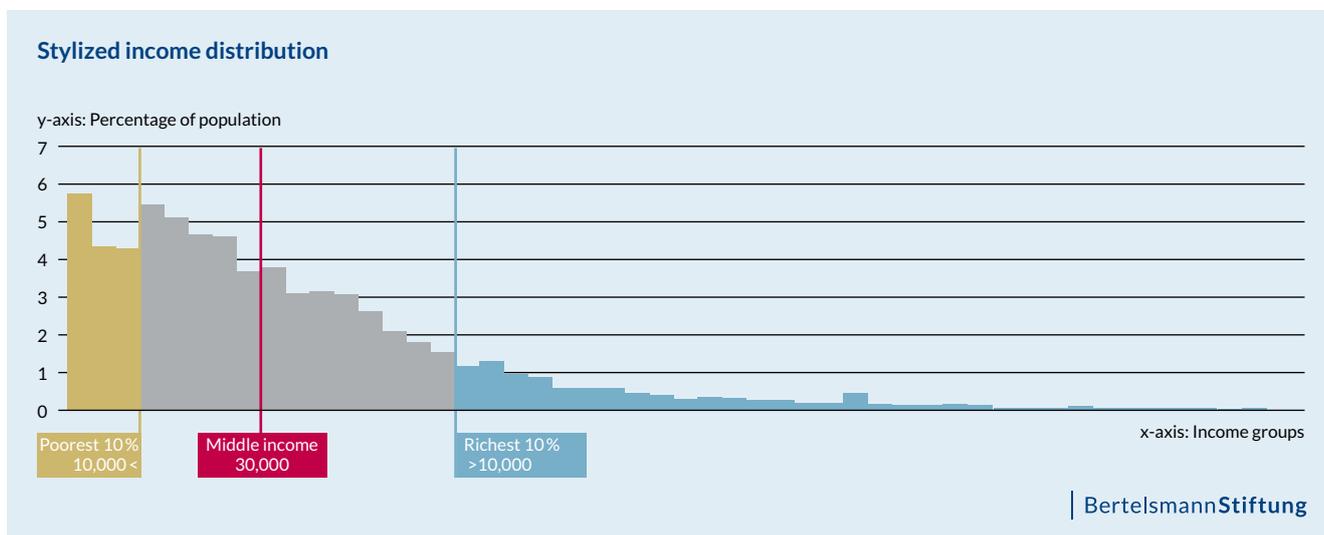
7 Annex

7.1 Example of treatment

The figure below shows the income distribution of <COUNTRY> for total yearly market income.

How to read the figure: The horizontal x-axis reflects income levels for different groups. The more you go to the right, the higher is the income. The length of the bars indicates the share of the population for an income level (vertical y-axis). The longer the bar is, the larger is the share of the population that earns a particular income.

What is inequality: If income was equally distributed, we would have only one bar for one unique income level. For instance, 100 percent of the population could earn the middle income. Income inequality exists when different numbers of people earn different incomes. For instance, high income inequality can be reflected by a large number of income bars. In addition, longer bars in lower income groups and shorter bars in high income groups imply that a large share of the population earns a low income and a small share of the population earns a high income.



Please take some time and carefully compare the answers you gave before and the true values for <COUNTRY>.

	Your answers were	True values
income of household in the middle of the population	ANSWER TO < >	NUMBER
average income of 10% poorest households	ANSWER TO < >	NUMBER
average income of 10% richest households	ANSWER TO < >	NUMBER
percentage of individuals with a lower income than yours	ANSWER TO < >	NUMBER

Notes: The research group collected with great care information on the income distribution from official sources. To calculate income distributions we used harmonized microdata from the cross-national data center of the Luxembourg Income Study (LIS) and the European Union statistics on income and living conditions (EU-SILC) for the year 2013. For illustrative purposes the lowest percentiles, including individuals with negative income before taxes, are excluded from the figure.

7.2 Tables and figures

Table A 1: The income position bias by countries and groups

Position bias in groups									
Countries		Neg. bias		No bias		Pos. bias		Total	
BRA	N %	192	39.59	91	18.76	202	41.65	485	100.00
FRA	N %	187	48.83	123	32.11	73	19.06	383	100.00
UK	N %	389	70.99	115	20.99	44	8.03	548	100.00
GER	N %	432	78.69	85	15.48	32	5.83	549	100.00
RUS	N %	397	65.73	102	16.89	105	17.38	604	100.00
SPA	N %	245	42.83	163	28.50	164	28.67	572	100.00
SWE	N %	385	53.32	263	36.43	74	10.25	722	100.00
USA	N %	298	52.46	190	33.45	80	14.08	568	100.00
Total	N %	2,525	56.98	1,132	25.55	774	17.47	4,431	100.00

Table A 2: The ratio between poor and rich (control group only)

Countries	Ratio perceived income	N (perceived income)	Ratio ideal income	N (ideal income)
BRA	0.1029	172	0.2331	177
FRA	0.1239	299	0.2909	263
UK	0.0821	469	0.2500	437
GER	0.0727	426	0.2263	409
RUS	0.0765	300	0.2233	367
SPA	0.1520	305	0.3751	335
SWE	0.1191	596	0.2984	477
USA	0.0567	435	0.1698	389
Total	0.0963	3,002	0.2577	2,854

Table A 3: The unemployment bias by countries and groups

Unemployment bias in groups									
Countries		Neg. bias		No bias		Pos. bias		Total	
BRA	N %	1	0.24	25	6.00	391	93.76	417	100.00
FRA	N %	5	1.30	79	20.57	300	78.13	384	100.00
UK	N %	11	2.47	148	33.18	287	64.35	446	100.00
GER	N %	0	0.00	131	30.47	299	69.53	430	100.00
RUS	N %	11	2.86	28	7.29	345	89.84	384	100.00
SPA	N %	58	13.06	73	16.44	313	70.50	444	100.00
SWE	N %	34	7.31	216	46.45	215	46.24	465	100.00
USA	N %	1	0.24	107	25.91	305	73.85	413	100.00
Total	N %	121	3.58	807	23.85	2,455	72.57	3,383	100.00

Table A 4: Number of observations for quintiles of actual income distribution

Quintiles of actual income position	All	Negative bias	No bias	Positive bias
First	302	14	68	220
Second	629	269	175	185
Third	1,332	733	407	192
Fourth	1,126	781	283	62
Highest	789	668	116	5
Total	4,178	2,465	1,049	664

Table A 5: Number of observations for social classes

Social class	All	Negative bias	No bias	Positive bias
Working class	879	511	194	174
Lower-middle class	858	492	187	179
Middle class	1,890	1,139	505	246
Upper-middle class	506	301	148	57
Upper class	45	22	15	8

Table A 6: Number of observations for education levels

Education levels	All	Negative bias	No bias	Positive bias
Low education	698	343	164	191
Medium education	1,818	1,104	430	284
High education	1,662	1,018	455	189

Figure A 1: Income deciles by country (survey data in comparison to EU LFS or LIS)



Table A 7: Sampling variables by country (weighted percentages)

Gender	Male	Female	Education	Low	Medium	High
GER	48.5%	51.5%	GER	18.1%	57.4%	24.5%
USA	48.2%	51.8%	USA	5.9%	59.5%	34.6%
UK	49.1%	50.9%	UK	20.5%	43.2%	36.3%
SWE	49.7%	50.3%	SWE	15.0%	51.2%	33.8%
RUS	45.8%	54.2%	RUS	32.6%	53.2%	14.2%
FRA	48.6%	51.4%	FRA	27.6%	45.4%	27.0%
SPA	49.1%	50.9%	SPA	48.8%	23.0%	28.2%
BRA	49.2%	50.8%	BRA	61.6%	28.3%	10.1%

Age	18-24	25-34	35-44	45-54	55>
GER	9.1%	15.0%	15.0%	20.2%	40.8%
USA	12.8%	19.1%	21.6%	18.0%	28.4%
UK	11.9%	16.8%	19.8%	17.8%	33.7%
SWE	12.2%	16.3%	17.9%	16.5%	37.1%
RUS	16.4%	20.5%	19.5%	20.2%	23.4%
FRA	11.7%	17.1%	18.4%	17.8%	35.0%
SPA	11.0%	21.9%	21.0%	16.0%	30.0%
BRA	22.4%	25.0%	20.2%	14.2%	18.2%

Regions		Regions		Regions	
Germany Nielsen 1: Bremen, Hamburg, Niedersachsen, Schleswig-Holstein	16.0%	France Nord-Est	23.4%	Spain North-East	22.2%
Germany Nielsen 2: Nordrhein-Westfalen	21.6%	France Nord Ouest	23.0%	Spain East	14.8%
Germany Nielsen 3a: Hessen, Rheinland-Pfalz, Saarland	13.5%	France Region Parisienne	18.5%	Spain South	20.5%
Germany Nielsen 3b: Baden-Württemberg	13.0%	France Sud-Est	24.4%	Spain Madrid Metropolitan	16.1%
Germany Nielsen 4: Bayern	15.5%	France Nord-Ouest	10.7%	Spain North (North Centre)	10.1%
Germany Nielsen 5: Berlin	4.5%	Sweden South	15.1%	Spain North-West	6.2%
Germany Nielsen 6: Brandenburg, Mecklenburg-Vorpommern, Sachsen-Anhalt	7.9%	Sweden Middle	12.1%	Spain Centre	10.0%
Germany Nielsen 7: Sachsen, Thüringen	8.0%	Sweden East	30.1%	Brazil Norte	6.8%
Russia Central Federal District	25.3%	Sweden West	19.1%	Brazil Nordeste	28.3%
Russia Far East	4.6%	Sweden North	10.5%	Brazil Sudeste	42.8%
Russia North West	10.2%	Sweden South East	13.1%	Brazil Sul	14.7%
Russia Siberian	14.4%	UK North	23.9%	Brazil Centro-Oeste	7.3%
Russia South	15.0%	UK Midlands	16.0%	USA North-East	19.0%
Russia Urals	8.9%	UK East	9.3%	USA Midwest	22.9%
Russia Volga (Privolzhsky)	21.6%	UK London	12.4%	USA South	36.0%
		UK South	22.2%	USA West	22.0%
		UK Wales	4.9%		
		UK Scotland	8.5%		
		UK Northern Ireland	2.8%		

Table A 8: Correlations between central variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Positive income position bias	1														
2 Negative income position bias		1													
3 Positive unemployment bias	* 0.2757	0.0146	1												
4 Negative unemployment bias	-0.3182	0.1506		1											
5 Estimated ratio poor to rich	* 0.1878	0.0041	* 0.2251	-0.0034	1										
6 Ideal ratio poor to rich	* 0.2509	0.0136	* 0.2272	-0.0392	* 0.4627	1									
7 Low education	* 0.1211	-0.0196	* 0.1870	0.0971	* 0.1223	* 0.1200	1								
8 Medium education	0.0222	-0.0099	-0.0244	-0.0841	0.0226	-0.0093	* -0.5004	1							
9 High education	* -0.1496	0.0238	* -0.1474	-0.0028	* -0.1155	* -0.0791	* -0.3746	* -0.6153	1						
10 Working class	0.0154	0.009	* 0.0573	0.0439	0.0424	* 0.0915	* 0.1965	* 0.0546	* -0.2352	1					
11 Lower-middle class	0.0727	-0.0294	* 0.0779	0.0183	-0.0361	0.0146	* 0.0382	* 0.0402	* -0.0772	* -0.2970	1				
12 Middle class	-0.0485	0.0471	* -0.0674	-0.0321	0.0036	-0.0362	* -0.1256	-0.0111	* 0.1249	* -0.4995	* -0.4414	1			
13 Upper-middle class	-0.0610	* -0.0614	* -0.0927	-0.0446	-0.0194	* -0.0690	* -0.1190	* -0.0948	* 0.2082	* -0.1959	* -0.1731	* -0.2912	1		
14 Upper class	0.0126	0.0503	0.0188	0.0262	0.0209	-0.0128	-0.0238	* -0.0527	* 0.0776	* -0.0639	* -0.0564	* -0.0949	* -0.0372	1	
15 Actual income position	* -0.4542	* 0.2475	* -0.2837	* -0.2800	* -0.1515	* -0.1418	* -0.1933	* -0.0498	* 0.2076	* -0.2121	* 0.1933	* 0.1799	* 0.2324	* 0.0549	1
16 Estimated income position	* 0.4958	* -0.3418	* 0.1587	-0.0352	0.0234	0.0126	-0.0278	* -0.1168	* 0.1426	* -0.1884	* -0.0903	* 0.0746	* 0.2195	* 0.0637	* 0.2217

Notes: Significance level: * p<0.01

Table A 9: Summary statistics (analysis of estimated income position)

Variable	Obs	Mean	Std. Dev.	Min	Max
Estimated income position	4,178	44.931	23.020	0	100
Actual income position	4,178	63.705	25.746	3	99
Income position bias	4,178	- 13.040	26.450	- 98	94
Low education level	4,178	0.167	0.373	0	1
Medium education level	4,178	0.435	0.496	0	1
High education level	4,178	0.398	0.490	0	1
Working class	4,178	0.210	0.408	0	1
Lower middle class	4,178	0.205	0.404	0	1
Middle class	4,178	0.452	0.498	0	1
Upper class	4,178	0.121	0.326	0	1
Upper class	4,178	0.011	0.103	0	1
Gender	4,178	0.469	0.499	0	1
Age	4,178	45.584	15.539	18	88
Household members	4,178	1.847	1.362	1	33
GER	4,178	0.127	0.333	0	1
USA	4,178	0.130	0.336	0	1
UK	4,178	0.123	0.328	0	1
SWE	4,178	0.165	0.371	0	1
RUS	4,178	0.134	0.340	0	1
FRA	4,178	0.086	0.281	0	1
SPA	4,178	0.130	0.337	0	1
BRA	4,178	0.106	0.307	0	1
Public employed	4,178	0.160	0.367	0	1
Private employed	4,178	0.370	0.483	0	1
Own business	4,178	0.084	0.278	0	1
Student	4,178	0.056	0.231	0	1
Unemployed	4,178	0.078	0.269	0	1
Out of the labor force	4,178	0.206	0.404	0	1
Never had a job	4,178	0.004	0.060	0	1
Other	4,178	0.041	0.198	0	1

Table A 10: Number by respondents by income quintile and social class

Social classes	Income quintiles					Total
	First	Second	Third	Fourth	Fifth	
Working class	81	240	365	145	48	879
Lower-middle class	96	181	320	200	61	858
Middle class	104	178	557	636	415	1,890
Upper-middle class	16	26	87	139	238	506
Upper class	5	4	3	6	27	45
Total	302	629	1,332	1,126	789	4,178

Table A 11: Summary statistics (analysis of treatment effects)

Variable	Obs	Mean	Std. Dev.	Min	Max
Inequality as serious problem	5,372	3.970	1.104	1	5
Pref. responsibility	5,487	4.722	2.967	1	10
Pref. differentials	5,454	4.554	2.822	1	10
Treatment	5,454	0.495	0.500	0	1
Gender	5,454	0.515	0.500	0	1
Age	5,454	43.464	15.013	18	88
Low education level	5,454	0.229	0.420	0	1
Medium education level	5,454	0.450	0.497	0	1
High education level	5,454	0.322	0.467	0	1
Household members	5,454	2.074	2.390	1	49
GER	5,454	0.167	0.373	0	1
USA	5,454	0.169	0.374	0	1
RUS	5,454	0.162	0.369	0	1
FRA	5,454	0.157	0.363	0	1
SPA	5,454	0.175	0.380	0	1
BRA	5,454	0.171	0.376	0	1
Public employed	5,454	0.140	0.347	0	1
Private employed	5,454	0.328	0.469	0	1
Own business	5,454	0.078	0.268	0	1
Student	5,454	0.078	0.268	0	1
Unemployed	5,454	0.132	0.339	0	1
Out of the labor force	5,454	0.180	0.384	0	1
Never had a job	5,454	0.009	0.092	0	1
Other	5,454	0.055	0.229	0	1

Table A 12: Country comparison of the treatment effect on demand for redistribution (estimations for figures of marginal effects)

Variables	(1) Model 1 Pref. differentials	(2) Model 2 Pref. differentials	(3) Model 1 Pref. responsibility	(4) Model 2 Pref. responsibility
Treatment	0.332 ** (0.159)	0.390 ** (0.155)	0.387 ** (0.171)	0.416 ** (0.169)
Reference group: Germany				
USA	1.013 *** (0.176)	1.239 ** (0.178)	1.122 *** (0.192)	1.327 *** (0.194)
RUS	0.521 ** (0.212)	0.628 *** (0.216)	-0.007 (0.214)	0.225 (0.220)
FRA	0.815 *** (0.175)	0.802 *** (0.177)	0.611 *** (0.180)	0.682 *** (0.181)
SPA	0.708 *** (0.165)	0.664 *** (0.171)	-0.398 ** (0.179)	-0.337 * (0.185)
BRA	0.860 *** (0.237)	0.746 *** (0.234)	0.868 *** (0.233)	1.018 *** (0.233)
Reference group: Treatment* Germany				
Treatment* USA	-0.080 (0.253)	-0.160 (0.250)	-0.197 (0.271)	-0.232 (0.269)
Treatment* RUS	-0.432 (0.302)	-0.444 (0.294)	-0.256 (0.313)	-0.245 (0.310)
Treatment* FRA	-0.470 * (0.252)	-0.522 ** (0.248)	-0.544 ** (0.257)	-0.564 ** (0.253)
Treatment* SPA	-0.599 ** (0.236)	-0.615 *** (0.232)	-0.656 *** (0.251)	-0.671 *** (0.248)
Treatment* BRA	-0.753 ** (0.325)	-0.779 ** (0.320)	-0.557 * (0.323)	-0.606 * (0.319)
Constant	4.007 *** (0.111)	4.137 *** (0.529)	4.398 *** (0.120)	3.391 *** (0.489)
Control variables	NO	YES	NO	YES
Observations	5,454	5,454	5,487	5,487
R-squared	0.013	0.042	0.037	0.059

Notes: OLS regressions with robust standard errors in parentheses. The dependent variables are in columns (1) and (2) preferences income differentials (1=more equal, 10=large differences) and in columns (3) and (4) preferences for responsibility (1=government, 10=people). Survey weights are included. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

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Bertelsmann Stiftung
Carl-Bertelsmann-Straße 256
33311 Gütersloh
Phone +49 5241 81-0
www.bertelsmann-stiftung.de

Responsible

Dr. Ulrich Schoof

Author

Dr. Elisabeth Bublitz

Design

Dietlind Ehlers

Photo

Jonathan Stutz / Fotolia

Address | Contact

Bertelsmann Stiftung
Carl-Bertelsmann-Straße 256
33311 Gütersloh
Phone +49 5241 81-0

GED-Team

Programm Nachhaltig Wirtschaften
Phone +49 5241 81-81353
ged@bertelsmann-stiftung.de
www.ged-project.de

www.bertelsmann-stiftung.de