

The role of subjective beliefs in preferences for redistribution

Lionel Page¹  · Daniel G. Goldstein²

Received: 1 February 2015 / Accepted: 24 December 2015
© Springer-Verlag Berlin Heidelberg 2016

Abstract We investigate whether beliefs about the income distribution are associated with political positions for or against redistribution. Using a novel elicitation method, we assess individuals' beliefs about the shape of the income distribution in the United States. We find that beliefs about inequality, measured in terms of income dispersion, play only a marginal role in political positions as well as prospects of future wealth. Political preferences, however, are predicted by beliefs about the level of income of the poorest members of society (consistent with quasi-maximin utility functions), and a belief in an open society with equal opportunities for all.

1 Introduction

Recent research in different countries has found that citizens' perception of the national level of inequalities are systematically biased (Piketty 2003; Norton and Ariely 2011; Cruces et al. 2013). This finding has important implications for the understanding of political preferences. Political debates often take place along a left-right dimension along which the ideal level of redistribution of resources is one of the main points of disagreement (Przeworski and Sprague 1986; Poole and Rosenthal 1991; Kitschelt 1994). Voting models in economics and political science most often assume that citizens' position in a known income distribution is what determines their political position (Persson and Tabellini 2002).

✉ Lionel Page
lionel.page@qut.edu.au

Daniel G. Goldstein
dgg@microsoft.com

¹ Queensland University of Technology, 2 George Street, Brisbane 4000, Australia

² Microsoft Research, 641 Avenue of the Americas, New York, NY 10011, USA

In the present study we elicit beliefs about the perceived shape of the US income distribution from a large national sample of respondents and investigate how these beliefs relate to their political positions. To elicit subjective beliefs we use an interactive graphical tool, the Distribution Builder (Goldstein et al. 2008), with which participants quickly and easily specify a 100 unit income distribution, providing more precise information about subjective income distributions than possible with previous methods. This allows us to investigate beliefs about the distribution's tail as well as its overall shape (e.g., skewness, degree of inequality). The answers to survey questions we pose validate the use of the DB. The average distribution elicited is close to the actual income distribution in the US. Participants also answered a survey asking about a range of beliefs and values concerning inequalities (e.g. equality of opportunity, determinants of economic success, prospect of upward mobility) in order to distinguish between competing theories of how redistribution preferences are formed.

Overall, this paper contributes to three strands of literature. First, it contributes to the literature on the accuracy of people's beliefs about the *income* distribution. In accordance with previous studies, we find systematic biases in individual beliefs with an overestimation of average household incomes and an underestimation of the dispersion of household incomes in the USA. Recent studies have pointed out that people's beliefs about macroeconomic variables can be influenced by local variations in these variables (Snowberg et al. 2011; Li et al. 2011). In the specific case of the beliefs about the income distribution, Cruces et al. (2013) suggest that the local income distribution may influence households' beliefs about the national distribution. We specifically selected our sample of respondents to test this hypothesis. We only find limited evidence that the local average income and other local characteristics are correlated with beliefs about the income distribution.

Second, this study contributes to the empirical literature on the factors influencing voters' preferences for redistribution (Fong 2001; Alesina and Angeletos 2005; Alesina and La Ferrara 2005; Fong et al. 2006; Alesina and Giuliano 2009; Isaksson and Lindskog 2009). First, the use of the Distribution Builder allows us to have a rich view of participants' beliefs and to investigate a wide range of possible links between beliefs and political positions (e.g. central moments, variance, tails). The main result of this analysis is that we do not find that beliefs about the centrality and variance of the income distribution predict political attitudes and preferences for redistribution. Instead, beliefs about the income level of the poorest members of society are the strongest predictors of redistribution preferences. Second, we designed a new survey including a wider range of questions than previous surveys used to address this question (e.g., the General Social Survey and World Value Survey). We are therefore able to test the correlations between a wide range of beliefs and political positions and to compare the ability of various economic theories to account for the observed data. We find that beliefs about the ease of social mobility and the fairness of society have a higher correlation with political positions than do beliefs about the distribution itself. These results seem not to be driven primarily by self-interest. That is, the link between beliefs about inequalities and redistribution preferences does not seem to be related to respondents' beliefs about their relative position in the income distribution or to their subjective prospects of upward mobility.

Third, this paper adds to the literature on social preferences and inequality aversion. Recent experimental evidence suggests that, unlike the first models about inequality aversion (Fehr and Schmidt 1999; Bolton and Ockenfels 2000), social preferences for redistribution are primarily driven by a concern for the poorest (Charness and Rabin 2002; Engelmann and Strobel 2004, 2007). Our elicitation tool allows us to disentangle these two different types of social preferences. Doing so, we find that participants who believe that the incomes of the poor are relatively lower tend to be more in favor of redistribution, in agreement with quasi-maximin and concave altruistic utility functions (Charness and Rabin 2002; Andreoni and Miller 2002; Cox and Sadiraj 2006). To our knowledge, this is the first time that citizens' political preferences for redistribution have been linked to their beliefs about the lower part of the income distribution, that is, concern for the poorest.

The remainder of the paper is organized as follows. Section 2 discusses the empirical evidence on subjective perceptions about income inequalities, Sect. 3 presents a theoretical framework showing how different types of beliefs about inequalities can play a role in preferences for redistribution. Section 4 describes our elicitation method and the sample of respondents. Section 5 analyzes participants' beliefs about the income distribution and how they relate to their individual and local characteristics. Section 6 studies how beliefs relate to political positions. Section 7 discusses the results and concludes.

2 Beliefs about inequality and income distribution

Prior empirical research suggests that people often misperceive the distribution of income or wealth in their country. Research by Piketty (2003) in France and by Norton and Ariely (2011) in the USA found that people make systematic mistakes when estimating levels of inequality. Piketty conducted a survey in 1998 on a representative sample of 2000 people in France, asking participants about their beliefs about the country's average income, the average income of two typical professions (cashier and middle management supervisor) and the percentage of people earning more than the equivalent of around \$4000 and \$10,000 per month. Respondents' answers were characterized by significant biases. First, they significantly underestimated the average income by around 30%. In addition, they overestimated the percentage of people with high incomes, estimating that 27% of households earned above \$4,000 per month and that 12% earned above \$10,000. (The correct answers are 20 and 2%.) While these results suggest that respondents overestimated the level of inequality, beliefs about the income distribution did not seem to drive political positions concerning redistribution. In a more recent study, Norton and Ariely (2011) surveyed beliefs about the distribution of wealth (as opposed to income) in the USA. In 2005, they asked an online sample to indicate their beliefs about the share of national wealth held by each quintile of the wealth distribution. Respondents underestimated the level of inequality, estimating that 56% of wealth was held by the richest quintile while it is actually 84%. In spite of this significant underestimation, respondents still supported a move towards greater wealth equality.

Two recent studies address the question of the perception of inequalities and their role in political positions. [Cruces et al. \(2013\)](#) studied the views of a representative sample of households from greater Buenos Aires. They elicited the beliefs of these households about the income decile they would belong to on a national level. They found systematic biases including a tendency for respondents to place themselves in the middle of the income distribution. They also found that providing information to the respondent about their actual position in the distribution could influence their stated preferences for redistribution. Similarly, [Kuziemko et al. \(2013\)](#) tested whether giving information about inequalities and their evolution could change attitudes in favor of redistribution. In their study the information provided changed the stated perception of respondents about the importance of inequalities. It had, however, only limited impact on their views regarding the reduction of poverty.

If citizens find it hard to form accurate beliefs about the income distribution, it is likely to be even harder for them to assess how difficult it is to move upward in this distribution. Several studies have shown empirical evidence of biases in the formation of subjective beliefs about social mobility. People who grew up during recessions have been found to have a tendency to believe that success is more influenced by luck than effort and they also tend to support greater levels of redistribution ([Giuliano and Spilimbergo 2009](#)). In the same spirit, positive macro-economic shocks tend to be followed by a decrease in support for redistribution ([Brunner et al. 2011](#)). A natural experiment by [Di Tella et al. \(2007\)](#) also found that squatters who are randomly selected to benefit from housing policy tend to change their beliefs about the ability to succeed on one's own. Together, these studies suggest that individual's beliefs about the possibility of social mobility in society may not be accurate.

3 Theoretical framework

In line with the Social Choice literature, we consider a decision maker having to choose between different income distributions. If the decision maker follows the standard von Neumann–Morgenstern axioms, she will behave, when choosing between two distributions, as if she was maximizing a social welfare function ([Kolm 1969](#); [Atkinson 1970](#)):

$$W(X) = \int u(x)dF \quad (1)$$

where F represents the belief of the decision maker about the income distribution in the society. If the decision maker is perfectly informed (i.e. F is the true distribution), her choices are driven by the function u whose curvature reflects her preferences for redistribution. A limitation of this model is that it places the decision maker under the “veil of ignorance” ([Harsanyi 1955](#); [Rawls 1971](#)). When making political decisions about the right level of redistribution, the decision maker typically knows her own income, x_s this may affect her choice. We can modify (1), calling F_o the distribution of others' income (x_o):

$$W(X) = \int u(x_s, x_o)dF_o \quad (2)$$

Such models are typically considered in the literature on social preferences in game theory.¹ In such a situation, the decision maker's choice can be driven by beliefs about the income distribution in society F_o .

We can use this framework to represent how social mobility can play a role in individual preferences for mobility.² Following [Atkinson and Bourguignon \(1982\)](#) and [Gottschalk and Spolaore \(2002\)](#), we can extend (1) to a two period model by writing the preference of a decision maker over distributions as:

$$W(X_1, X_2) = \int V(u_1(x_1) + u_2(x_2))dF_{12} \tag{3}$$

where V is a concave transformation which creates the possibility for preferences over social mobility as such, and F_{12} is the joint income distribution over the two periods. Allowing for the decision maker to know her present income $x_{s,1}$ and to form beliefs about the distribution $G_{s,2}$ of her income in period 2, we can generalize (2) to:

$$W(X_1, X_2) = \int \int V(u_1(x_{s,1}, x_{o,1}) + u_2(x_{s,2}, x_{o,2}))dF_{o,12}dG_{s,2} \tag{4}$$

While the decision maker knows her income in period 1, she does not know it with certainty for period 2 and forms a belief about it. $G_{s,2}$ represents the corresponding subjective distribution of probability over future incomes. Using (4), we can decompose the sources of differences in political positions for redistribution as: (1) differences in preferences for fairness per se (curvatures of u_1, u_2, V), (2) beliefs about present inequalities (marginal distribution of $F_{o,12}$ in period 1), (3) differences in beliefs about social mobility in society (marginal distributions of $F_{o,12}$ in period 2 conditional on the incomes in period 1), (4) and differences in beliefs about the decision maker's own prospects of mobility (distribution $G_{s,2}$).

In the present study, we elicit the beliefs (2), (3), and (4) which, in this framework, could play a role in positions for or against redistribution. By doing so, we aim to contribute the understanding of how such beliefs relate to political positions. From this theoretical framework and the existing literature we make the following hypotheses:

Hypothesis 1 Individuals have biased perception of the income distribution.

This hypothesis follows naturally from the existing evidence ([Piketty 2003](#); [Norton and Ariely 2011](#); [Cruces et al. 2013](#)).

Hypothesis 2 Subjective beliefs about the national distribution of income will be biased by the characteristics of the local area where the respondent lives.

¹ Several models in the literature are equivalent to specific cases of (2) where u is additively separable in own and others income ([Fehr and Schmidt 1999](#); [Andreoni and Miller 2002](#)). Such a separability has been axiomatised in the two person case by [Karni and Safra \(2002\)](#).

² We do not make claims of exhaustivity here. Our framework is not the only way to represent preferences for redistribution. More general models of preferences over distribution already exist in the one period case ([Weymark 1981](#)).

This hypothesis is motivated by the research on the influence of local variables on beliefs about macro level variables (Snowberg et al. 2011; Li et al. 2011; Cruces et al. 2013).

Hypothesis 3 Beliefs in the level of inequality will be positively correlated with positions in favor of redistribution.

It is usually assumed that voters may exhibit a preference for fairness. If the decision maker forms preferences over income distributions as if being under the veil of ignorance, she will exhibit an aversion to inequality if u is concave in (1). Even, if the decision maker takes into account her own income, the literature on social preferences suggests that she may be willing to reduce inequalities even at a cost of a lower net income for her (Fehr and Schmidt 1999; Bolton and Ockenfels 2000). Finally, even if the decision maker is purely self centred, a more unequal distribution will typically be negatively skewed with, as a consequence, the mean income in the distribution being above the median. In that case, more voters are going to favor redistribution (Alesina and Rodrik 1994).

Hypothesis 4 The belief in ones' personal mobility is negatively correlated with positions in favor of redistribution.

Voters who believe that their income is going to increase significantly in the near future may find rational to oppose greater taxation now for higher income. This is the Prospect Of Upward Mobility (POUM) hypothesis formalised by Bénabou and Ok (2001).³

Hypothesis 5 Beliefs in social mobility and opportunity will be negatively correlated with positions in favor of redistribution.

Several recent papers have proposed models in which a belief in social mobility determines political positions: the more voters believe that social mobility is possible, the less they tend to support redistribution (Piketty 1995; Alesina and Angeletos 2005; Alesina and La Ferrara 2005; Bénabou and Tirole 2006). Outside of standard economic mechanisms, it has also been suggested that a belief in *equality of opportunity* may decrease preferences for redistribution. In this view, voters who believe in equality of opportunity may view the dire conditions of the poor as a result of their choices, in particular a lack of effort (Fong 2001; Fong et al. 2006).

4 Method and sample

4.1 Method

An innovation of this study is the use of an interactive computer application to elicit respondents' beliefs about the income distribution. This elicitation was conducted

³ This idea got a lot visibility during the 2008 US presidential campaign when a member of the public, afterward nick named "Joe the plumber", criticised the candidate Obama for his proposed taxes which would hit Joe in the future as he was expecting to see his business grow.

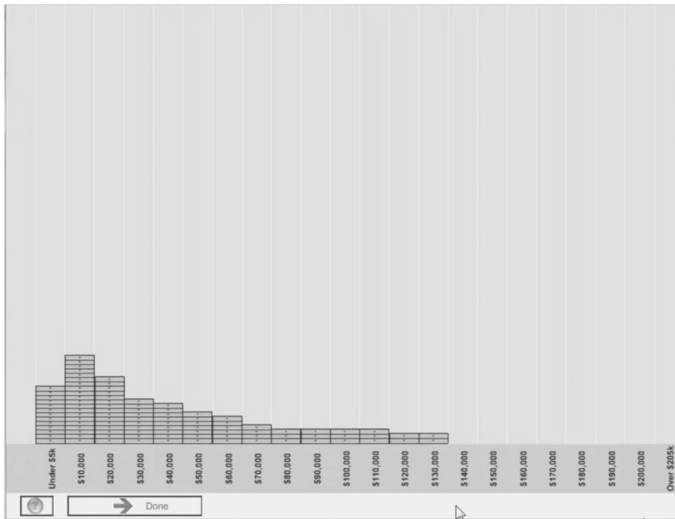


Fig. 1 Distribution Builder: Participants draw a histogram with 100 markers via an interactive interface

using the Distribution Builder (DB) methodology of [Goldstein et al. \(2008\)](#). The use of this application allows researchers to obtain richer data on participants' beliefs about the income distribution than was possible in previous survey studies. With the DB, a participant can quickly construct a 100 unit probability distribution over levels of household income through several movements of the mouse. Figure 1 shows the graphical interface of the application. At the start of the experiment, participants viewed a training video covering the use of the DB and the concepts of 50th and 95th percentiles of a distribution. They were next given a practice task with the DB before being instructed to create an income distribution with the following instruction: "Imagine that the 100 green markers represent 100 randomly-selected households in the US. If you had such a sample, how many households might fall into each category of annual income? Place the 100 markers on various columns to show us what you think this random sample might look like." To prevent anchoring effects, the 100 markers begin off to the left or right of the chart, determined randomly for each participant. One of the advantages of the DB is its ability to retrieve beliefs about the tails of the income distribution which may well play a specific role in preference for redistribution.

The DB is designed to be easy to understand and is based on numerous psychological studies showing that people better understand questions about probabilities when they are framed in terms of natural frequencies ([Gigerenzer 1991](#); [Goldstein et al. 2008](#)). That said, the task of specifying an entire distribution may be demanding in terms of knowledge and abstraction. As a robustness and comprehension check, participants were also asked to indicate their beliefs about the income distribution through direct fill-in-the-blank questions. First, participants gave point estimates of what they believed to be the 50th and 95th percentiles of household income in the US. Second, participants gave estimates of the average yearly income of four typical professions: unskilled workers, skilled workers, medical doctors, and CEOs of large

national corporations.⁴ Drawing on multiple and repeated measurements for each participant should provide the most detailed picture to date of what laypeople believe about the income distribution. In addition, the juxtaposition of different measurement tools helps to circumvent the limitations that each technique may present individually.

To test economic theories that link perceptions of income inequality to political leanings, we included questions to assess beliefs about several aspects of income inequality. From the General Social Survey (2010), we employed the following items: “America has an open society. What one achieves in life no longer depends on one’s family background, but on the abilities one has and the education one acquires” and “Some people say that people get ahead by their own hard work; others say that lucky breaks or help from other people are more important. Which do you think is most important?”. To measure participants’ social mobility up to the present day, we asked the question: “Would you say that your current position and prospects in life are better than those of your parents at that age?”. To measure beliefs about their future prospects, participants were asked: “What is your best guess of what your household income will be five years from today?”. The choice of a five year horizon is motivated both by the fact that participants are likely to be able to assess their prospects accurately within a relatively short time horizon and by the fact that [Bénabou and Ok \(2001\)](#) suggest that prospects of upward mobility can already have a substantial effect over such a short time horizon.

We measured political positions with questions about participants’ political leaning on a left-right axis: “How would you describe yourself on the political spectrum, where left is liberal and right is conservative?”. We also asked which candidate they supported in the previous presidential election. In addition, to understand views on redistribution, we measured agreement with the following two items from the International Social Survey (1987): “Differences in income in America are too large”, and “It is the responsibility of the government to reduce the differences in income between people with high incomes and those with low incomes”. When not asking for exact numbers, we presented respondents with the original Likert scales found in the cited publications.

4.2 Participants

Participants were 1025 adult US residents who were recruited through a national survey sampling firm and paid for their time. In order to be able to test whether local inequality affects national perceptions ([Snowberg et al. 2011](#); [Li et al. 2011](#)), we adopted a geographically selective sampling scheme covering the most equal and unequal regions of the US in terms of income. Drawing upon US Census regional classifications that divide the country into four regions (Northeast, South, West, Midwest), we identified the 26 counties with the highest levels of inequality (as measured by Gini coefficient) and the 26 counties with the lowest levels of inequality such that at least 10 counties

⁴ These questions about the average income of typical professions are taken from the International Social Survey Program, allows for the elicitation of beliefs with simple benchmarks (e.g., “What do you think is the average income in the USA of a chairman of a large national corporation?” and “What do you think is the average income in the USA of an unskilled worker in a factory?”).

Table 1 Sample descriptive statistics

| Variable | Mean | Min | Max | SD |
|------------------------------|--------|------|---------|--------|
| Male | 0.28 | 0 | 1 | 0.45 |
| Age | 46.95 | 19 | 80 | 13.42 |
| Income | 83,653 | 5000 | 650,000 | 55,720 |
| White | 0.93 | 0 | 1 | 0.26 |
| Black | 0.02 | 0 | 1 | 0.13 |
| Asian | 0.03 | 0 | 1 | 0.17 |
| High School diploma or lower | 0.29 | 0 | 1 | 0.45 |
| Undergraduate degree | 0.44 | 0 | 1 | 0.50 |
| Graduate degree | 0.27 | 0 | 1 | 0.44 |
| Democrat | 0.58 | 0 | 1 | 0.49 |
| Rightwing | 2.8 | 0 | 6 | 1.79 |

were sampled in each of the four regions. The firm targeted its panelists living in specified counties to participate in the survey. To favor an even representation from all areas, each county contributed at least 15 respondents and no more than 35 with a mean of 19.

Table 1 presents the main demographic characteristics of the sample. Our sample of participants tends to have a higher proportion of females, a higher household income, and a higher proportion of self-declared “White” participants than in the general US population. Furthermore, our selected sampling of the highest and lowest-Gini areas weights our sample toward the extremes of income dispersion. In comparison to the demographics of the panel of respondents from the sampling firm, our sample is slightly older, richer and more feminine (see table in Appendix). Such selections are common in online experiments and in survey questionnaires with voluntary participations. The average answers in our study should not be taken to represent the average view in the US population.⁵

Participants responded online, with the average respondent taking 20 min and 95 % taking between 12 and 35 min. After the survey, participants were asked whether they understood the instructions and whether they gave the task their best effort; these two items served as our a priori standard for inclusion in the analysis. 98 % of participants indicated comprehension and 99 % indicated that they gave their best effort. At the onset of the study, participants indicated their sex, age, race, citizenship, ZIP code,

⁵ This selection is however not necessarily an issue when discussing the effect of respondents’ characteristics on their survey answer. Formally, Magee et al. (1998) show that this type of analysis is valid as long as there is no unobservable variable influencing the choice to self-select in the sample which is both correlated with the respondents’ characteristics and with the dependent variables studied (here the beliefs about inequalities and political positions). This is an issue which has been investigated in depth in experimental economics where most samples are self-selected and non representative. Studies such as Von Gaudecker et al. (2008), Harrison et al. (2009), and Cleave et al. (2010) have found that while samples of participants may differ from the population sampled the differences between groups of different demographics are not biased. These studies conclude that there is no selection bias based on social and risk preferences.

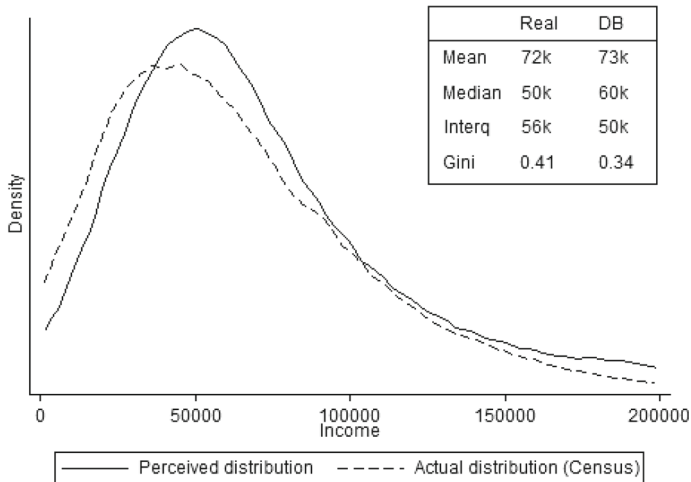


Fig. 2 Perceived and actual income distribution in the USA. Distributions are truncated at \$200,000. Comparative statistics (mean, median, interquartile range and Gini coefficient) are included in the *top right* frame

highest level of education attained, and political leaning. In addition to the surveys' answers, for each ZIP code area in which respondents lived, Census data contributed covariates such as population density, population, and beyond (as will be seen in the regression tables).

To draw generalizations for only those participants who appeared to follow instructions and to have taken the task seriously, we created a retained sample of participants by eliminating: participants who did not watch the entire instructional video (13 %), participants who made fewer than five clicks on the DB needed to draw an income distribution (4 %), and participants for whom the difference between the direct question about the 50th percentile and the 50th percentile in the DB distribution were above \$80,000 (1 %). In what follows, we take a conservative approach and analyze this sample of 839 participants (82 % of the initial sample) who we believe understood the task. We note, however, that this selection makes little difference in the overall results, for instance, the estimate of the 50th percentile differs by less than 1 percent between the full and retained samples.⁶

5 Beliefs about income inequalities

Result 1 *Respondents systematically mis-judged the distribution of households' income in the USA. They overestimated the average income and underestimated the level of inequality.*

To show a summary of respondents' views on the income distribution, we average all the respondents' DB data. Figure 2 shows this average distribution over the

⁶ A table comparing the answers of the retained and non retained sample is included in Appendix 1.

whole sample (estimated by kernel density) and compares it to the actual distribution estimated from the Census data. The averaged DB distribution differs from the actual income distribution ($p < 0.001$, Kolmogorov–Smirnov test), however it is relatively close in shape. This result comes from the aggregation of individual distributions and evokes the “wisdom of the crowd”, the fact that the aggregation of individual subjective perceptions provides relatively good estimates of the quantity measured (Surowiecki 2004).

In spite of this, Fig. 2 shows that the average does not perfectly reflect the actual distribution: Respondents tend to overestimate the median level of household income and they tend to underestimate the level of inequality (lower interquartile range and lower Gini coefficient).

Figure 2 masks the heterogeneity of individual answers. To observe this heterogeneity, we look at each respondent’s beliefs about the median and interquartile range of the distribution and we then plot the distribution of these values over the sample. Figure 3 represents these distributions; it reveals that participants tend both to overestimate the median income and to underestimate the overall level of inequality. These results are somewhat similar with those of Norton and Ariely (2011), however, where those authors found profound deviations from the objective *wealth* distribution, we find that lay estimates of the *income* distribution are reasonably accurate.⁷

Answers from multiple elicitation methods give qualitatively similar results. The correlation between the response to the direct question about the 50th percentile and 50th percentile observed in the DB is .6. The average estimate of the median household income in the direct question is \$52,678 while the observed median extracted from the DB distributions is \$62,067, a difference of about 15 %. Concerning beliefs about the 95th percentile of income, the answers from the survey and DB are not directly comparable as the DB axis is censored upward: the top income category recorded by the DB is “\$205,000 and above”. To address this, we use a parametric model of the income distribution to estimate the 95th percentile from the observed DB distribution. We estimated such a model under the common assumption that the income distribution is lognormal (see details of the estimation in Appendix), and estimate the average 95th percentile from the DB at \$181,228, which is just 10 % different from \$200,000, the median answer to the direct question. The responses to the direct questions are noisier, with 25 % of participants giving answers equal or higher than \$500,000. With the DB method, such high responses were not possible, and only 1 % of participants produced distributions such that the modeled 95th percentiles were higher than \$370,000.

Overall, answers to the direct questions about the percentiles were noisier than the observed percentiles extracted from the DB.⁸ These differences could have at least two likely explanations. On the one hand, the direct survey questions about percentiles

⁷ The randomisation of the initial position of the markers on the left or on the right allows us to check whether the answers to the DB are very sensitive to the framing. Over the 839 participants retained, 51.61 % had the markers stacked on the left (proportion not significantly different from 50 %: $p = 0.35$). We did not find any significant differences in answers as a function of the markers initial location. A t-test of means indicate that both groups gave very similar answers in average ($p = 0.69$). A plot of the two corresponding densities, similar to the one from Fig. 2 does not show any difference between the two distributions.

⁸ This result is consistent with other studies. The DB estimates tend to be less variable and more accurate Goldstein and Rothschild (2014).

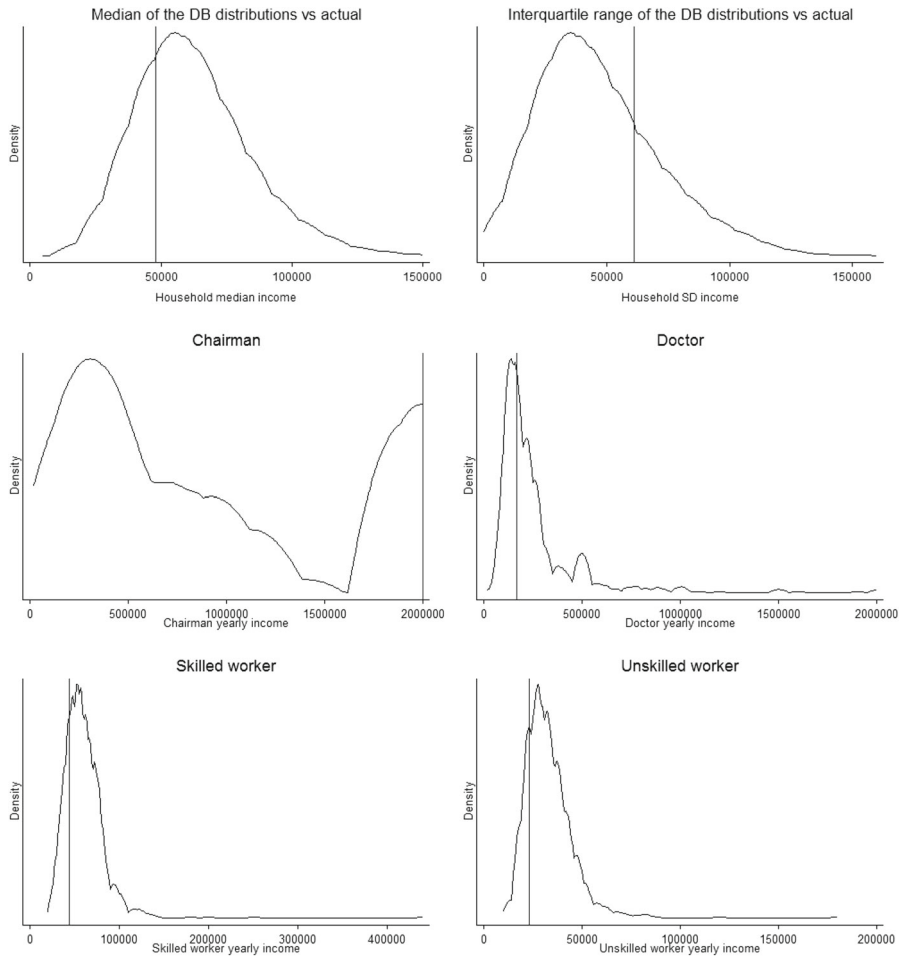


Fig. 3 Distribution of participants' beliefs. Centrality (median) and dispersion (interquartile range) of the DB distributions (*upward panels*) and beliefs about the income of each profession. Scales are not constant. Actual median and interquartile range are indicated by a *vertical line* in *top two panels*, median income values for each profession are given in the *four lower panels*

may appear abstract and unfamiliar, leading to noise from miscomprehension, while the frequency format of the DB could help participants express their beliefs in an intuitive way. On the other hand, one could think that the DB provides an x-axis that gives the participants cues about the likely range of the true distribution (though this would not explain how participants were able to correctly infer the shape and skewness of the distribution within the range).⁹ These possible caveats justify using multiple

⁹ Note that the cues provided by the DB would be limited: The upper end of the DB axis was labelled \$205,000 and above, and participants were free to place any number of markers in this bin. Still the DB is not clue free, and participants could try to read through the choice of axis some underlying knowledge revealed by the experimenters. We tried to minimise this concern by choosing an upper label slightly above

techniques to capture beliefs about income inequality, such as the items concerning the incomes of typical professions. These professional income questions also have the advantage of being more concrete than the DB task. Figure 3 shows the distribution of beliefs for the four professions. It is interesting to observe that the answers to these questions also indicate a tendency to underestimate inequalities. Using Bureau of Labor Statistics data to approximate the values of the answer to the questions, we find that more than 70 % of the participants provided incomes for chairpeople below the actual average income for chairpeople.¹⁰ Furthermore, a majority of participants overestimated the income of skilled and unskilled workers, with 82 and 84 % of participants providing incomes higher than the average income of these groups. The data also show a significant dispersion of answers expressing the imprecision of the participants' level of knowledge about what various workers earn.

The results of the varied elicitation methods suggest that even though each method may present some limitations, their use in conjunction allows for a better understanding of individuals' beliefs about the income distribution.

Result 2 *We find evidence of correlation between respondents' personal characteristics and beliefs about the income distribution, however we only find limited evidence of correlation between local area characteristics and respondents' beliefs in the income distribution.*

To assess whether differences in subjective beliefs are associated with differences in individual characteristics, we use OLS regressions to look at the correlations between the subjective beliefs about the income distribution and participants' characteristics. While we find that several characteristics are correlated with beliefs, we find only limited correlations between beliefs and local economic variables.

We use the estimates from the DB to look at the individual differences in beliefs about percentiles (namely the 10th, 25th, 50th, 75th, and 90th percentiles) of the income distribution. In Table 2, columns 1–6 show the results of OLS regressions with these variables as explained variables. As a measure of income dispersion, we use the interquartile range (column 7) and we also use the two direct questions from the survey about the 50th and 95th percentiles. We find that older and more educated

Footnote 9 continued

the true 95th percentile, not too far from the real value but unlikely to seem too low or too high. In practice, the tendency of respondents to draw skewed distribution with only few markers on the top category could suggest that they did not feel constrained by the x axis. A possible alternative to our choice of design for future studies would be to adopt as a 95th percentile the level from the answers to the questionnaire. The drawback of this alternative is that if participants do not understand the concept of 95th percentile, it can introduce noise in the elicitation procedure by creating an upper income category which is way off the mark.

¹⁰ We took the data from the [Of Labor Statistics B \(2010\)](#). While our survey questions asked for average income, the BLS only give data for median income. This is likely to give a lower bound for the average income in the profession, in particular for doctors and chairpeople where a negative skew in the distribution is likely to exist. For each category, we took a representative profession listed by the BLS (overall results are not sensitive to the choice of other specific professions. The BLS data gives: (1) Unskilled factory worker (Food processing workers) \$23,000 per year (2) Skilled factory workers (Industrial Machinery Mechanics and Maintenance Workers) \$44,000 per year (3) Doctors (Physicians and Surgeons) \$166,400 per year (4) Chairman of a large national corporation (based on 158 Standard & Poors 500 index companies) \$9,000,000 per year.

Table 2 Beliefs about the shape of the income distribution

| | (1) 10th Percentile | (2) 25th Percentile | (3) 50th Percentile | (4) 75th Percentile | (5) 90th Percentile | (6) 95th Percentile | (7) Interquartile | (8) 50th Percentile Q. | (9) 95th Percentile Q. |
|---------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------|----------------------------|-------------------|---------------------------|---------------------------|
| Education | -1916.92** (680.69) | -1611.10* (779.15) | -2797.30** (966.83) | -3436.17* (1394.08) | -1425.47 (1725.78) | 1997.46 (1764.24) | -0.04 (0.04) | -2746.96** (1016.69) | 8.32e+07 (6.60e+07) |
| Income | 0.03*** (0.01) | 0.04*** (0.01) | 0.06*** (0.01) | 0.07*** (0.02) | 0.07** (0.02) | 0.04 (0.03) | -0.00 (0.00) | 0.05*** (0.01) | -613.59 (479.66) |
| Male | 75.23 (1121.90) | -687.19 (1219.15) | -1771.05 (1540.45) | -2582.94 (2208.14) | -2164.78 (2740.66) | -1618.98 (2856.19) | -0.04 (0.06) | -4623.94** (1519.81) | 9.66e+07 (1.29e+08) |
| Age | -143.00*** (34.91) | -84.16* (41.30) | 77.94 (55.56) | 367.14*** (76.99) | 612.41*** (97.15) | 667.70*** (100.06) | 0.01*** (0.00) | -80.16 (55.24) | 2.09e+06 (1.44e+06) |
| Local pop. dens. | 51955.37 (208316.26) | 82759.45 (219480.23) | 99530.00 (246939.62) | 175841.14 (259634.41) | 136886.77 (266338.12) | 403052.11 (266634.19) | 5.79 (6.36) | 47742.43 (202819.61) | -9.11e+09 (7.70e+09) |
| Local avg. inc. | 21.22 (29.62) | 14.06 (32.83) | -18.13 (41.15) | -75.44 (59.61) | -85.45 (74.51) | -53.83 (80.53) | -0.00 (0.00) | -37.88 (44.09) | 2.72e+06 (3.54e+06) |
| Local st. dev. inc. | 0.02 (0.09) | 0.07 (0.10) | 0.10 (0.13) | 0.07 (0.19) | 0.17 (0.24) | 0.25 (0.26) | 0.00 (0.00) | 0.13 (0.15) | 123.35 (2271.35) |
| Local Black pop. | -0.16* (0.07) | -0.18* (0.08) | -0.11 (0.12) | -0.03 (0.18) | 0.30 (0.24) | 0.43 (0.24) | 0.00 (0.00) | -0.17 (0.14) | 9790.70 (10084.31) |
| Local Asian pop. | 0.14 (0.21) | 0.26 (0.20) | 0.38 (0.23) | 0.55 (0.38) | 0.87 (0.59) | 0.55 (0.55) | -0.00 (0.00) | 0.19 (0.29) | 12587.45 (13277.84) |
| Constant | 39087.33*** (3963.03) | 47056.44*** (4371.96) | 59917.51*** (5911.59) | 79771.11*** (8472.48) | 96192.39*** (10930.51) | 104404.27*** (11250.73) | 1.80*** (0.22) | 59898.00*** (6287.20) | -4.29e+08 (4.15e+08) |
| R-squared | 0.04 | 0.02 | 0.02 | 0.04 | 0.05 | 0.06 | 0.03 | 0.02 | -0.00 |
| N | 825 | 825 | 825 | 825 | 825 | 825 | 825 | 825 | 825 |

The dependent variables are at the top of each column. Columns (1)–(7) use the answers from the DB, columns (8) and (9) use the answers to the survey questionnaire. SE in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

people tend to give a more accurate picture of the income distribution with lower income estimates for lower percentiles and higher income estimates for higher percentiles. As a consequence, the distribution of the interquartile range for older and more educated people is more concentrated around the actual value. Personal income correlates positively with the beliefs about the level of almost all percentiles except the highest ones. Our results suggest that wealthier participants tend to overestimate the income of the bottom 90 % of the population.

Most local variables, such as local income inequality, are not correlated with beliefs elicited with the DB.¹¹ This stands in contrast to recent studies finding that local situations affect perceptions of global conditions (Snowberg et al. 2011; Li et al. 2011; Cruces et al. 2013). One exception is that the number of African Americans in a ZIP code does correlate with beliefs about income inequalities, with people living in areas with more African Americans being less likely to overestimate the lowest percentiles of the income distribution.¹²

Once again, the results from the multiple elicitation methods lend support for the use of the DB. When comparing the regression results using answers about the 50th percentiles from the DB and from the direct questions, the results are reasonably close (see Table 2). Looking at the correlation between participants' characteristics and their beliefs about the typical level of income of the four specific professions gives results that are largely in line with those collected with the DB (see Table 3). More educated participants made more accurate inferences about the average income of professions, providing lower estimates for skilled and unskilled workers and higher estimates for chairpeople. Participants with higher incomes overestimated the incomes of unskilled and skilled workers. Older respondents tended to give higher estimates for each profession instead of giving lower estimates for low income professions and higher estimates for high income professions. The inclusion of local variables in these regressions shows that in areas where the average income per household is higher, participants tended to have lower estimates of the yearly income of unskilled and skilled workers and tended to provide higher estimates of a chairperson's yearly income. It is not clear a priori whether this reflects an effect of the local income distribution. A reference-group approach (Cruces et al. 2013) would on the contrary suggest that people living in richer neighborhoods overestimate the income of poorer households in the country. It is possible that this effect only reflects better knowledge of the distribution by households living in richer neighborhoods—note that the signs of the coefficients follow the same patterns as for the education variable.

Overall, our results are globally consistent and do not indicate any major misalignment between questions and answers across the DB and the survey questions. One limitation of the above approach is that it only allows studying the link between individual characteristics and specific parts of the distribution or specific statistics of

¹¹ In addition, we also tested for possible correlations between more elaborate measures of inequality, such as the Gini coefficient, between the DB distribution and the local income distribution at the Zip level or in the county (using both income standard deviation and local Gini coefficients). We did not find any correlation.

¹² Our sample does not contain enough African American or Asian American participants to estimate significant differences between these categories and White Americans in terms of beliefs.

Table 3 Beliefs about the income level of typical professions

| | (1) Unskilled | (2) Unskilled | (3) Skilled | (4) Skilled | (5) Doctor | (6) Doctor | (7) Chairman | (8) Chairman |
|---------------------|-----------------|-----------------|-----------------|------------------|-------------------|-------------------|------------------|-------------------|
| Education | -1.91*** (0.56) | -1.84*** (0.56) | -1.53 (1.26) | -1.39 (1.22) | -21.66 (11.17) | -23.68* (11.11) | 89.63** (33.80) | 81.54* (33.87) |
| Income | 0.02* (0.01) | 0.03* (0.01) | 0.04* (0.02) | 0.05** (0.02) | -0.01 (0.15) | -0.02 (0.16) | 0.82 (0.42) | 0.49 (0.42) |
| Male | 0.86 (0.94) | 0.78 (0.94) | 4.82 (2.50) | 4.64 (2.47) | -37.33* (15.38) | -37.27* (15.39) | 149.01** (54.27) | 155.65** (54.20) |
| Age | 0.14*** (0.03) | 0.14*** (0.03) | 0.33*** (0.07) | 0.34*** (0.07) | 3.07*** (0.71) | 3.09*** (0.71) | 13.61*** (1.81) | 13.11*** (1.82) |
| Local Black pop. | -0.00 (0.00) | -0.00 (0.00) | 0.00 (0.00) | -0.00 (0.00) | -0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) |
| Local Asian pop. | -0.00 (0.00) | -0.00 (0.00) | -0.00 (0.00) | -0.00 (0.00) | 0.00 (0.00) | 0.00 (0.00) | 0.02 (0.01) | 0.01 (0.01) |
| Local pop. dens. | | -67.11 (70.62) | | -94.04 (146.70) | | 1615.66 (1395.34) | | 3700.03 (6130.16) |
| Local avg. inc. | | -0.05* (0.03) | | -0.10* (0.04) | | -0.28 (0.38) | | 3.01* (1.48) |
| Local st. dev. inc. | | 0.00 (0.00) | | -0.00 (0.00) | | 0.00 (0.00) | | 0.01 (0.00) |
| Constant | 30.40*** (2.21) | 31.97*** (3.68) | 44.95*** (6.08) | 49.54*** (10.40) | 189.39*** (37.41) | 123.81* (56.81) | -1.93 (132.77) | -334.60 (200.00) |
| R-squared | 0.04 | 0.04 | 0.05 | 0.05 | 0.03 | 0.03 | 0.09 | 0.09 |
| N | 839 | 839 | 839 | 839 | 839 | 839 | 839 | 839 |

The dependent variables are at the top of each column. SE in brackets

* p < 0.05, ** p < 0.01, *** p < 0.001

dispersion. This can be misleading as there can be a link between statistics of centrality and dispersion. This is the case in particular for skewed distributions such as the income distribution. To address this issue, we use maximum likelihood estimation of the parameters of a lognormal distribution that best fits the distributions participants submitted with the DB. We can then estimate jointly the measures of centrality μ and dispersion σ for each participant's DB distribution and can then model these two parameters as a function of individuals' characteristics. The results of this estimation (provided in the Appendix) provide qualitatively similar results to those of Table 2.

6 Beliefs about income inequalities and political position

The large range of beliefs elicited (e.g., beliefs about the overall level of inequality, belief in social mobility in general, personal experience of social mobility) allows us to study how these different beliefs relate to political positions. To do so, we use beliefs to predict answers to two questions: a question on the preference for income redistribution, and a question about positioning oneself on a traditional left-right scale.

Result 3 *Preference for redistribution and left leaning political position are not correlated with overall measures of income inequality or income dispersion. However they are correlated with beliefs in the level of income of the poorest households.*

To study preferences for redistribution, we analyse respondents' beliefs about whether income differences are currently too large in America. Political position was measured with a Likert scale item in which higher values indicate a tendency of be on the political left. Similar results to those we report below are obtained when looking at partisanship for the Democrats or Republicans.

Table 4 shows the regression results of the answers to the question asking respondents whether they think that income differences are currently too large in America (columns 1–4) and to the question about left-right position. With regard to individual demographics, the results are in line with common patterns in which participants with higher incomes are significantly less favorable to redistribution while participants with higher levels of education and those from urban areas are more favorable to it. When looking at beliefs about income inequality, we find that the beliefs about the level of inequality measured with an overall index of dispersion (here the interquartile range¹³ from the DB) is significantly correlated with redistribution preferences (columns 1–2) but not with a left leaning position (columns 5–6).

Interestingly, when we use the items about the incomes of specific professions as a way to measure beliefs about income dispersion, we find that the belief about the lowest income profession (unskilled worker in a factory) is always strongly significant: Participants are more likely to be in favor of income redistribution when they believe that unskilled workers in a factory have lower incomes ($p < 0.001$). This suggests that redistribution preferences may be more sensitive to beliefs about the lower tail of the income distribution.

¹³ The results are robust to other specifications.

Table 4 Regression of preference for redistribution and political position on beliefs about inequality of the income distribution (all income variables in thousands of dollars)

| | (1) Ineq. large | (2) Ineq. large | (3) Ineq. large | (4) Ineq. large | (5) Left leaning | (6) Left leaning | (7) Left leaning | (8) Left leaning |
|-------------------------------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|
| Median DB 000s | 0.01 (<0.01) | 0.01 (<0.01) | | | -0.01* (<0.01) | -0.01 (<0.01) | | |
| Interquartile range | 0.07* (0.03) | 0.06* (0.03) | | | -0.01 (0.05) | 0.01 (0.06) | | |
| Income 000s | | 0.01** (<0.01) | | 0.01** (<0.01) | | -0.01* (<0.01) | | -0.01* (<0.01) |
| Male | | -0.11 (0.10) | | -0.10 (0.10) | | -0.15 (0.13) | | -0.11 (0.13) |
| Age | | 0.01 (<0.01) | | 0.01 (<0.01) | | -0.01* (<0.01) | | -0.01 (<0.01) |
| Education | | 0.12* (0.06) | | 0.10 (0.06) | | 0.42*** (0.09) | | 0.37*** (0.08) |
| Black | | 0.01 (<0.01) | | 0.01 (<0.01) | | -0.01 (<0.01) | | -0.01 (<0.01) |
| Asian | | 0.01 (<0.01) | | 0.01 (<0.01) | | -0.01 (<0.01) | | -0.01 (<0.01) |
| Local pop. dens. | | 26.63** (9.57) | | 26.61** (9.57) | | 62.35*** (12.33) | | 61.10*** (11.77) |
| Local av. inc. 000s | | 0.01 (<0.01) | | 0.01 (<0.01) | | -0.01 (<0.01) | | -0.01 (<0.01) |
| Local st. dev. inc. | | 0.01 (<0.01) | | 0.01 (<0.01) | | -0.01 (<0.01) | | -0.01 (<0.01) |
| Chairman yearly income 000s | | | 0.01 (<0.01) | 0.01 (<0.01) | | | -0.01 (<0.01) | -0.01 (<0.01) |
| Doctor yearly income 000s | | | 0.01 (<0.01) | 0.01 (<0.01) | | | -0.01* (<0.01) | -0.01 (<0.01) |
| Skilled worker yearly income 000s | | | 0.01 (<0.01) | 0.01 (<0.01) | | | -0.01 (<0.01) | -0.01 (<0.01) |
| Unskilled worker yearly income 000s | | | -0.02*** (0.01) | -0.02*** (0.01) | | | -0.03*** (0.01) | -0.03*** (0.01) |
| Constant | 3.48*** (0.17) | 3.27*** (0.39) | 3.98*** (0.15) | 3.71*** (0.39) | -3.34*** (0.26) | -4.18*** (0.54) | -2.49*** (0.22) | -3.47*** (0.53) |
| R-squared | 0.01 | 0.02 | 0.01 | 0.03 | 0.01 | 0.08 | 0.05 | 0.11 |
| N | 818 | 818 | 818 | 818 | 825 | 825 | 825 | 825 |

SE in parentheses

* p < 0.05, ** p < 0.01, *** p < 0.001

Table 5 Beliefs on different percentile of the distribution of income and rightwing position

| Percentile | 5 | 10 | 25 | 50 | 75 | 90 | 95 |
|--------------------------------------|--------|--------|--------|-------------------|-------------------|------|-------|
| No control (1) | 0.15** | 0.15** | 0.12** | 0.08* | 0.04 [†] | 0.02 | -0.00 |
| Demographics controls (2) | 0.13** | 0.13* | 0.11** | 0.06 [†] | 0.03 | 0.01 | 0.00 |
| Demographic and beliefs controls (4) | 0.13* | 0.13* | 0.11* | 0.06 [†] | 0.03 | 0.01 | 0.00 |

For an increase of \$10,000 in the perceived income percentile from the DB (in column), each number in the table represents the marginal effect on the variable indicating a right wing position. The first column represents the marginal increase of \$10,000 in the 5th percentile, and so on. These coefficients are estimated by replacing the DB median by each percentile in the regressions (5) and (6) of Table 4 and regression (4) of Table 6

Coefficients significant at [†] 10 %, * 5 %, ** 1 %

To further investigate this possibility, we use the rich information elicited with the DB. Instead of only extracting the median in the distribution, we extract a wider range of percentiles in the subjective distributions. This allows us to study whether various parts of the subjective distributions are more correlated with political positions than others. If a left-wing position is linked with the view that inequality is too great, this could be driven either by a concern for the poorest households, or by a reprobation for the incomes of the richest people, or by both. In Table 5, we show the results of replacing the median in models (5) and (6) from Table 4 and (4) from Table 6 by key percentiles. The coefficients for each percentile are displayed for the three regression models. The results confirm those from Tables 4 and 6, namely, that the beliefs about the income of the poorest households in the society are those which correlate most highly with political positions. Providing high estimates of the poorest people's income predicts being on the right, while beliefs about the income of wealthier groups do not correlate with political positions. This pattern persists and stays significant even when covariates from models (2) and (4) of Table 6 are included in the regression. These results bring support to those from Tables 5 and 6 where the beliefs about unskilled workers income have a strong and very significant effect on preferences for redistribution an political positions, respectively.¹⁴

Result 4 *Preferences for redistribution and political positions are not clearly correlated with the belief in the personal prospect of mobility. However, they are correlated with beliefs in the ease of upward social mobility in society.*

¹⁴ One possible explanation could be that higher income respondents are both less informed about low household incomes (and as a consequence overestimated them) and more conservative. In that case, the correlation between beliefs and political position would just be a spurious link created by the correlation between the political position of the respondent and his/her degree of error made when asked to guess the level of income of the poorest households. We checked for such a possible explanation by running the same regression on the subsample of respondents with an income lower than \$50,000 (median of the US distribution of household incomes) and on the subsample of those whose income is higher than \$80,000 (75th percentile of the distribution) poorest respondents in our sample. In both samples, beliefs about the income of the poorest had a similarly positive marginal effect on political positions. This indicates that the observed correlation between beliefs about the lowest incomes in society and political positions is not reflecting different errors from respondents.

Table 6 Regression of preference for redistribution and political position on beliefs about inequality of the income distribution and beliefs about social mobility (all income variables in thousands of dollars)

| | (1) Ineq. large | (2) Ineq. large | (3) Left leaning | (4) Left leaning |
|-----------------------------------------|-----------------|-----------------|------------------|------------------|
| Median DB | 0.01 (<0.01) | | 0.01 (<0.01) | |
| Interquartile range | 0.04 (0.03) | | -0.02 (0.06) | |
| Income 000s | -0.01* (<0.01) | -0.01* (<0.01) | 0.01 (<0.01) | 0.01 (<0.01) |
| Male | -0.14 (0.10) | -0.13 (0.10) | -0.21 (0.13) | -0.18 (0.13) |
| Age | 0.01 (<0.01) | 0.01 (<0.01) | -0.01* (<0.01) | -0.01 (<0.01) |
| Education | 0.08 (0.06) | 0.07 (0.06) | 0.37*** (0.08) | 0.34*** (0.08) |
| Black | 0.01 (<0.01) | 0.01 (<0.01) | 0.01 (<0.01) | 0.01 (<0.01) |
| Asian | 0.01 (<0.01) | 0.01 (<0.01) | 0.01 (<0.01) | 0.01 (<0.01) |
| Local pop. dens. | 18.29* (9.11) | 18.46* (9.04) | 52.71*** (11.41) | 52.42*** (10.73) |
| Local average income per household 000s | 0.01 (<0.01) | 0.01 (<0.01) | 0.01 (<0.01) | 0.01 (<0.01) |
| Local st. dev. inc. | 0.01 (<0.01) | 0.01 (<0.01) | 0.01 (<0.01) | 0.01 (<0.01) |
| Parent | 0.02 (0.03) | 0.01 (0.03) | -0.02 (0.04) | -0.03 (0.04) |
| Open society | -0.14*** (0.03) | -0.13*** (0.03) | -0.14*** (0.04) | -0.12** (0.04) |
| Hard work | -0.34*** (0.07) | -0.34*** (0.07) | -0.53*** (0.10) | -0.50*** (0.10) |
| Income increase next 5 years 000s | 0.01 (<0.01) | 0.01 (<0.01) | 0.01 (<0.01) | 0.01 (<0.01) |
| Chairman yearly income 000s | | 0.01 (<0.01) | | 0.01 (<0.01) |
| Doctor yearly income 000s | | 0.01 (<0.01) | | 0.01* (<0.01) |
| Skilled worker yearly income 000s | | 0.01 (<0.01) | | 0.01 (<0.01) |
| Unskilled worker yearly income 000s | | -0.01** (0.01) | | -0.03*** (0.01) |
| Constant | 4.84*** (0.43) | 5.14*** (0.42) | -2.03*** (0.58) | -1.63** (0.58) |
| R-squared | 0.09 | 0.10 | 0.13 | 0.16 |
| N | 808 | 808 | 814 | 814 |

SE in brackets

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

When we include variables about the beliefs on social mobility, the variables about the median income and interquartile range cease to be significant for the preferences for redistribution. This result is robust to a wide range of inequality measures (e.g., variance, Gini coefficients). On the contrary, the beliefs about the average income of unskilled workers stays significantly correlated with political positions. Lower estimates of unskilled factory workers income are positively associated with left-wing leanings. We also find that, to a lower degree, this is also true for estimates of doctors' incomes.

The prospect of upward mobility, measured by expectations of an income increase over the next five years, is not significant at conventional level. Social mobility already

experienced (i.e., the question about present success relative to one's parents) is not significantly correlated with preferences for redistribution when controlling for individuals characteristics. On the contrary, we find that the beliefs about social mobility in general (questions about the US being an open society and whether hard work or luck is an explanation for social success) are the main predictors of preferences for redistribution. The significance of these beliefs as predictors is very strong ($p < 0.001$) even when controlling for individual characteristics, individual experience, and personal prospects of social mobility.

Overall, our results lend support to social mobility or reciprocity explanations, and suggest that the personal prospects of upward mobility are unlikely to be the main drivers of redistribution preferences. In regard to the possible existence of an “aversion to inequality”, our results suggest that respondents are not so much averse to inequality or dispersion in general—as would be suggested by certain behavioral models (Fehr and Schmidt 1999; Bolton and Ockenfels 2000)—as they are to low incomes for the poorest members of the society, consistent with quasi-maximin preferences and a concave altruistic utility function (Charness and Rabin 2002; Andreoni and Miller 2002; Cox and Sadiraj 2006).¹⁵

Overall, our results suggest that, while political positions are not very sensitive to the centrality and dispersion of the perceived income distribution, they are influenced by beliefs about the incomes of the poorest. This result stands in contrast to views in which self-interest or a philosophical objection to inequality largely governs redistribution preferences. Interestingly, our results with the DB indicate that the beliefs about the top 5th percentile of the distribution are not correlated with political position. A limit of the DB is that it has an upper bound at \$205,000. The answers from the survey about a chairman income seemed to back this lack of correlation between beliefs about high income and political position. The beliefs about doctors' income do not respect this pattern. Even though this result is less robust and significant than the link observed for unskilled workers' income, it may suggest that more research is warranted about beliefs about high incomes.¹⁶

¹⁵ A possible concern could be that low income respondents are more knowledgeable about the income of low income households than high income respondents who may overestimate the income from the poorest households in society. Such a situation would create the observed correlation if low income respondents tend to be in favor of redistribution and high income respondents tend to be against redistribution. The fact that the coefficient on the belief about unskilled workers' income does not change between columns (5) and (6) when the income of the respondent is included as a covariate tends to suggest that it is not what is driving the results. The coefficient from the income variable should partially capture the correlation between income and political position in column (6). The link between participants income and political position could however be non linear and be imperfectly captured by the inclusion of the income variable in the regression. We therefore constructed a set of four dummies for the quartiles of the income distribution and we included them in the regression. The results show that the coefficients and their level of significance are almost unchanged. This suggest that for respondents of different income levels, estimates of income of unskilled workers is positively correlated with being against redistribution.

¹⁶ We checked here again that this result could not simply reflect a better information from higher income respondents who tend to be more conservative. The magnitude of the coefficient does not decrease when the regressions are made within samples of richer and poorer respondents.

7 Discussion

The political economy and political science literatures have suggested several potential links between income inequality and preferences for wealth redistribution. In this study, we have elicited subjective beliefs about several dimensions of income inequality and investigated both the possible factors influencing these beliefs as well as the role these beliefs may play in determining political positions.

First, in contrast to recent studies finding evidence that local variables influence individual's beliefs about the state of the economy nationally, we find only limited evidence that beliefs about the national income distribution are influenced by the characteristics of the local income distribution (such as local average income or income dispersion). However, we do find that wealthier people assume that incomes are higher (their subjective distributions are shifted to the right) suggesting a kind of hyper-local influence on subjective estimates: neighbors' incomes do not seem to affect one's impressions, but one's own income does. This result is somewhat different than that of [Cruces et al. \(2013\)](#), which suggests that the relative position in the local income distribution influences a household's beliefs in its relative position in the national income distribution. Several reasons could explain these differences such as the different countries where the studies take place (USA and Argentina) or the different set of controls used in each study (we controlled for a wide range of local characteristics). One of the possible limitations of our strategy to study the role of local variables is that we may have failed to identify the right level of "locality" by using the characteristics of the ZIP code area. In that sense, our lack of results with local variables should not be seen as proof that local variables do not matter. Further studies could investigate other levels of geographical locality as well as the role of "local" information provided by social networks (friends, workplace).¹⁷

Second, we looked at the possible role of these beliefs in shaping preferences for redistribution. We find that beliefs about the income distribution are correlated with individual preferences for redistribution. Interestingly, we do not find any effect of the standard statistics of centrality or variance of the distribution. The main link between the perceived income distribution and political position on a left–right axis is the belief about income of the poorest members of society. We find that higher estimates of the incomes of the poorest (whether directly stated or extracted from the lower percentiles of people's DB rendering of the income distribution) are strongly correlated with a right-wing political leaning. Notably, this specific link between beliefs about the income distribution and political preferences is not what would naturally stem from the models of inequality aversion ([Fehr and Schmidt 1999](#); [Bolton and Ockenfels 2000](#)) which suggest a rejection of distributions with larger inequality. On the other hand, this result is in line with quasi-maximin and concave altruistic utility preferences in which individuals' utility over income distributions includes a trade off between efficiency and the conditions of those who are the worst off ([Charness and Rabin 2002](#); [Andreoni and Miller 2002](#); [Cox and Sadiraj 2006](#)). Such preferences are close to Rawls' maximin

¹⁷ We also investigated the effect of inequalities at the county level, with the same limited results. If another level of locality is appropriate, we suspect it may be a level closer to the respondent.

preferences (Rawls 1971), in which people care primarily about ensuring the highest level of resources for the poorest members of society.¹⁸ Experimental evidence has also shown that people labelled as “poor” benefit from higher transfers in dictator games (Braas-Garza 2006).

In addition to beliefs about inequalities, we find favorable support for the theory that a belief in the existence of social mobility may determine attitudes towards redistribution (Piketty 1995; Alesina and Angeletos 2005; Bénabou and Tirole 2006). Previous empirical studies have used survey data to provide support to this idea (Piketty 1996; Corneo and Grüner 2002). The present study provides further evidence by estimating the correlation between these beliefs and preference for redistribution while controlling for a wider range of beliefs about income inequality. Not only does this approach test the robustness of past studies, it also permits for the testing of more theories than was possible with existing surveys. In particular, we tested the joint role of beliefs about inequality and respondents’ prospects of upward mobility (Hirschman and Rothschild 1973; Ravallion and Lokshin 2000; Bénabou and Ok 2001; Fillippin and Checchi 2004). While a belief in *social mobility in general* predicts political positions, it is not the case for one’s own personal chances of upward mobility.

In the television program *The West Wing*, the US President is asked “Who gives a damn, sir? This is a tax cut that benefits only 4,500 families.” The President replies, “It doesn’t matter if most voters don’t benefit. They all believe that someday they will. That’s the problem with the American dream: it makes everyone concerned for the day they’re gonna be rich.” In contrast to this opinion, which suggests that voters are concerned for the day they will become rich, the present investigation finds empirical support for the idea that people oppose further redistribution when they believe that *anyone* can become rich.

Appendix 1: Survey sample

The Table 7 below compares the sampling firm panel demographics to our sample. The largest differences is observed for gender with more female respondents than in the overall panel. We have already experienced such a gender imbalance in previous uses of this firm panel. This suggests that it may be due to a general gender differences in the propensity to participate to a survey rather than a selection induced specifically by our topic. We also observe a smaller number of young participants, a larger number of participants with high income. We have now added this information to the description of our sample.

We retained 82 % of the initial sample and eliminated respondent who looked that they may not have taken the task seriously. Table 8 compares the answers of both samples (retained and not retained). On most answers, there are no significant differences. The standard deviation of the distribution elicited by the DB is significantly higher in the retained sample relative to the non retained sample. It is likely to be a

¹⁸ The recent “Occupy Wall Street” political movement, rallying under the cry of “We are the 99 %”, used the high level of inequality at the top of the income distribution to mobilize support. Our results suggest that people may be more influenced towards redistribution by focusing on the lower end of the distribution instead.

Table 7 Comparison of the study sample with the sampling firm panel demographics

| Variable | Retained sample (%) | Overall sampling firm panel (%) |
|----------------------|---------------------|---------------------------------|
| Age 18–24 | 2.5 | 14 |
| Age 25–34 | 20.6 | 18 |
| Age 35–44 | 21.5 | 20 |
| Age 45–54 | 23.4 | 19 |
| Age 55–64 | 22 | 19 |
| Age 65+ | 10.1 | 10 |
| Female | 72 | 51 |
| Income < \$15k | 3.2 | 10 |
| Income \$15k–\$25k | 4.6 | 19 |
| Income \$25k–\$50k | 22.8 | 29 |
| Income \$50k–\$75k | 23.5 | 20 |
| Income \$75k–\$100k | 20 | 10 |
| Income \$100k–\$150k | 18.3 | 8 |
| Income \$150k+ | 7.5 | 5 |

Table 8 Comparison of the retained sample with the non retained sample

| | Retained sample | Non retained sample | t-test p-value |
|-------------------|-----------------|---------------------|----------------|
| Mean DB | 72,749 | 73,205 | 0.78 |
| Median DB | 52,938 | 51,117 | 0.30 |
| St. Dev. DB | 39,925 | 32,428 | <0.001* |
| Income chairman | 1,031,365 | 889,892 | 0.02* |
| Income doctor | 258,879 | 258,753 | 0.99 |
| Income skilled w. | 60,369 | 56,478 | 0.05* |
| Income unsk. w. | 32,872 | 31,263 | 0.11 |
| Open Society | 5.23 | 5.15 | 0.54 |
| Hard work | 2.36 | 2.40 | 0.47 |
| Parent | 5.35 | 5.42 | 0.33 |
| Right wing | 3.83 | 3.64 | 0.18 |
| Democrat | 57.6 % | 58.3 % | 0.88 |
| N | 839 | 186 | |

mechanical effect of the rule we chose: we eliminated participants who clicked less than 5 times on the DB. This is likely to eliminate participants who created DB distributions with only limited dispersion. The retained sample also display a belief which is (marginally) significantly higher than for the non retained sample. Overall, our choice to retain the sample do not lead to a sample of respondents with very different answers. In particular, there are no significant differences in regard to the answers to the political questions.

Appendix 2: Structural estimation

Estimating a parametric distribution from DB data requires taking into account that the DB allows participants to give an estimate of the percentage of households in a series of brackets 10,000 dollars wide each, up to the highest bracket “\$205k and above”. To summarize beliefs about the income dispersion in one parameter, we model the DB observations as coming from a lognormal distribution with mean and standard deviation μ and σ . To estimate these parameters for each participant, we maximise the log-likelihood function for each individual i :

$$\ell(\mu_i, \sigma_i | M_i) = \sum_{k=1}^{100} \sum_{j=1}^{22} \ln \left(\Phi \left(\frac{\ln(\bar{b}_j) - \mu_i}{\sigma_i} \right) - \Phi \left(\frac{\ln(\underline{b}_j) - \mu_i}{\sigma_i} \right) \right)$$

where M_i is the vector of observed marker values m_{ki} for the individual i , with k being the id of the marker for each participant, j the id of the bracket and $\underline{b}_j, \bar{b}_j$ respectively the lower and upper bounds of bracket j (with $\underline{b}_1 = 0$ and $\bar{b}_{22} = +\infty$).

This model allows us to estimate how different participant characteristics correlate with participants’ beliefs about the shape of the distribution. To do so, we sum the individual log likelihood over the whole sample:

$$\mathcal{L}(\mu, \sigma | M) = \sum_{i=1}^N \ell(\mu_i, \sigma_i | M_i) \tag{5}$$

where M is the vector of all observed marker values m_{ki} in the sample. In order to estimate links between individual and local characteristics of participants and their beliefs, we parametrize the coefficients as linear functions of vectors of observed variables X_1 and X_2 respectively:

$$\begin{aligned} \mu &= \beta_1 X_1 \\ \sigma &= \beta_2 X_2 \end{aligned} \tag{6}$$

Table 9 shows the results of the estimations of parameters μ and σ from the lognormal distribution by maximizing the likelihood (5). The parameters are written as linear functions of variables characterizing the individual and local characteristics following equation (6). To take the non-independence of observations within participants into account, we use a robust matrix of variance clustered by participants. We find that education and age are significant, while no local variable is significant.

Appendix 3: Median comparison

An interesting feature of our design is the elicitation of the subjective belief about the median household income using two different methods: a direct question and the Distribution Builder. Figure 4 shows the scatterplot of the individual answers to these two methods. There are clearly lots of variations across the two elicitation methods

Table 9 Beliefs about the moments of the distribution from the distribution builder

| | (1) | (2) | (3) | (4) | (5) |
|---------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| μ | | | | | |
| Education | | -0.028* (0.043) | -0.028* (0.043) | -0.031* (0.031) | -0.032* (0.027) |
| Income | | 0.001*** (0.000) | 0.001*** (0.000) | 0.001*** (0.000) | 0.001*** (0.000) |
| Male | | -0.018 (0.412) | -0.018 (0.412) | -0.021 (0.340) | -0.019 (0.375) |
| Age | | 0.001 (0.403) | 0.001 (0.403) | 0.001 (0.351) | 0.001 (0.323) |
| Local avg. inc. | | | | | -0.000 (0.817) |
| Local pop. dens. | | | | | 2.091 (0.431) |
| Local Black pop. | | | | -0.167* (0.041) | -0.170* (0.039) |
| Local Asian pop. | | | | 0.041 (0.421) | 0.038 (0.451) |
| Constant | 10.995*** (0.000) | 10.982*** (0.000) | 10.982*** (0.000) | 10.988*** (0.000) | 10.993*** (0.000) |
| σ | | | | | |
| Education | | 0.012 (0.188) | 0.012 (0.188) | 0.012 (0.176) | 0.010 (0.266) |
| Income | | -0.000** (0.009) | -0.000** (0.009) | -0.000* (0.011) | -0.000* (0.010) |
| Male | | -0.011 (0.449) | -0.011 (0.449) | | |
| Age | | 0.003*** (0.000) | 0.003*** (0.000) | 0.003*** (0.000) | 0.003*** (0.000) |
| Local avg. inc. | | | | | 0.000 (0.881) |
| Local st. dev. inc. | | | | | -0.000 (0.711) |
| Local pop. dens. | | | | | 2.906* (0.024) |
| Local Black pop. | | | | 0.049 (0.340) | 0.039 (0.452) |
| Local Asian pop. | | | | -0.012 (0.688) | -0.012 (0.687) |
| Constant | 0.679*** (0.000) | 0.516*** (0.000) | 0.516*** (0.000) | 0.514*** (0.000) | 0.529*** (0.000) |
| R-squared | | | | | |
| N | 825 | 825 | 825 | 825 | 825 |

* p < 0.05, ** p < 0.01, *** p < 0.001

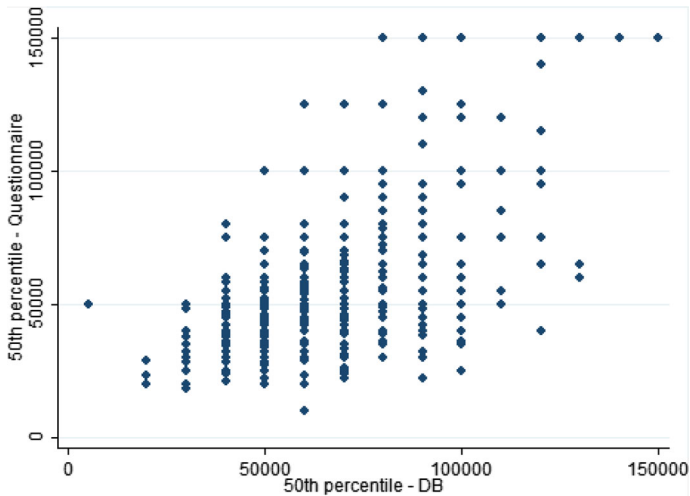


Fig. 4 Individual answers about the median in the questionnaire and in the DB

reflected in the overall correlation of 0.6 between the two types of answers. We think that these difference can be due to the abstract nature of the direct question which require participants to think about the notion of percentile. This may lead to more noisy answer from guesses. Another possibility is that people may take more or less care in answering each question. Overall 60 % of participants's estimates about the median via these two methods are within \$10,000 from each other and 78 % are within \$20,000.

References

- Alesina A, Angeletos G (2005) Fairness and redistribution. *Am Econ Rev* 95(4):960–980
- Alesina A, Giuliano P (2009) Preferences for redistribution. Technical report, National Bureau of Economic Research
- Alesina A, La Ferrara E (2005) Preferences for redistribution in the land of opportunities. *J Public Econ* 89(5–6):897–931
- Alesina A, Rodrik D (1994) Distributive politics and economic growth. *Q J Econ* 109(2):465–490
- Andreoni J, Miller J (2002) Giving according to garp: an experimental test of the consistency of preferences for altruism. *Econometrica* 70(2):737–753
- Atkinson A (1970) On the measurement of inequality. *J Econ Theory* 2(3):244–263
- Atkinson A, Bourguignon F (1982) The comparison of multi-dimensioned distributions of economic status. *Rev Econ Stud* 49(2):183–201
- Bénabou R, Ok E (2001) Social mobility and the demand for redistribution: the poum hypothesis. *Q J Econ* 116(2):447–487
- Bénabou R, Tirole J (2006) Belief in a just world and redistributive politics. *Q J Econ* 121(2):699–746
- Bolton G, Ockenfels A (2000) Erc: a theory of equity, reciprocity, and competition. *Am Econ Rev* 90(1):166–193
- Braas-Garza P (2006) Poverty in dictator games: awakening solidarity. *J Econ Behav Organ* 60(3):306–320
- Brunner E, Ross S, Washington E (2011) Economics and policy preferences: causal evidence of the impact of economic conditions on support for redistribution and other ballot proposals. *Rev Econ Stat* 93(3):888–906
- Charness G, Rabin M (2002) Understanding social preferences with simple tests. *Q J Econ* 117(3):817

- Cleave BL, Nikiforakis N, Slonim R (2010) Is there selection bias in laboratory experiments? University of Sydney-Economics Working Paper Series
- Corneo G, Grüner H (2002) Individual preferences for political redistribution. *J Public Econ* 83(1):83–107
- Cox J, Sadiraj V (2006) Direct tests of models of social preferences and a new model, Andrew Young School of Policy Studies Research Paper Series, 07-13
- Cruces G, Perez Truglia R, Tetaz M (2013) Biased perceptions of income distribution and preferences for redistribution: evidence from a survey experiment. *J Public Econ* 98:100–112
- Di Tella R, Galiani S, Schargrodsky E (2007) The formation of beliefs: evidence from the allocation of land titles to squatters. *Q J Econ* 122(1):209
- Engelmann D, Strobel M (2004) Inequality aversion, efficiency, and maximin preferences in simple distribution experiments. *Am Econ Rev* 94(4):857–869
- Engelmann D, Strobel M (2007) Preferences over income distribution, experimental evidence. *Public Financ Rev* 35(2):285–310
- Fehr E, Schmidt K (1999) A theory of fairness, competition, and cooperation. *Q J Econ* 114(3):817–868
- Fillippin A, Checchi D (2004) An experimental study of the poum hypothesis. *Res Econ Inequal* 11:115–136
- Fong C (2001) Social preferences, self-interest, and the demand for redistribution. *J Public Econ* 82(2):225–246
- Fong C, Bowles S, Gintis H (2006) Strong reciprocity and the welfare state. *Handb Econ Giv Recip Altruism* 2:1439–1464
- Gigerenzer G (1991) How to make cognitive illusions disappear: beyond heuristics and biases. *Eur Rev Soc Psychol* 2(1):83–115
- Giuliano P, Spilimbergo A (2009) Growing up in a recession: beliefs and the macroeconomy. Technical report, National Bureau of Economic Research
- Goldstein DG, Rothschild D (2014) Lay understanding of probability distributions. *Judgm Decis Mak* 9(1):1–14
- Goldstein DG, Johnson E, Sharpe W (2008) Choosing outcomes versus choosing products: consumer-focused retirement investment advice. *J Consum Res* 35(3):440–456
- Gottschalk P, Spolaore E (2002) On the evaluation of economic mobility. *Rev Econ Stud* 69(1):191–208
- Handbook, Occupational Outlook (2010) 2011 Edition US Bureau of Labor Statistics
- Harrison GW, Lau MI, Elisabet Rutström E (2009) Risk attitudes, randomization to treatment, and self-selection into experiments. *J Econ Behav Organ* 70(3):498–507
- Harsanyi J (1955) Cardinal welfare, individualistic ethics, and interpersonal comparisons of utility. *J Polit Econ* 75(5):309–321
- Hirschman A, Rothschild M (1973) The changing tolerance for income inequality in the course of economic development. *Q J Econ* 87(4):544
- Isaksson AS, Lindskog A (2009) Preferences for redistribution a country comparison of fairness judgements. *J Econ Behav Organ* 72(3):884–902
- Karni E, Safra Z (2002) Individual sense of justice: a utility representation. *Econometrica* 70(1):263–284
- Kitschelt H (1994) The transformation of European social democracy. Cambridge University Press, Cambridge
- Kolm SC (1969) The optimal production of social justice. In: Margolis J, Guitton S (eds) *Public economics*. Macmillan, London, pp 145–200
- Kuziemko I, Norton M, Saez E, Stantcheva S (2013) How elastic are preferences for redistribution? Evidence from randomized survey experiments. Technical report, National Bureau of Economic Research
- Li Y, Johnson EJ, Zaval (2011) Local warming: daily temperature deviation affects beliefs and concern about climate change. *Psychol Sci* 22(4):454–459
- Magée L, Robb A, Burbidge J (1998) On the use of sampling weights when estimating regression models with survey data. *J Econom* 84(2):251–271
- Norton M, Ariely D (2011) Building a better America one wealth quintile at a time. *Perspect Psychol Sci* 6(1):9
- Persson T, Tabellini G (2002) *Political economics: explaining economic policy*. MIT Press, Cambridge
- Piketty T (1995) Social mobility and redistributive politics. *Q J Econ* 110(3):551
- Piketty T (1996) Mobilité économique et attitudes politiques face à la redistribution, cEPREMAP working document No 9603
- Piketty T (2003) Attitudes vis-à-vis des inégalités de revenu en France: existerait-il un consensus. *Comprendre* 4:209–41
- Poole K, Rosenthal H (1991) Patterns of congressional voting. *Am J Polit Sci* 35(1):228–278

- Przeworski A, Sprague J (1986) Paper stones: a history of electoral socialism. University of Chicago Press Chicago, Chicago
- Ravallion M, Lokshin M (2000) Who wants to redistribute?: The tunnel effect in 1990s Russia. *J Public Econ* 76(1):87–104
- Rawls J (1971) A theory of justice. Harvard University, Cambridge
- Snowberg E, Meredith M, Ansolabehere S (2011) Micro-economic voting: local information and micro-perceptions of the macro-economy, SSRN
- Surowiecki J (2004) The wisdom of crowds: why the many are smarter than the few and how collective Economies, Societies and Nations, Doubleday, p 296
- Von Gaudecker HM, Van Soest A, Wengström E (2008) Selection and mode effects in risk preference elicitation experiments, *iZA Discussion Paper*
- Weymark J (1981) Generalized Gini inequality indices. *Math Soc Sci* 1(4):409–430