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Social Position and Fairness Views

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SOCIAL POSITION AND FAIRNESS VIEWS

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Social Position and Fairness Views*

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Abstract

We link survey data containing Danish people's perceptions of where they rank in various reference groups and fairness views with administrative records on their income history, life events, and reference groups. People know their income positions well, but believe others are closer to themselves than they really are. The perceived fairness of inequalities is strongly related to current social position, moves with shocks to social position (e.g., unemployment or promotions), and changes when people are experimentally shown their actual positions. People view inequalities within education group and co-workers as most unfair, but underestimate inequality the most exactly within these reference groups.

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People's social positions can affect their views on a range of issues. A long-standing literature on social status, economic decision-making, and subjective well-being shows that people care about their social positions relative to others (Duesenberry, 1949; Easterlin, 1974, 1995; Blanchflower and Oswald, 2004) and theoretical work in Political Economy and Public Economics highlights that social positions are important for fairness considerations and redistribution policy (Boskin and Sheshinski, 1978; Meltzer and Richard, 1981; Bénabou and Ok, 2001; Alesina and Angeletos, 2005). But how well do people actually know their own position relative to others and how does their social position affect their views on the fairness of inequality? How do they view (un)fairness of inequality within different reference groups and are they better or less well-informed about inequality and social position where it matters the most to them?

To answer these questions, we leverage a unique dataset constructed by linking responses from a custom survey of a large sample of people in Denmark born between 1969 and 1973 to detailed administrative data on their full income histories, life events, and true positions in the income distributions of different "reference groups." The reference groups include large groups such as people from the same cohort and of the same gender, living in the same municipality, having the same education level, or working in the same sector, as well as smaller groups such as neighbors, co-workers in the same firm, family members, and former schoolmates. In the survey, we ask people about their knowledge of the income distributions in these reference groups, how fair they think income inequalities within these groups are, and about where they rank themselves within the various groups (i.e., their income or "social" position within each group).

The link between survey and administrative data enables us to explore how well people know their positions in various reference groups and the relationship between social positions and fairness views. Income in the survey is defined in the same way as on tax returns, implying that we can compute the true income positions from the tax returns of all people in the reference groups. The link also enables us to study how changes in social positions over the course of life, including changes due to unemployment, health shocks, and promotions, affect fairness views. Finally, we show how a randomized treatment informing individuals of their true social positions shapes these views.

Our results can be grouped into three main sets of findings. First, respondents are overall well aware of the income distributions and their own social positions, even though they underestimate the degree of inequality by systematically believing that the income levels of others are closer to their own than they actually are. Starting from the perception of the overall income distribution, 45% of the respondents perceive the median income level of their cohort correctly with at most 10% error. For comparison, 70% recall their own income correctly within the same error band. Lower-income respondents tend to underestimate the median income level and also the 95th percentile level of their cohort. In contrast, higher-income respondents tend to overestimate these levels. Yet, at most positions in the income distribution, the average perception is within 5% of the actual median and within 10% of the actual 95th percentile. The most striking misperception is that people at the very top of the distribution (above the 95th percentile) overestimate the 95th percentile level by 50%.

We then consider the accuracy of respondents' perceptions of their own position in the income distribution. This is what is normally done in the literature but, as we show, this may exaggerate how inaccurate people are. Consistent with the systematic misperceptions of the P50 and P95 moments, lower-income respondents believe they are ranked higher in the distribution than they really are, while higher-income respondents believe they are ranked lower. These systematic misperceptions of own social position seem large at first glance, but they are in fact mainly due to a mechanical "center bias" that arises because ranks are bounded between 1 and 100. Indeed, people in the top of the distribution cannot overestimate their rank, while people in the bottom cannot underestimate it. This implies that perceived rank positions are not uniformly distributed like actual rank positions, but instead concentrated towards the center. By ranking the respondents by their perceived social positions, thereby creating a uniform rank distribution of perceptions and removing the mechanical center bias, we show that perceived and actual social positions line up almost perfectly. Put differently, people who have rank x in the actual distribution tend to also have rank x in the distribution of perceptions.

The second set of findings shows that fairness views on inequality across all the reference groups studied strongly depend on the current social positions of individuals. We show this link in three ways: First, we highlight that views on the fairness of inequalities are more strongly correlated with current social position than with historical (past) social positions. In contrast, political views are more weakly correlated with current social position and more strongly correlated with respondents' past social positions and even significantly correlated with the social position of their father when they were growing up. Second, we show that changes in social positions following shocks affect fairness views. Conditional on a detailed array of individual-level controls and starting social position, we find that the perceived fairness of inequality significantly declines with negative shocks (unemployment spells, hospitalization episodes, or disability) and increases with positive income shocks (promotions at work). Third, we exploit our randomized information treatment that informs individuals of their true positions in their reference groups. This information affects views on the fairness of inequality within all reference groups, but in an asymmetric manner. Those who overestimated their social position in any of the reference groups to start with believe inequality is more unfair when they are informed of their actual (lower) social position. In contrast, those who are told that they are ranked higher than they thought do not adjust their fairness views. In line with the overall correlation patterns, people's political views respond much less than fairness views to the information treatment and the real-life shocks.

Third, people view inequality within peers working in the same sector or with same education level as more unfair than inequality among peers of the same age, or same gender, or living in the same municipality. Yet, these are exactly the reference groups within which respondents tend to underestimate the degree of inequality the most and within which lower-income people strongly overestimate their own positions. More precisely, for all reference groups, respondents perceive quite accurately the median income level, but systematically underestimate the 95th percentile income level among their co-workers and people with same education. Lower-ranked individuals

overestimate their social position mostly within their education group or work sector. For example, people at the 20th percentile among their co-workers on average think they are well above the 40th percentile, while people at the 20th percentile in their municipality believe they are around the 30th percentile. This pattern also holds if we zoom in on smaller reference groups, namely co-workers within a firm instead of within sector and if we look at neighbors instead of people living in the same municipality. We also show that respondents perceive their social positions relative to former schoolmates surprisingly well; perceive their positions relative to siblings very well, but far from perfect; and have very little idea about the social positions of their parents when they were around the same age.

To sum up, on average, individuals seem well-aware of their social positions, and their positions are important for their fairness views on inequality. Moving up the social ladder makes people more tolerant of inequality, while moving down makes them less tolerant of it. By contrast, political views seem more stable. Respondents perceive inequality to be most unfair among people with the same education level and working in the same sector. Yet, these are also the reference groups in which lower-income people overestimate their position the most and within which respondents in general underestimate inequality the most.

Related Literature. Crucial for our results is the link between survey data on people's perceptions and attitudes and information from administrative records on their real-life outcomes. Recent research has started to combine subjective information from surveys with objective information from administrative records (Almås et al., 2017; Kreiner et al., 2019; Andersen and Leth-Petersen, 2020; Epper et al., 2020). Related to our agenda, one previous study (Karadja et al., 2017) has merged survey data and administrative data to check the reported income of respondents against actual income. We go much further by using the administrative records to obtain information on many of the reference groups of the respondents, their income histories over the life cycle, and their experience of major life events.

One of our key contributions is to measure and compare perceptions and misperceptions of social position in different reference groups that vary by domain, size, and proximity to the respondent and to show their relationship to views on the fairness of inequality within these groups. Connected to our result on the perceived position within co-workers in the same firm, recent papers have analyzed the impacts on satisfaction and effort of within-firm or within-employer wage differences (Card et al., 2012; Cullen and Perez-Truglia, 2018a,b; Baker et al., 2019). Complementary to these studies, our new findings show that people care more about income differences within co-workers, as compared to other reference groups, and that they particularly strongly misperceive inequality and their own income position within this reference group.

A second contribution is our analysis of the link between changes in social position and fairness views using the unique combination of information on individual income histories back in time, income shocks that shift social positions, and randomized information treatments. Previous literature has looked at the relationship between tastes for redistribution and living or growing up

in different environments (Roth and Wohlfart, 2018; Giuliano and Spilimbergo, 2014; Malmendier and Nagel, 2011), but not on changes in social positions of the respondents.

Related to our information experiment, Kuziemko et al. (2015) show respondents information on the actual distribution of income in the U.S. and where they rank based on self-reported income in the survey, but are unable to study how it relates to misperceptions or to different reference groups. Cruces et al. (2013) find that those who overestimate their position in the overall national distribution tend to demand higher levels of redistribution when informed about their true position. Conversely, Karadja et al. (2017) show that those who underestimated their position demand less redistribution. Fehr et al. (2019) provide information about position in both the national and international distribution and find that only demand for national redistribution decreases with national relative income. Perez-Truglia (2020) studies a natural experiment in Norway that made tax records and incomes easily visible online. He finds that this transparency substantially increased the gap in happiness and life satisfaction between higher and lower income individuals, which is consistent with our findings that those who realize they are ranked lower than they thought perceive inequality as more unfair.

Our third contribution is to show that people overall are well-informed about social positions although they systematically underestimate inequality by believing others are closer to themselves than they really are. Our finding of a high accuracy of perceptions is in contrast to the few existing studies on people's perceived ranking. Cruces et al. (2013) find an inverted S-shape between perceived own position and actual own position, similar to what we find before correcting for the center bias. Karadja et al. (2017) find that a majority of surveyed individuals misperceive their position in the income distribution and believe they are ranked lower than they actually are. Fehr et al. (2019) find that respondents are misinformed about their positions in both the global and national income distributions.

We believe that the high accuracy of perceptions we detect is due to a number of methodological advances. We demonstrate how large misperceptions arise when asking people about their own social position because of a center bias in the elicitation and use a simple method to filter out this type of systematic error. In addition, eliciting people's perceptions of the income distribution allows us to disentangle possible misperceptions along those dimensions from misperceptions of own position. We focus on people's position relative to peers of their cohort, which neutralizes large differences due to life cycle effects. Indeed, as we show, small changes in the definition of the relevant age group (e.g., cohort, vs. all adults, or the full working population, or the total population including those below 18 and retirees) have large effects on the percentiles of the distributions, which makes it important to ask people about their position in very clear and well-defined groups. In addition, position within one's cohort is arguably a more relevant measure of social position for fairness concerns than thinking about position relative to people of all ages. We also use a well-defined concept of income, by asking respondents in the survey about income as it appears on their last tax return and their corresponding perceptions about income positions. This allows us to distinguish misperceptions of social position from misreporting or misperception of own income. To

make the elicitation procedure as precise as possible, we use video instructions with illustrations on income ladders to explain the concept of income positions and what respondents are asked to do, and a corresponding graphical interface where respondents report percentile levels (median, "P50", and 95th percentile, "P95"), and their own positions in the distribution. Finally, our sample is an order of magnitude larger than existing studies, which implies that we can provide more precise evidence.

Our paper is also broadly related to empirical work documenting that people care about relative income and that their social positions shape their well-being (Easterlin, 2001; Easterlin et al., 2010; Clark and Oswald, 1996). Luttmer (2005) shows that holding own income constant, self-reported happiness declines as neighbors' incomes increase. Using German panel data, Ferrer-i Carbonell (2005) finds that people's income rank in their reference group is a determinant of happiness and well-being whose importance is comparable to that of their own income. Kuziemko et al. (2014) highlight the role of "last-place aversion," a particular form of relative position concerns whereby individuals particularly fear being ranked last. Charité et al. (2015) point out the importance of reference points, while we highlight the need to consider specific reference groups. Fisman et al. (2020) show that people care about inequality in a non-linear way relative to their own position, putting weight both on their nearest neighbors and on the top of the distribution. Using online surveys, Weinzierl (2014) demonstrates that people do not hold utilitarian preferences, but rather have other, mixed fairness views.

Organization. Section 1 describes our survey, the administrative data, and our sample. Section 2 analyzes respondents' perceptions and misperceptions about the distributions of income and their own position in various reference groups. Section 3 studies the relationship between perceived social position and fairness views. Section 4 offers some concluding remarks.

1 Data Collection, Survey, and Administrative Data Linkage

1.1 Survey Sample and Link to Administrative Data

Target Sample. Assisted by Statistics Denmark, we conducted a large-scale survey in February and March 2019. We sent out survey invitations to a representative sample of 50,100 respondents, born in Denmark in the years from 1969 to 1973, randomly selected by Statistics Denmark. The respondents were 45 to 49 at the time of the survey and, hence, no longer enrolled in formal education, well into their careers with a large share of their lifetime income realized, but still quite far from retirement. We excluded immigrants because we ask people about histories, schoolmates, and parental positions, which are only available for Danish-born respondents.

Survey Method. Our survey method is original and leverages an official channel of communication of the Danish public authorities with citizens. The invitations were sent out through the secure website "Digital Post," used to receive and read mail from public authorities. By law, all citizens

older than 15 have to have an electronic mailbox where they receive information from public institutions, for example tax and health authorities. Communications may also come from private companies, for instance salary statements from employers or account statements from banks. The use of this official channel of communication, together with the University of Copenhagen's stamp, likely increased the credibility of our survey and experiment, and of the information provided to respondents, which sets the setting apart from lower-stakes survey environments. To incentivize respondents further, they were told that those who completed the full survey would be enrolled in a lottery for 100 gift cards with a value of 1,000 DKK ($150) each to be used in more than 150 chains of stores in Denmark.

The average time for completion of the survey was 33 minutes with a median time of 25 minutes (the full distribution of time spent on the survey can be seen in Appendix Figure A-5). Responses were linked by Statistics Denmark to the register data using the social security number (assigned to all Danes at birth), which ensures a precise and unique match.

Testing for Selection into the Survey and Attrition. Thanks to the register data, we can analyse selection into the survey. Indeed, we know the characteristics of the respondents who entered the survey, of those who completed it, of those who were sent an invitation but chose not to participate, and of those who were not sent an invitation at all. Table 1 shows summary statistics for our sample of people who received an invitation and completed the survey (column 1), and compares it to the characteristics of those who received an invitation to participate and started the survey, regardless of whether they completed it or not (column 2), the characteristics of the full Danish-born population in these cohorts, excluding non-Danish born people (column 3) and the full population in these cohorts, including immigrants (column 4). The invitee group of people who received an invitation to participate, regardless of whether they did start the survey or not, is not shown here as it is almost perfectly identical to the full Danish-born population excluding immigrants (column 3) in these cohorts, as should be the case given that they were randomly drawn from this group by Statistics Denmark. The final analysis sample of respondents who completed the survey has on average somewhat higher income and education levels than the full target population in column 3, but is representative in terms of region of residence, age, and gender. Compared to other surveys, the top of the income distribution is very well-represented. People from the top five percent of the income distribution make up almost 8% of our analysis sample.

The use of the official Digital Post channel are perhaps the reason we are able to sample extensively from the top of the income distribution, a group that is typically very hard to reach with standard survey methods.

Out of the 50,100 people invited from the population 13,686 clicked on the personal link in the invitation (column 2) and 10,089 completed the survey. After dropping respondents for whom the reported birth year or gender do not match the register data (19 respondents), who spent less than ten minutes answering the survey (50), who did not report their income as instructed in the survey for example by reporting monthly instead of annual income (343), had zero or negative

Table 1: Summary statistics: Sample compared to population

	Analysis sample (1)	**Started survey** (2)	**Full population (excl. immigrants)** (3)	**Full population** (4)
Demographics				
Male	0.51	0.47	0.51	0.50
Age	47.0	47.0	47.0	47.0
Married	0.63	0.61	0.57	0.58
Immigrant	0.00	0.00	0.00	0.13
Descendant	0.00	0.00	0.01	0.00
Income Position				
Income position	64.2	59.6	53.3	50.5
Bottom 50%	0.29	0.36	0.46	0.50
Middle 40%	0.54	0.50	0.43	0.40
Top 10%	0.17	0.14	0.11	0.10
Education				
Primary education	0.08	0.10	0.16	0.17
Upper secondary edu.	0.06	0.06	0.05	0.06
Vocational education	0.31	0.34	0.39	0.38
Short cycle higher edu.	0.09	0.08	0.07	0.07
Bachelor programs	0.27	0.26	0.20	0.20
Masters programs	0.19	0.17	0.13	0.13
Socio Economic Status				
Self-employed	0.04	0.04	0.06	0.06
Employee	0.90	0.87	0.80	0.77
Unemployed	0.01	0.02	0.02	0.02
Not in work force	0.05	0.07	0.12	0.14
Private Sector	0.66	0.65	0.69	0.70
Regions				
Copenhagen	0.31	0.30	0.30	0.32
Sealand	0.16	0.16	0.16	0.15
Southern Denmark	0.21	0.21	0.21	0.21
Middle Jutland	0.23	0.23	0.23	0.22
North Jutland	0.09	0.09	0.10	0.10
Parents' Income				
Mother's income position	53.1	52.1	50.5	50.2
Father's income position	53.3	52.4	50.8	50.5
Observations	9415	13686	339231	389863

Notes: Full Population is the full Danish population born between 1969 and 1973. *Full population* (*excl. immigrants*) is the population our contact sample was drawn from. This sample was provided by Statistics Denmark and is the full population excluding immigrants. *Started survey* are the respondents who started the survey. *Analysis sample* are respondents who completed the survey and are used in the analysis. All variables are indicators, except for the income positions, which are based on the percentile rank position within the cohort of the respondent.

income according to the register data or missing background register data (61) or who skipped one of our key questions (201), we have 9,415 respondents in total (column 1).[1] The response rate of 20% (=10,089/50,100) is reasonably high when contacting a representative sample of new potential respondents that have never expressed a particular interest in taking surveys.[2]

Appendix Table A-1 highlights which characteristics predict the drop out rate and at which point respondents drop out. Out of those who start the survey, 6% dropped out at the consent page or are screened out for the reasons listed above; 10% drop out when having to report their income. Only 1% drop out after the treatment. This means that attrition is not selectively driven by the treatment, as confirmed by the insignificant coefficient on treatment status. Men, non-married, higher-income and more educated respondents are less likely to drop out.

1.2 Survey Outline

The survey consists of five blocks of questions and is available in full in Appendix A.1. In addition, a consent page informs respondents about the use of their responses in accordance with the General Data Protection Regulation of the European Union and a conclusion section asks respondents whether they thought that the survey was left- or right-wing biased. 81% think the survey is neutral, 14% that it is left-wing biased and 5% that it is right-wing biased.

Background and Political Views block. This block contains questions on birth year, gender, educational attainment, and sector of employment. These answers are later used to inform respondents about their positions relative to other people in the same large reference groups (see Table 2 for a definition of each reference group). We also ask about voting behavior and attitudes towards economic policy:

"Which party did you vote for in the last general election (in 2015)? [10 parties; Other; Did not vote; Do not wish to answer]"

"How would you describe your attitude on economic policy? [Very left-wing; Left-wing; Moderate; Right-wing; Very right-wing]"

Income block. This block asks about the income of the respondent one year ago (earned in 2017) and includes wage income, self-employment income, and taxable income benefits and transfers (composed mainly of unemployment insurance benefits, disability benefits and social assistance).

[1] The completion rate of 74% (=10,089/13,686) may seem low, but our invitees are not people who have signed up in advance to participate in survey panels as is the case in other settings. Instead, our potential respondents receive an invitation through the official Digital Post, which probably leads many to click on the survey link in order to learn more about this somewhat unusual for them invitation. Once people realize it is a research survey they are not obliged to answer and they have to report personal information some of them drop out. In regular survey settings where respondents have signed up to receive survey links, those not interested do not even click on the link to start with as there is no element of surprise for them. In our case this will appear as attrition, while in other settings, we will never get to see who did not click on the survey link to start with.

[2] For comparison, a recent study in Denmark invited similar cohorts by ordinary mail and reports a response rate of 13% (Epper et al., 2020).

We ask separately about these three income components and with the sum of the components appearing on the screen (see an image of the exact formulation in Appendix Figure A-1). The breakdown of total income into smaller parts is done to help people report the correct income and to highlight that self-employment income and taxable benefits are included in total income. We include taxable benefits and transfers to reflect the fact that they contribute to income and leaving them out may lead us to wrongly rank individuals, e.g., individuals receiving UI benefits are in general better off economically both in the short run and in the long run than individuals receiving social assistance. Respondents are informed that it is important to report the income correctly and that they can see the amounts on their annual tax statement (available online). Our rationale for asking about income as it appears on the tax statement is to be able to base the analysis on a well-defined income concept that is both clear to the respondent and for which the true value can be verified in the register data. With the exception of self-employment income, the income components are third-party reported to the tax agency and pre-populated on the tax return. Tax evasion is in general low in Denmark and close to nil on third-party reported income components (Kleven et al., 2011).

To avoid making the survey too complicated and time consuming, we exclude capital income, deductions and tax payments. This is not an important issue for our analysis for two reasons. First, our narrower income definition makes up almost all of total income as calculated by Statistics Denmark for most respondents, which includes capital income. Thus, the average across individuals of our narrower income concept relative to average total income according Statistics Denmark is 96.0%; the median income according to our definition represents 98.5% of the median total income according to Statistics Denmark.

Second, and crucially, Appendix Figure A-6 shows that the income rank positions based on total income line up almost perfectly with the the positions based on our income definition. In fact, this remains the case if we instead used a third definition of income, namely Statistics Denmark's measure of "disposable income" that includes the imputed value of housing, interest deductions, and tax payments.

Perceptions block. This block elicits people's perceptions about the median (hereafter, P50), the 95th percentile (hereafter, P95) and their own position in the distribution of each of the five large reference groups. The block starts with a video that uses a ladder and 100 stick people to explain the different positions in the income distribution. It states and illustrates, for instance, that the P50 is the income level for which 50% have a lower income and 50% have a higher income. The full script for and link to the video are in Appendix A.2. After this video, we elicit respondents' perception of the P50 and P95 incomes for their cohort (see Appendix Figure A-2). We then ask the respondents to use a horizontal slider to indicate their perceived P50 and P95 income levels for their municipality, education group, gender group, and sector (see Appendix Figure A-3). Respondents are subsequently prompted to place themselves within each of the five large reference groups using a vertical slider next to the illustrative ladder that was also used in the explanatory video (see Panel

Table 2: Definition of reference groups

Reference group	Definition
Large reference groups	
Cohort	People born the same year.
Gender	People born the same year with the same gender.
Municipality	People born the same year currently living in the same municipality.
Educational level	People born the same year with the same level of education: basic school, upper secondary education, vocational education and training, short cycle higher education, bachelor degree and master or PhD degree. Uses the Danish DISCED education classification, which follows the international education classification ISCED.
Sector of work	People born the same year and working in the same sector: Construction, real estate, business services, finance and insurance, trade and transport, manufacturing, information and communication, culture, agriculture, public work. Uses the Danish Sector Codes DB07, which is a sub-classification of the NACE classifications of the EU.
Small reference groups	
Schoolmates	People born the same year who went to the same school the year they turned 15.
Co-workers	People working in the same workplace. Workplace is defined as a single address entity, e.g., for a firm with multiple locations, each location is a separate workplace.
Neighbors	For people living in an apartment, the neighbors are people from age 25 to 65 who live in the same stairwell. For people living in a house, the neighbors are people from age 25 to 65 who live on the same road.

A of Figure 1). We also ask respondents about their parents' positions in the income distribution of all the parents of the other people in their cohort and to compare their own income to that of their sibling(s). For neighbors, co-workers, and former schoolmates, we first asked the respondent about the perceived number of individuals in these reference group (denoted by N) and then asked them to report their perceived income position on a horizontal slider going from 1 to N (see e.g., Figure A-4 for the co-worker question). For these small reference groups, it does not make sense to ask about moments of the distribution such as P50 and P95 as we do for the large reference groups.

Treatment block. This part is presented for the treatment group at this point in the survey and for the control group at the very end of the survey (so that it does not affect any of their answers). The treatment informs respondents about their true social positions. Based on the respondents' earlier answers to the questions in the background and income blocks, we interactively calculate

their true positions in each of the five large reference groups. *For each of these five reference groups,* the treatment reminds people which position they had earlier responded to be in, shows them their actual position, and highlights how much higher or lower they are in the distribution compared to where they thought they were. Panel B of Figure 1 shows a screenshot from one of the treatment screens (in English, and only for the cohort reference group) for a fictitious respondent with a positive misperception of their own position within her cohort. In this example, the respondent indicated that they thought they were ranked at position 70; the treatment informs them that they are, in fact, ranked at position 57 and points out the misperception gap in red on the ladder and numerically in the text above. The misperceptions of the positions within the other four reference groups are shown in the same way.

An alternative treatment could construct many sub-samples and inform respondents about their true position in only a single group. However, informing respondents of their position in one reference group only may still make them update their beliefs about their position in the other groups, but in a way we do not control. By telling them their actual positions in each group, we are certain about the information provided. Due to Danish rules of conduct, we cannot show respondents their true position in the small reference groups (co-workers, neighbors, former schoolmates).

Appendix Table A-2 shows that the treatment and control groups are balanced in terms of observable respondent characteristics.

Outcomes block. This sequence asks about views on fairness of inequality within the respondent's cohort and (large) reference groups, and also about the role of effort versus luck, and political view. For each reference group, we asked a standard question about fairness of inequality and a standard question about the role of effort versus luck. We only asked two questions to avoid increasing the length of the survey too much and selected questions that could be applied with the same formulation across all reference groups. However, we also asked a few questions related to general well-being and views on inequality and show results for these outcomes in Appendix D.

The main questions are as follows:

"On a scale from 1 to 7 where 1 is "Completely fair", 4 is "Neither fair nor unfair" and 7 is "Completely unfair", indicate to what extent you think that it is fair or unfair that there are differences in income among people born the same year as you WITHIN the following groups that you are yourself a part of?"

[The screen then lists five reference groups, filling out their labels directly with the respondent's information from the earlier block, as can be seen in Panel C of Figure 1.]

"Now, think about people born the same year as you WITHIN these groups (indicated below). On a scale from 1 to 7 where 1 is "Only luck", 4 is "Equally important", and 7 is "Only effort", indicate to what extent you think that differences in income are caused by differences in people's efforts over their lifetime or rather by luck? By luck, we mean conditions, which you have no control over. By

effort, we mean conditions, which you can control."

"Which party would you vote for if there was a general election today? [11 parties; Other; Do not wish to answer]"

1.3 Response Quality

Figure 2 shows that the reported incomes in the survey match the actual incomes on tax returns well. Panel A depicts the distribution of the difference between reported and actual income. The average percentage difference is less than 0.5%. More than 25% of the respondents report an income that deviates less than 1% from their actual income and more than 70% of the respondents have a discrepancy that is less than 10%.[3] Panel B shows that across different levels of actual income both the average reported income and the median reported income within each bin are very close to the actual income.

Next, we describe how the reference groups reported by the respondents align with the the official classifications in the administrative data and how we can account for possible discrepancies in the analysis. Appendix Table A-3 shows that information on gender and cohort are aligned and that 98% of the respondents report living in the correct municipality. Respondents are also relatively precise when they report educational level and sector of work, and the mismatches can be explained and dealt with in a consistent manner. Overall, for 74% of respondents, education levels reported in the survey match the register data and for 72% the sector reported matches. In fact, on the education level dimension, 93% of the respondents with a bachelor or master program as their highest level of education according to the registers report the correct level of education. Almost half of the respondents who report an incorrect educational level have a vocational education and training program as their highest level of education. The majority of these respondents report their highest level of education as either upper secondary school or short cycle higher education. The explanation for the first group is that many consider upper secondary school as a higher level than vocational education, but according to the standard education classification this is not the case. For the second group, the majority have an education within *Office, commercial and business service*, and therefore plausibly think they have a short cycle higher education, but according to the education classification these are also categorized as vocational educations.

For the sector dimension, it is understandable that some respondents have difficulties in knowing the correct *label* of their sector, which is based on the standard classification and labelling of sectors as described in Table 2. For two of the large and well-defined sectors such as *Finance and insurance* and *Public administration, education, health and social activities* 89% and 91% of people in the sectors correctly report working in those sectors. In the smaller and less well-defined sectors such as *Culture, leisure and other services* and *Real estate activities* only 50% and 56% of people in the

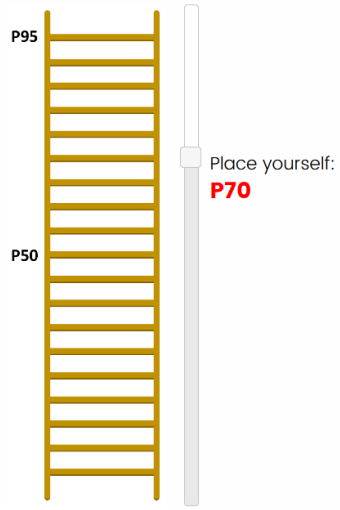
[3] We see a small spike at a reported income 8-9% below actual income. Respondents are asked to report their income including labor-market contribution, which is 8% of income before taxes; a few respondents seem to report their income excluding these contributions.

Figure 1: Example Survey Pages

(a) Eliciting perceptions of position

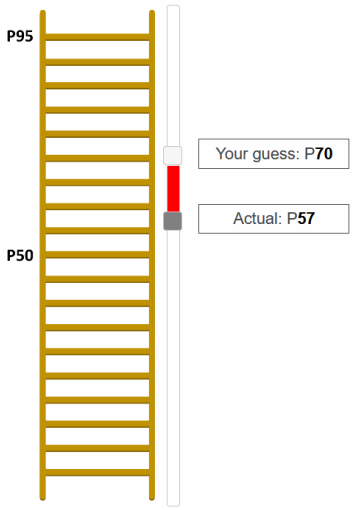
Rank among all people **born in 1970**

You previously reported that you had a yearly income in 2017 of 400000 DKK before tax. We will now ask you to report where you think this income placed you on the income ladder in 2017 for people who were born in 1970. Use the slider to select your position. Later, we will inform you about your true position.



(b) Information treatment (example of cohort reference group)

Rank among all people born in 1970
You GUESSED that you were on position P**70**.
Based on the income you reported, your TRUE position is P**57**.
You are actually 13 positions lower on the ladder than you thought.



(c) Question on Unfairness of Inequality

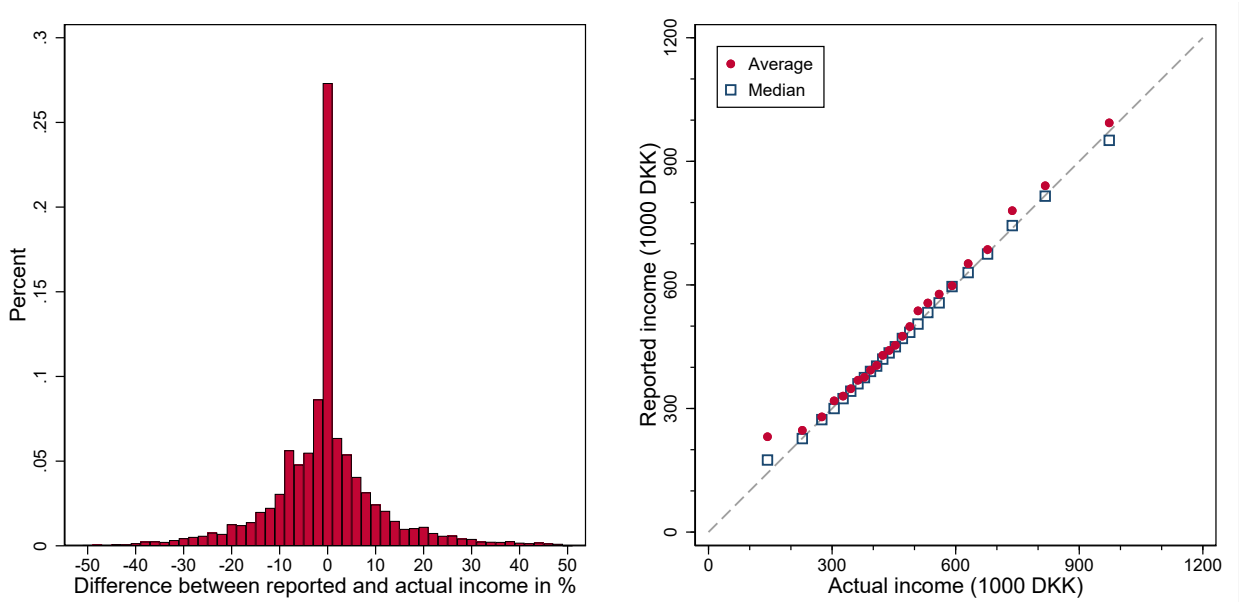
On a scale from 1 to 7 where 1 is "Completely fair", 4 is "Neither fair or unfair" and 7 is "Completely unfair", indicate to what extent you think that is fair or unfair that there are differences in income among people born the same year as you **WITHIN** the following groups that you are yourself a part of?

	Completely fair			Neither fair or unfair			Completely unfair
	1	2	3	4	5	6	7
Differences in income among people **born in 1970**	○	○	○	○	○	○	○
Differences in income among **men** born in 1970	○	○	○	○	○	○	○
Differences in income among people, living in **Københavns municipality**	○	○	○	○	○	○	○
Differences in income among people with the educational level **Master or PhD program**	○	○	○	○	○	○	○
Differences in income among people working in the sector **Finance and insurance**	○	○	○	○	○	○	○

Notes: Panel A shows the question eliciting the respondent's perceived position in the income distribution. In this example the respondent is born in 1970, has an income of 400,000 DKK and thinks they are in position 70. The slider is initialized at P1. Panel B shows part of the information treatment this respondent receives. The bottom panel shows a screenshot of the fairness of inequality question and illustrates how the reference groups are adapted (in bold) based on the respondent's earlier answers so as to ask directly about their reference group.

FIGURE 2: REPORTED AND ACTUAL INCOME

(A) RELATIVE DIFFERENCE (B) CORRELATION



Notes: The left panel shows a histogram of the relative difference between reported and actual income in %. The bin width is 2 and the plot is truncated at ±50. The right panel shows binned scatter plots of the average and median reported income against actual income (measured in 1000 DKK). The 25 bins have approximately the same number of respondents.

sectors correctly report working in those sectors. For instance, for *Real estate activities* more than half of those who report an incorrect sector, report working in either *Construction* or *Business service*. The discrepancies are thus likely attributable to genuine ambiguity, rather than to careless answers or misunderstandings.

The benchmark results we present use the reference groups respondents believe they belong to. Appendix E shows that the conclusions are unchanged if we instead use their actual reference groups or only include respondents who perceive their reference group correctly. This reflects that, to start with, the differences are not large across the groups that are difficult for respondents to differentiate between.

2 Perceptions and Misperceptions about Social Positions

In this section, we describe people's perceptions and misperceptions about the distribution of income and their own position in their cohort and their various reference groups.

2.1 Cohort Income Distributions and Within-Cohort Position

We start with people's perceptions of the income distribution of their cohort. Our approach of asking about perceptions at the cohort level neutralizes life-cycle effects. This is both practically convenient and normatively more relevant. Arguably, large income variations due to life cycle effects

are considered normatively less important than large income differences across similar, working-age people. Respondents in our chosen target cohorts are close to the peak of their career paths and income trajectories, with much of their permanent income already realized.[4]

Perception of the cohort income distribution. Panel A of Figure 3 plots respondents' misperceptions about the P50 income level (red curve) and the P95 income level (blue curve) relative to the actual levels. For the P50 income level, errors are symmetric around zero and bell-shaped. 45% of respondents estimate the median with at most a 10% error; 75% estimate it with at most a 25% error. For comparison, the errors when people report their own income (black curve) are such that 70% (respectively, 90%) percent report correctly within a 10% (respectively, 25%) error band.[5] Against this benchmark, people seem reasonably well aware of the P50 income level of others in their cohort. As compared to the perceived P50, there is larger variance of the perceived P95 level and a small majority of people underestimating its level.

Panel B reveals an increasing relationship between the average perceived P50 income level and the respondent's own position in the distribution; the same holds for the median perceived P50. Higher-income respondents tend to over-estimate the P50 and lower-income people to underestimate it. Yet, except for respondents in the very top and the very bottom of the distribution, the average prediction errors are within 5% of the actual P50 value and the mean and median are very similar.[6] Similarly, there is a weak positive relationship between the perceived P95 level and the position of the individuals in Panel C. At most income levels up to percentile 95, the average perception error for the P95 is below 10%. By contrast, those in the very top of the distribution starkly overestimate the P95 by 50%. For most income positions, the median perception is slightly below the average perception.

Perception of own position within the cohort. Figure 4 shows the relation between respondents' actual and perceived positions in their cohort. Panel A plots average and median perceived position against actual position.[7] The two curves both have a horizontal, inverted S-shape, whereby people below the median income level tend to overestimate their position, while people above the median tend to underestimate it. The misperceptions seem large compared to the misperceptions of the moments of the distribution (P50 and P95), but to some extent such a pattern is mechanical be-

[4] Appendix F highlights the pitfalls of asking about the full income distribution without specifying proper age limits. Both the P50 and P95 income by cohort varies drastically across different ages or by excluding or including some cohorts.

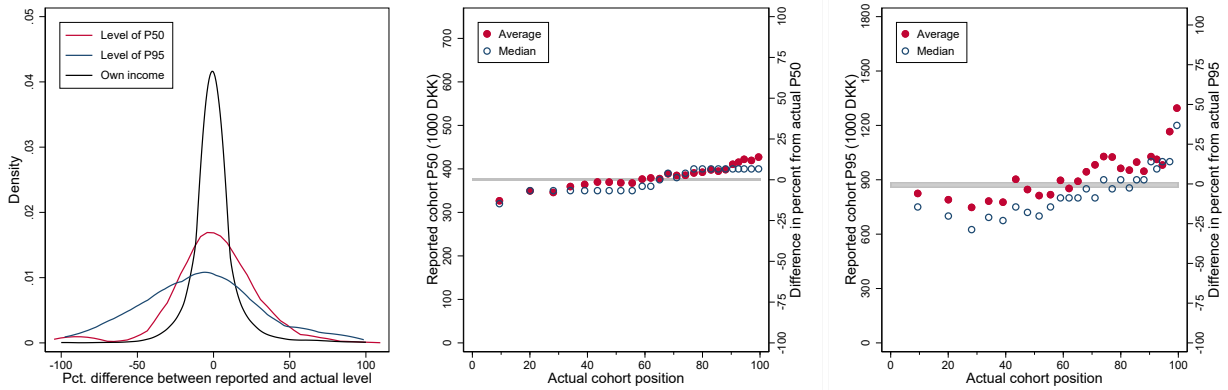
[5] Regarding this comparison, note that the spike at exactly zero in Panel A of Figure 2 suggests that many of the respondents have checked their actual income on the tax return when answering the survey. It is not possible to similarly easily find information about the median of a cohort.

[6] Equivalently, in terms of positions, an income level 5% below the actual median (DKK 350,000) corresponds to a percentile position of 44-45 within the cohorts and an income level 5% above (DKK 400,000) corresponds to a percentile position of 56-57.

[7] Appendix Figure A-7, Panel A shows that if we compute the actual position in different ways using the average income on the tax return over the last three years (to reduce the role of potential noise and large fluctuations in actual position) or the reported income in the survey, the pattern is the same. Panel B of Appendix Figure A-7 depicts the 25th percentile and the 75th percentile by actual position. It reveals more variation in perceived position of people in the very bottom of the distribution relative to those at the very top.

Figure 3: Perceived P50 and P95 of cohort

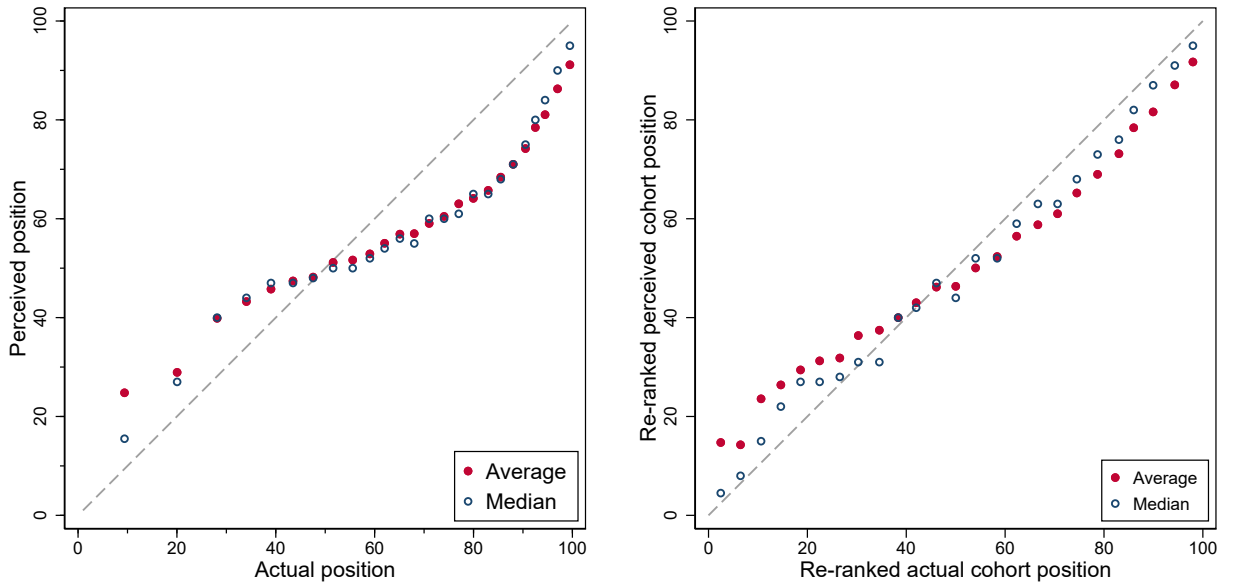
(a) Size of misperceptions (b) P50 misperception (c) P95 misperception



Notes: Panel A shows the distribution across respondents of the misperception in percent of the level of P50 and P95 (i.e., the percent difference between perceived and actual levels). For comparison, we plot the misperception of the respondent's own income as reported in the survey and their actual income on the tax return. The distributions are smoothed using epanechnikov kernels with a bandwidth of 5 for *Own income*, 10 for *Level of P50* and 15 for *Level of P95*. Panel B (respectively, Panel C) is a bin scatter with 25 bins of the average and median perceived P50 (respectively, P95) reported in DKK (left scale) and the corresponding misperception in percent (right scale) by actual position in the within-cohort income distribution. The perceived P50 and P95 are winsorized at the 5th and 95th percentiles within each bin (the median is unaffected by this).

Figure 4: Perceived position within cohort

(a) Average & median (b) Re-ranked



Notes: The left panel is a bin scatter of the average and median perceived position by actual position in 25 equally-sized bins. Actual position is based on the income from the tax return. In the right panel, we re-rank both actual and reported position, such that they are uniformly distributed from 1 to 100 in our sample, and plot the average and median perceived position by actual position.

Table 3: Accuracy of perceptions regressed on individual characteristics

	A. Top 20% most inaccurate			B. Top 20% most accurate		
	Position	P50	P95	Position	P50	P95
Male	-0.04***	-0.06***	-0.04***	0.04***	0.02*	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Left-wing	-0.02*	0.00	0.03**	0.01	0.00	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Right-wing	-0.03**	-0.01	-0.00	0.03**	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Vocational education	-0.06**	-0.04	-0.00	0.01	-0.00	0.04
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Upper secondary edu.	-0.03*	-0.03*	-0.02	0.01	0.03	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Short cycle higher edu.	-0.05**	-0.07***	-0.04	0.02	0.02	0.06**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Bachelor programs	-0.08***	-0.06**	-0.02	0.04*	0.02	0.04*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Masters programs and PhD	-0.15***	-0.11***	-0.01	0.10***	0.05**	0.06**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
N	9415	9415	9415	9415	9415	9415
R^2	0.087	0.034	0.025	0.079	0.036	0.029
Cohort FE	✓	✓	✓	✓	✓	✓
Actual position FE	✓	✓	✓	✓	✓	✓
Regional FE	✓	✓	✓	✓	✓	✓
Sector FE	✓	✓	✓	✓	✓	✓

Notes: In Panel A (respectively, Panel B), the outcomes are indicator variables equal to 1 if the respondent is among the 20% of respondents with the largest (respectively, smallest) misperceptions for each variable. *Left-wing* and *Right-wing* are indicators that equal one if a respondent reported having either a very left-wing/left-wing or very right-wing/right-wing view on economic policy. For the educational level dummies, the baseline group is primary education. The *Actual position FE* is fixed effects for all 100 positions in the income distribution. Appendix Table A-4 shows an expanded table including coefficients on regions of residence and sectors of work. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

cause of a simple "center bias" logic: people at the highest position can only weakly underestimate their position, while people at the lowest position can only weakly overestimate it. Put differently, perceived income ranks are not uniformly distributed, unlike actual income ranks (see Appendix Figure A-8 for the distribution of perceived ranks). To filter out this center bias mechanism, we ask: Are those ranked at position x with respect to actual income also ranked at position x with respect to perceived position (i.e., is x also their rank in the *perceived* position distribution)? Panel B of Figure 4 shows that this is indeed the case, with all points lying close to the 45 degree line. Thus, the systematic misperception of own position almost disappears.

Which respondents are most accurate? In addition to actual cohort position, what are the characteristics that drive respondents' perceptions and misperceptions? Table 3 regresses measures of accuracy and inaccuracy of perceived position, P50, and P95 on indicator variables capturing

the respondents' gender (2 groups), political view (3), area of residence (5), education level (6), and sector of work (11) as well as cohort fixed effects and actual income position fixed effects. For conciseness, we only show the coefficients for the significant characteristics, with the full table in Table A-4. The dependent variable in Panel A is an indicator for whether the respondent is among the 20% of the sample with the largest misperception of their position, the P50, or the P95; by contrast, the dependent variable in Panel B is an indicator for whether the respondent is among the top 20% most accurate ones.[8] We find that more educated respondents and male respondents are significantly more likely to be accurate across all domains (own position, P50, and P95). Characteristics related to area of residence and sector of work are not strongly associated with misperceptions.

2.2 Income Distribution of and Position in Large Reference Groups

Perceptions of income distribution. Panel A of Figure 5 plots the average perceived P50 for different reference groups of respondents in those groups against the actual P50 of each group. Each point represents either the overall cohort, a gender group, an education group, a sector, or a set of municipalities. For example, the two red dots show how men perceive P50 of men and how women perceive P50 of women. Municipalities, which are too numerous to be plotted individually, are grouped into ten bins defined by median municipality income. In general, respondents estimate the P50 income level of their various reference groups relatively well. Misperceptions are largest for some sectors, particularly for the two sectors with the highest median income levels, namely "Finance & Insurance" and "Information & communication" where respondents tend to underestimate the median income.[9] The distributions of P50 misperceptions are similar across reference groups and mirror the distribution of misperceptions of the cohort P50 displayed in Figure 3 (see Appendix Figure A-9).

Panel B shows the perceived P95 levels for the different reference groups. Individuals are also well aware of this moment of the whole cohort distribution (black point), the gender-specific distribution (red points) and the municipality-specific distribution (blue points). Note, however, that they systematically underestimate P95 of their education group and, in particular, underestimate P95 in the sector where they work (the green and purple points are all below the 45 degree line). Thus, respondents are not well-aware of the degree of inequality within their education groups and within their sectors.[10] Panel B and C of Appendix Figure A-9 shows these patterns also hold if we use group medians instead of averages.

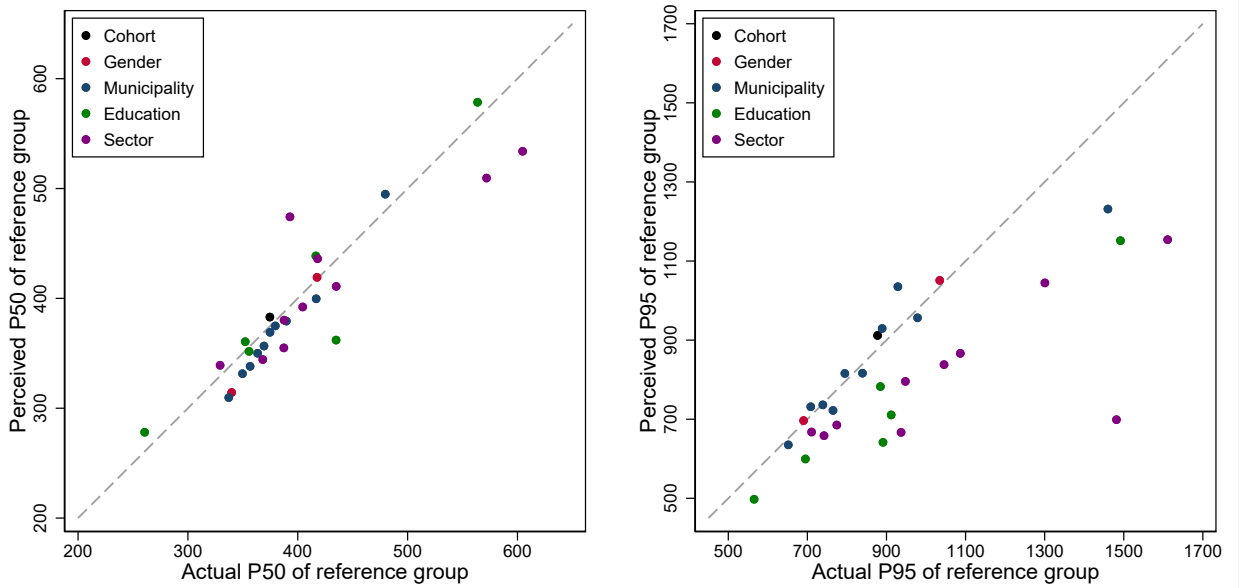
[8] The 20% most inaccurate respondents misperceive their position by more than 22 percentiles, the P50 by more than 33%, and P95 by more than 66%. The 20% most accurate ones misperceive their position by less than 5 percentiles, the P50 by less than 6%, and P95 by less than 10%.

[9] "Information & communication" covers a wide range of industries, from computer programming to the publication of newspapers. It does not include advertising or marketing.

[10] The outlier in the lower-right corner is the sector "Agriculture, forestry and fishing." This is a small sector in Denmark measured by the number of employed people in the sector and we only have 80 respondents in our sample that work in this sector. Furthermore, it is a sector with large income inequality: the P50 income level is the lowest of the ten sectors, yet it has the second highest P95 income level.

FIGURE 5: PERCEIVED AND ACTUAL P50 AND P95 LEVELS OF LARGE GROUPS

(A) P50 (B) P95



Notes: For gender, we show one point for men and one for women. For municipality we divide the respondents into 10 similar sized groups based on the actual municipality P50 and P95 income and plot one point for each group. Each education level and sector are also represented by one point. The points show the means of the reported P50 or P95 by respondents in that group, winsorized at the 5th and 95th percentiles within the group.

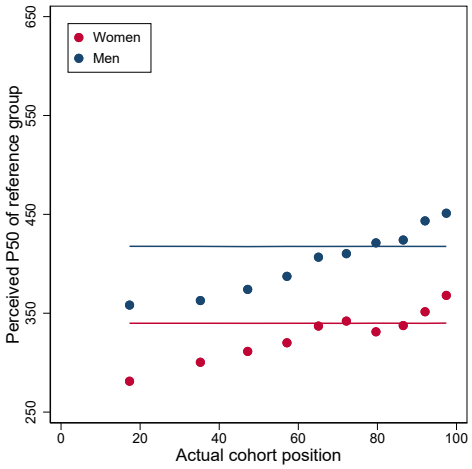
How do respondents' perceived P50 levels for different reference groups vary with their own social positions? Figure 6 shows the perceived P50 levels for different large reference groups as a function of respondents' own actual positions, split by type into each panel (gender, municipality, education, and sector of work).

In Panel A, the horizontal lines represent the P50 income level of men and women. The dots show the average perceived P50 level of their gender group among men and women, by bins of actual cohort position. Conditional on being at the same income position in their cohort, men tend to correctly report a higher P50 income and women a lower P50 income for their own gender group. In fact, the vertical distance between the estimates of men and women at the same cohort position is very close to the actual difference between the P50 incomes. Yet, there is a systematic bias in perceptions: high-income men and women overestimate the P50 income level of their gender group, while lower-income men and women underestimate it. The belief that the median income of one's gender group is closer to one's own income is similar to the one observed for the cohort median income in Figure 3.

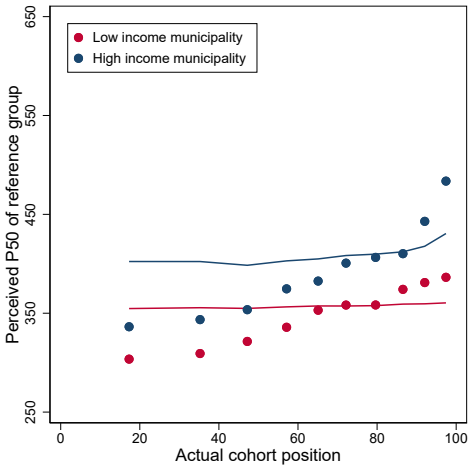
In Panel B, we split respondents into two roughly equally-sized groups, depending on whether they live in a low-income or high-income municipality. For each of these two municipality groups and by bins of actual cohort position, we plot the bin average perceived P50 income and the average actual P50 income of their municipality for respondents. We repeat the same procedure for education groups and sectors (Panel C and D). For all reference groups at all income levels, we

FIGURE 6: PERCEIVED AND ACTUAL P50 LEVELS BY COHORT POSITION

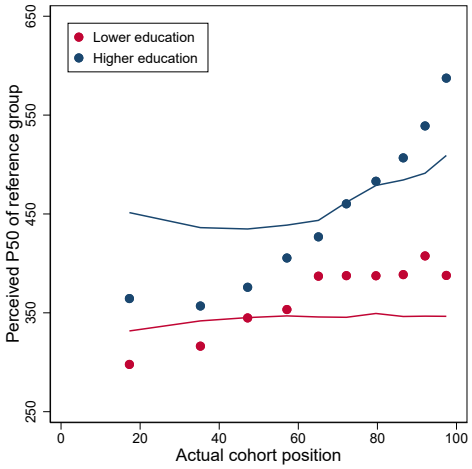
(A) GENDER



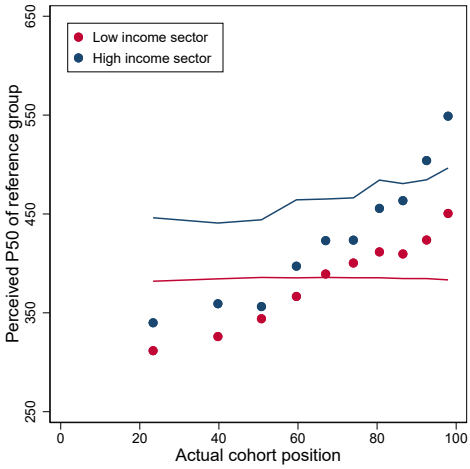
(B) MUNICIPALITY



(C) EDUCATION



(D) SECTOR

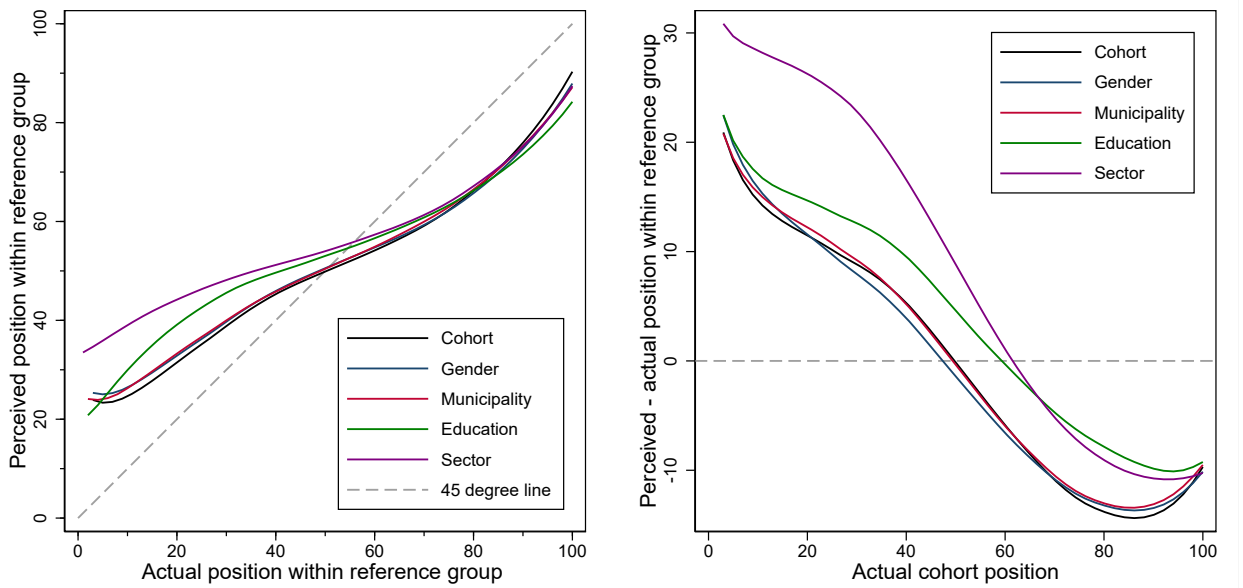


Notes: The solid lines indicate the actual average P50 income of their reference group for respondents grouped into bins by actual cohort positions. The dots indicate the bin average of perceived P50 income of the reference group. Municipalities and sectors are classified into two equally-sized groups based on their P50. The *Higher education* category includes short cycle higher education, bachelor programs, and master programs.

observe that people belonging to a high income group consistently report a higher P50 for their group than people belonging to the corresponding low-income group. For the municipality and education reference groups, the differences in perceptions between low-income and high-income groups (vertical differences between the blue and red dots) tend to be somewhat smaller than the actual differences (difference between the red and blue lines) except towards the top of the distribution, while for the sector reference group these differences in perceptions are much smaller, i.e., much more compressed, than the actual differences. To a large extent, this reflects the fact that people with low and middle income working in high-income sectors tend to significantly underestimate the P50 of the sector.

FIGURE 7: PERCEIVED AND ACTUAL POSITION WITHIN LARGE REFERENCE GROUPS

(A) BY REF. GROUP POSITION (B) BY COHORT POSITION



Notes: Panel A plots perceived position within each reference group as a function of actual position in that reference group. Panel B plots misperception of position in reference group by cohort position. The local linear polynomials have a bandwidth of 10. We use reported reference groups both for actual and perceived positions.

Perceptions of own position. Panel A of Figure 7 plots respondents' perceptions of their own position within each reference group as a function of their actual position within that group. To better compare the different reference group positions, we show local linear polynomials for each group in the same plot. Panel B recasts this information in a different way, by plotting respondents misperception of their reference group positions for given overall position *in the cohort*. People in the lower part of the income distribution tend to overestimate their position within all reference groups; people in the higher part of the distribution tend to underestimate their positions. Especially within sector or education groups, the relation between actual and perceived position is quite weak. At all income levels, people tend to be most optimistic about their position within their education group and their sector. In particular, people with income below the median level greatly overestimate their position within the sector they work in. For example, people at the 20th percentile among their co-workers on average think they are well above the 40th percentile, while people at the 20th percentile in their municipality believe they are around the 30th percentile. This is in line with our previous conclusions that people in general tend to underestimate the inequality in their sector (as reflected by a negative misperception of P95), and that people in the lower part of the distribution significantly understate the P50 income level of their sector.

Robustness and Extensions. To what extent do people report very similar positions for all reference groups? If they do not really know, they may be tempted to simply state the same perceived position across the groups. Appendix Figure A-10 shows this not to be the case. For

each perceived position in the overall cohort distribution, we observe a lot of variation in perceived positions in the reference groups. In addition, we may wonder about the correlation between actual positions across the different reference groups. Appendix Figure A-11 shows respondents' actual position for each large reference group (top panels) and perceived position (bottom panels) as a function of their actual positions within the cohort. We split respondents into high-income reference groups (blue dots) and low-income reference groups (red dots), which both represent roughly half of the sample. This is reminiscent of Figure 6, which focuses on the P50 of the reference group, while the current figure focuses on the individual's own position. The top, left panel shows that men's position in the cohort is higher than their position in the distribution of men, while the women's position is lower than their position in the distribution of women. Furthermore, we can compare the link between actual position in the reference groups and in the cohort to the link between the perceived position in the reference group and actual cohort position, which is done in the second row of Appendix Figure A-11. The first panel shows that women's perceived position in the women distribution and men's perceived position in the men's distribution as a function of their overall position within the cohort have the by-now familiar inverted S-shapes because of the center bias logic described earlier. In addition, the differences in the perceptions of men and women about their positions in the respective reference groups are smaller than the actual differences. For the other reference groups, we see a similar pattern. The differences in perceptions between high- and low-income groups are most compressed for education and sector in line with the result for the perceived median. In general, the differences in perceptions are more compressed when looking at own position compared to P50, which can be explained by the center bias effect of misperceptions that moves perceptions of own position towards the mean.

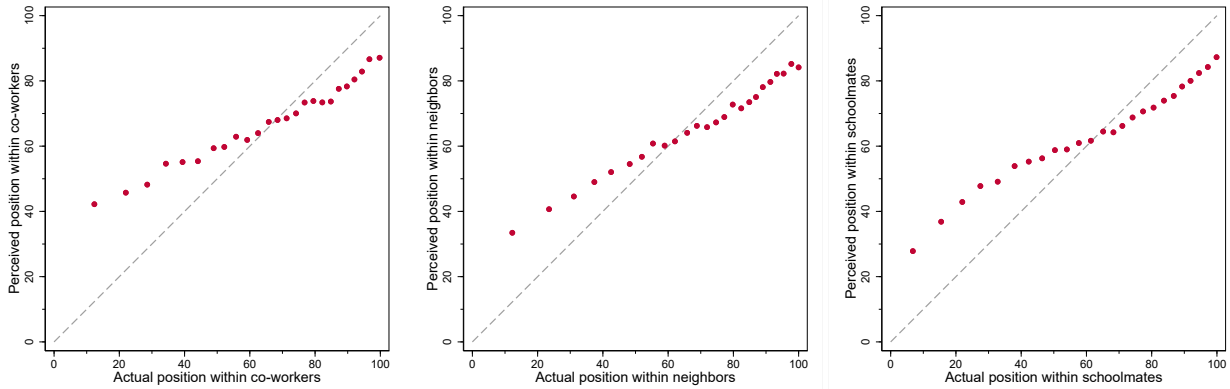
2.3 Position in Small Reference Groups

In this section, we look at perceptions related to smaller reference groups that are perhaps easier to relate to and closer to a respondent's daily life. Figure 8 shows how people rank themselves among co-workers at the same workplace, among neighbors living on the same road (if living in a house) or stairwell (if living in an apartment), and among former schoolmates. Recall from Section 1 that for each group, we first asked the respondent about the perceived number of individuals in the group (N) and then asked them to report their perceived income position (X) on a horizontal slider going from 1 to N. Finally, to construct Figure 8, we compute the perceived percentile rank as $\frac{X}{N} \cdot 100$ and the actual percentile rank using the true X and N from the register data.

The graph of the perceived position among co-workers at the same workplace in Panel A is very similar to the result for perceived position among co-workers in the same sector in Figure 7. In both cases, people who are in the bottom of the distribution believe that they are higher up than they truly are, e.g., respondents at the 20th percentile among co-workers in the same firm or sector on average believe that they are above the 40th percentile in those groups. In the upper part of the distribution people underestimate their positions, but the misperceptions are smaller than in

Figure 8: Perceived position within small reference groups

(a) Co-workers (b) Neighbors (c) Schoolmates



Notes: The panels depict the average perceived position of respondents among their co-workers in the same firm, their neighbors, and their former schoolmates, as a function of their actual position within these groups. There are 25 equally-sized bins in each panel.

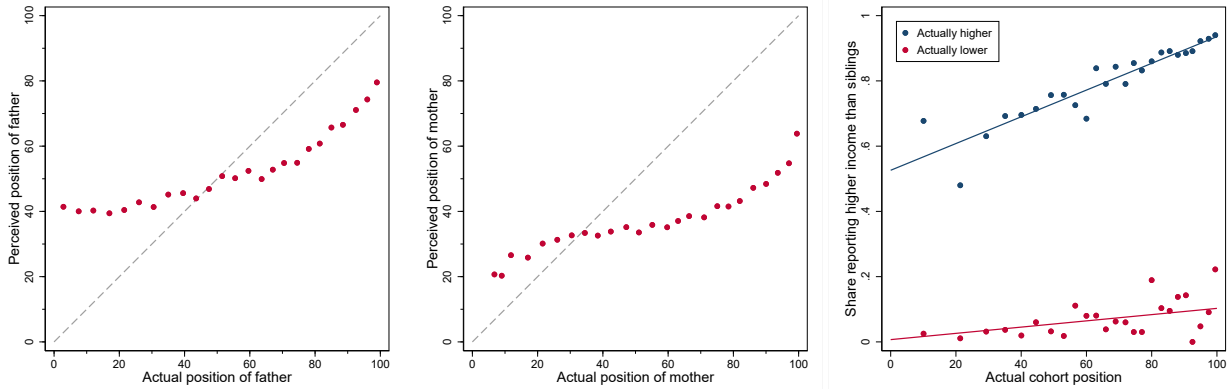
the bottom. The graph of the perceived position among neighbors in Panel B is similar, but with smaller misperceptions at the lower part of the distribution. Actually, this graph is very similar to the graph for municipalities in Figure 7, which aligns with the conclusion that misperceptions at the bottom are larger when comparing yourself to co-workers than when comparing to people living in your area. The graph of the perceived position among schoolmates in Panel C has the same shape as the other graphs. One notable conclusion from this graph is that people tend to make smaller errors when ranking themselves among their former schoolmates during their teenage years than when ranking themselves among their current co-workers.[11]

Figure 9 shows results for family members. Panels A and B show the perceived positions of parents of the respondents, when the respondents were fifteen years old, as a function of the true position in the ranking of parents of children from the same cohort. The line is close to flat for the ranking of fathers in Panel A, except for fathers who were ranked in the top 25%, indicating that respondents have little idea about the historical income positions of their fathers. The same holds for mothers, where respondents starkly underestimate the ranking of mothers, including at the very top. Panel C shows the share of respondents who report having income higher than their siblings, as a function of their actual cohort position and split by whether they actually do have higher income than their sibling or not. In general, respondents are well aware whether they are making more or less than their siblings. The share of those who report making more and who in

[11] A deviation between perceived and actual rank could reflect that people misperceive the number of people belonging to their refererence group rather than their own position within the group. In Appendix Figure A-12, we show that respondents are well aware of the size of their reference groups. The exception is a small share of respondents who have more than one hundred neighbors and underestimate that number. Appendix Figure A-13 shows that we obtain similar results if we restrict the analysis to respondents whose reported number of people in the small reference group matches the number observed in the register data within a 10% error band or if we use bin medians instead of bin averages. In addition, Appendix Figure A-13 shows similar patterns for co-workers and for neighbors if we split the respondents into people working in small firms versus large firms and into those living in apartments versus houses.

FIGURE 9: PERCEIVED POSITION OF FAMILY MEMBERS

(A) FATHER (B) MOTHER (C) SIBLINGS



Notes: We asked about the respondents' perceived position of father's or mother's position when the respondent was 15 years old relative to parent's of other children from the same cohort as the respondent. We asked men about their father's position and we asked women about their mother's position. The right panel only includes responses from people reporting the correct number of siblings. *Actually higher* means that a respondent's income is at least 25 pct. higher than the siblings' mean income. *Actually lower* means that a respondent's income is more than 25 pct. below the siblings' mean income.

fact make less is very small, except for respondents who are ranked close to the top of their cohort. On the other hand, information is far from perfect even among siblings and, in line with evidence above, misperceptions correlate systematically with the respondent's cohort position. People who are higher ranked than their siblings are less aware of this if they have a low cohort rank, and people who are lower ranked than their siblings are more likely to wrongly believe they are higher ranked if they belong to the upper part of the cohort distribution.

3 Relationship Between Social Positions and Fairness Views

This section analyzes the relationship between social position and views on fairness. We approach this question in four ways. First, we study the contemporaneous correlations between social position and fairness views within and across reference groups. We then leverage our data on respondents' past income histories to relate fairness views to overall changes in social position over the lifetime and to specific changes in social position caused by major life events such as unemployment, health shocks, disability, and promotions. Finally, we analyze how fairness views are causally affected by changes in perceived social positions induced by our information treatment.

As described in Section 1.2, we study three types of outcomes: views on the fairness of inequality within each reference group, the belief that effort matters more than luck for differences in income within a reference group, and right-wing support represented by support for political parties that vary from left-wing to right-wing. The "unfairness (of inequality)" variable for each reference group ranges from 1 (inequality within the group is considered completely fair) to 7 (inequality within the group is considered completely unfair). The perceived "importance of effort (relative to luck)" variable measures to what extent a respondent believes that differences in income are caused by

differences in people's effort or rather by luck on a scale of 1 (only luck matters) to 7 (only effort matters).

The "Right-wing" variable is based on the party that the respondent plans to vote for if there was a general election today. They could choose among 11 parties and the two other options, "Other" and "Do not wish to answer" for a total of 13 options. To classify parties into left- and right-wing in an objective, data-driven way, we take the control group respondents and use their answers to the economic policy view question to rank these 13 options based on the average economic policy views of respondents. The party ranked 1 has voters in the survey who on average report to be most left-wing while the party ranked 13 has voters in the survey who on average report to be most right-wing.[12]

In our benchmark regressions, we standardize the outcome variables into z-scores by subtracting the control group mean and dividing by the standard deviation. As a robustness check, we show the results are similar if we use indicator outcome variables throughout instead of categorical ones (see Appendix G).

3.1 Fairness Views Within and Across Reference Groups

How fair do people consider income differences within the various reference groups to be and how does this vary with their own position in those reference groups? Panel A of Figure 10 plots the perceived unfairness of inequality for each reference group against the perceived position in that reference group. First, it shows that those who think they are ranked higher in their cohort believe inequality within the cohort to be less unfair. Similarly, those ranked higher within each reference group systematically find differences in income within that group to be less unfair. Second, views on how fair or unfair inequality is for the cohort, gender, and municipality reference groups are similar in magnitudes and exhibit an analogous relation to respondents' position. But compared to these groups, income inequalities within education and sector groups are considered considerably more unfair at all positions in the distribution. Panel B shows that those positioned higher within the different reference groups also tend to believe that income differences in these groups are the result of effort rather than luck. In this dimension, there is no major difference between reference groups either on the level or the slope.

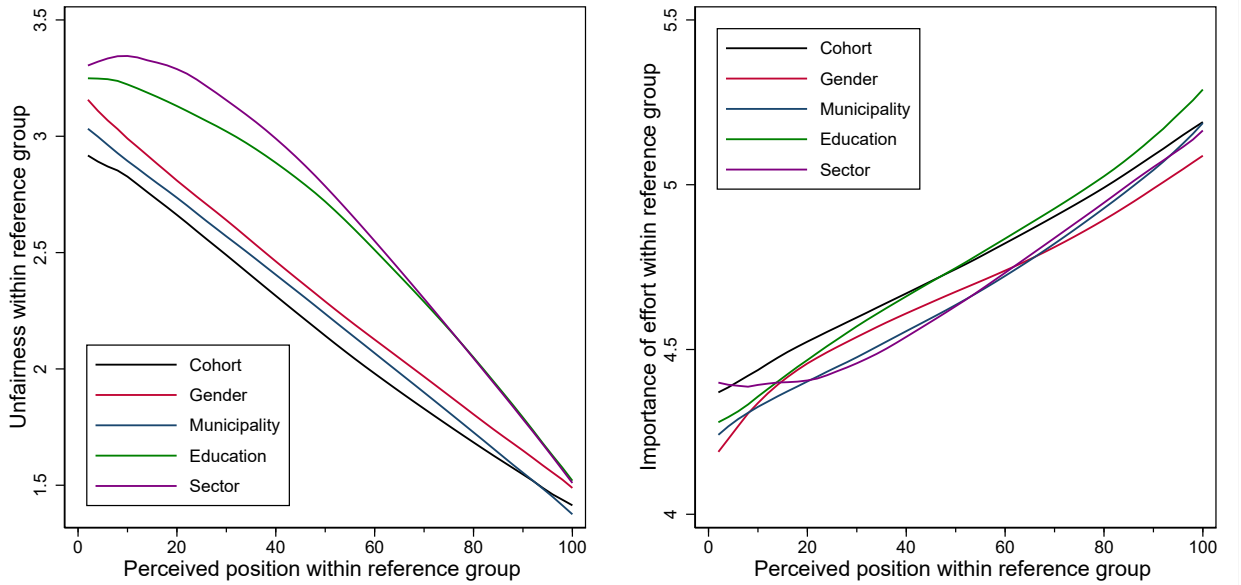
The same patterns hold if we instead plot the outcomes against actual (rather than perceived) position within each reference group or within cohort on the x-axis, as can be expected in light of the findings in Section 2 that perceived positions are in general in line with actual ones (see Appendix Figure A-14, which also shows the distribution of the outcomes by reference group).

Table 4 confirms the graphical analysis in Figure 10 without controls (Panel A) and with fixed effects for cohort, gender, municipality, educational level, sector of work, and employment

[12] This data-driven ranking of parties aligns almost perfectly with the subjective ranking of the Danish parties by fourteen experts in Green-Pedersen and Kosiara-Pedersen (2020). For robustness, we verify that our results hold if we directly use the answers to the question on economic policy views rather than party support where this is possible (see Appendix H for the full set of tables and figures).

FIGURE 10: UNFAIRNESS OF INEQUALITY AND IMPORTANCE OF EFFORT ACROSS LARGE REFERENCE GROUPS

(A) UNFAIRNESS OF INEQUALITY (B) IMPORTANCE OF EFFORT



Notes: The left panel plots the unfairness of inequality variable (locally linear polynomials with bandwidth 20), which is on a scale of 1 (completely fair) to 7 (completely unfair). The right panel plots the perceived importance of effort on a scale of 1 (only luck matters) to 7 (only effort matters). The sample is restricted to respondents in the control group only.

status (Panel B). The last column shows the third main outcome, i.e., right-wing political views. For comparability across columns and figures, outcome variables are standardized into z-scores by subtracting the mean and dividing by the standard deviation of the control group sample for all figures and tables below. The "Outcome mean" row shows the average, non-standardized fairness views by reference group and highlights the different levels of perceived unfairness across reference groups. The precisely estimated means confirm that education and sector-level income differences are considered significantly more unfair than inequality overall within cohort or within other reference groups.

The inclusion of controls does not affect the results substantially. A higher position in the cohort and a higher positive misperception of it significantly correlate with weaker perceived unfairness of inequality, a stronger belief in the role of effort over luck, and a higher likelihood of voting for a right-wing party. The precisely estimated coefficients on actual position show that, across reference groups, moving up by 10 positions in the income distribution is correlated with a 0.12-0.14 standard deviation increase in perceived unfairness. These are substantial effects, equal to around one third of the gap in perceived fairness between respondents who voted for left-wing parties (*Rød blok*) and those who voted for right-wing parties (in Danish *Blå blok*) in 2015. The effects of moving up in misperceived rank across the reference groups are smaller, i.e., around 30-60% of the effects of moving up in actual rank, but they are still significant and sizable.

Table 4: Unfairness, importance of effort and political view by actual position and position misperception

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Panel A: No controls							
Position	-1.18***	-1.13***	-1.27***	-1.36***	-1.42***	0.82***	0.90***
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Misperception	-0.38***	-0.61***	-0.48***	-0.38***	-0.86***	0.44***	0.49***
	(0.10)	(0.09)	(0.09)	(0.08)	(0.09)	(0.10)	(0.10)
Panel B: With controls							
Position	-1.09***	-1.01***	-1.09***	-1.03***	-1.19***	0.92***	0.99***
	(0.09)	(0.08)	(0.08)	(0.08)	(0.08)	(0.09)	(0.08)
Misperception	-0.40***	-0.41***	-0.42***	-0.30***	-0.61***	0.47***	0.54***
	(0.10)	(0.10)	(0.09)	(0.09)	(0.09)	(0.10)	(0.10)
N	4692	4692	4692	4692	4452	4692	4692
Outcome mean	2.01	2.16	2.09	2.54	2.53	4.81	7.10
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.05)

Notes: The sample is restricted to control group respondents. All outcomes are as defined in the text, but standardized to z-scores. *Position* denotes the actual position within the reference group from percentile 1 to 100 divided by 100. A coefficient of 1 means that going from the bottom of the distribution to the top increases the outcome by one standard deviation. Similarly, *Misperception* is the difference between perceived and actual position within the reference group divided by 100. In the last two columns, the position and misperception are computed in the distribution of the cohort. *Controls* are cohort, municipality, education, gender, and sector fixed effects (including unemployed/not in workforce). *Outcome mean* is the mean of the non-standardized outcome variable. Standard errors on the estimates are reported in the parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

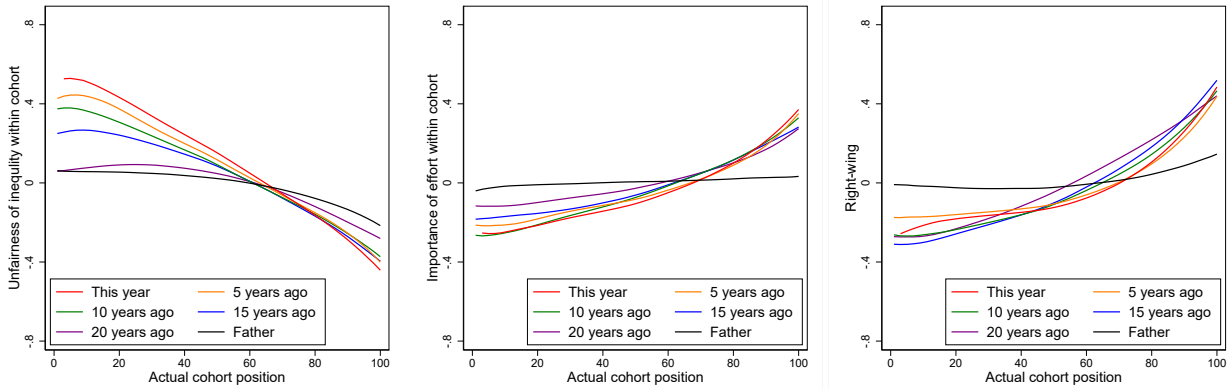
3.2 Historical Variation in Social Positions

What is the relative importance of current social position and social position back in time in shaping views on fairness, the role of effort, and political affiliation? To address this question, we make use of the rich register data to reconstruct people's income and economic histories for the last twenty years and correlate them with their views today. In this section, we focus on their overall income path, while in the next section, we look at the effects of changes in social position due to specific negative and positive shocks.

Figure 11 plots respondents' views against their position in their cohort, measured at different points in time in five-year intervals, as well as against their father's position relative to other fathers in the cohort, measured when the individual was 15 years old. Panel A depicts the standardized (z-score) unfairness variable, i.e., the extent to which within-cohort income differences are considered unfair. In line with the aforementioned findings, there is a strong negative correlation between current social position and perceived unfairness. This association between current fairness views and social position becomes weaker when measuring social position at different points back in

FIGURE 11: HISTORY OF PAST SOCIAL POSITIONS, UNFAIRNESS, IMPORTANCE OF EFFORT, AND POLITICAL VIEWS

(A) UNFAIRNESS (B) IMPORTANCE OF EFFORT (C) RIGHT-WING



Notes: Bandwidth for local linear polynomials is 20. For *Father*, the x-axis is the father's position among fathers when the respondent was 15 years old. The outcomes are standardized z-scores of the unfairness variable, perceived importance of effort relative to luck, and right-wing political views. Sample restricted to the control group.

time. The father's social position is essentially uncorrelated with current fairness views. Recall from Section 2 that perceived and actual position are quite closely aligned for most respondents. Thus, although we do not have respondent's history of perceived positions (as opposed to actual positions), it is likely that these have co-moved to a significant extent over the life time.

Panels B and C show how the perceived importance of effort relative to luck and support for right-wing parties relate to social positions over time. These links appear more stable regardless of the time at which social position is considered, suggesting that these are stickier outcomes.[13]

Putting this all together and to understand whether one's history of social positions over time is correlated with fairness view conditional on current position, each column in Table 5 shows the regression coefficients of the variables in the columns on positions 20, 15, 10 and 5 years ago, as well as current position, and controlling for cohort, gender, education, sector, and treatment fixed effects. The table shows that the coefficients on current social position are large on views of unfairness, in particular when compared to political views. Some of the historical positions are also significantly, but less related to fairness views. Political views are related to current and past positions; and even the position of the father, conditional on the individual's own historical positions. Views on the importance of effort are correlated most strongly with current position, and more weakly so with past positions. Appendix Tables A-8 and A-9 show that these findings are unchanged if we omit the controls, or use average positions over five-year intervals instead of yearly position 20, 15, 10 and 5 years ago.

[13]These results need to be interpreted in light of the degree of income mobility over different time spans. Appendix Tables A-6 and A-7 show that, naturally, the correlation between the current social position and past positions decreases as we move back in time. If we think of position as being composed of a permanent income component and a transitory component then the results are consistent with political views being mostly related to the permanent component, while fairness views are mainly related to the current position, i.e., the sum of the permanent component and the current transitory component.

Table 5: History of past social positions, unfairness, importance of effort, and political view

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Position father	-0.059	-0.051	-0.068	-0.081*	-0.075*	0.025	0.147***
	(0.037)	(0.037)	(0.037)	(0.036)	(0.037)	(0.037)	(0.035)
Position -20 yr.	-0.122**	-0.097*	-0.108**	-0.113**	-0.131**	0.061	0.263***
	(0.042)	(0.041)	(0.041)	(0.040)	(0.041)	(0.042)	(0.039)
Position -15 yr.	-0.203***	-0.169***	-0.148**	-0.126**	-0.139**	0.131**	0.268***
	(0.048)	(0.048)	(0.048)	(0.047)	(0.048)	(0.049)	(0.046)
Position -10 yr.	-0.085	-0.100	-0.117*	-0.186***	-0.162**	0.206***	0.163**
	(0.058)	(0.057)	(0.057)	(0.056)	(0.057)	(0.058)	(0.055)
Position -5 yr.	-0.108	-0.096	-0.152*	-0.108	-0.130	0.037	-0.015
	(0.070)	(0.068)	(0.069)	(0.067)	(0.069)	(0.070)	(0.066)
Position this yr.	-0.655***	-0.618***	-0.647***	-0.678***	-0.761***	0.540***	0.479***
	(0.074)	(0.073)	(0.073)	(0.071)	(0.074)	(0.074)	(0.070)
Observations	9046	9046	9046	9046	8575	9046	9046
Controls	✓	✓	✓	✓	✓	✓	✓

Notes: All outcomes are z-scores. *Position* denotes the cohort position from percentile 1 to 100 divided by 100. A coefficient of 1 means that going from the bottom of the distribution to the top increases the outcome by one standard deviation. *Importance of effort* is for income differences within cohort. *Position father* is the respondent's father's income rank when the respondent was 15 years old compared to other fathers of 15 year olds. *Controls* includes a treatment indicator, cohort, municipality, gender, education, and sector fixed effects (including unemployed/not in workforce). Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

3.3 Variation in Social Positions due to Major Life Events

We now consider four major life events – negative and positive – that could have affected people over the past ten years: having experienced an unemployment spell, having become disabled, having had a health condition that required hospitalization, and having received a promotion.

For each of these shocks, we perform the analysis on the subsample of individuals who did not experience this shock in any of the years 2008-11 (the "pre-shock period") and assign a treatment indicator to individuals who experienced the shock sometime during the years 2012-2017 ("shock period"). We regress our fairness outcomes, perceptions of the role of effort, and being right-wing on the treatment indicator, detailed individual level controls including fixed effects for cohort, gender, municipality, education, sector and percentile cohort position prior to the shock.[14] Thus,

[14]The unemployment shock is defined as more than three months of unemployment in at least one year in the shock period. We estimate this regression on respondents who were not unemployed according to this definition at any time in the pre-shock period and who were in the workforce for the entire ten-year period. A disability shock is identified by a respondent receiving disability insurance benefits in one of the years in the shock period (according to the official Integrated Database for Labour Market Research, IDA, from Statistics Denmark). We only use respondents who were not on disability insurance in the pre-shock period. Hospitalization denotes at least one emergency room visit or hospital visit by referral from a general practitioner, but excluding visits due to congenital diseases, pregnancy, or routine checks, which do not reflect unexpected health shocks. In the regression we only use respondents who were not hospitalized according to this definition in the pre-shock period. Finally, promotion in the table indicates if a

the question we are asking is: conditional on starting from the same position ten years ago, and conditional on an array of personal characteristics, do those that experienced one of these four shocks that shifted their social position hold different views today than those who did not?

Table 6 shows the results. Column 1 shows the effect of the shocks on the current social position; columns 2 through 8 show the effects on our usual outcomes; column 9 reports the size of the subsamples of analysis for each type of shock; and column 10 indicates the share of respondents affected by the shock during the shock period. The unemployment and promotion shocks affect 5-7 percent of the sample and are related to large changes in social position (in opposite directions). Disability shocks hit less than 1 percent of the sample, but are related to a drop of around 22 percentiles in social position. By contrast, half of the sample visits the hospital during the shock period and this is associated with a smaller drop in social position of 2 percentiles.

Respondents who have experienced any of the negative shocks (unemployment, disability, and hospitalization) are significantly more likely to consider inequality within the different reference groups unfair. To the contrary, those who have been promoted are less likely to consider inequality unfair, especially within sector, which is the domain most closely related to work promotions. Consistent with our previous results, the effects of the shocks are weaker and less significant on the perceived importance of effort relative to luck and on right-wing views.

Of course, these results do not necessarily identify the causal effects of these shocks, as they are not random and may be correlated with other unobservable characteristics of the respondents that also affect their views. Still, the detailed controls, fixed effects, and accounting for the starting position ten years ago give confidence in the estimation. We actually obtain similar effects if we omit individual level controls except for starting position (see Appendix Table A-13), suggesting that there is not a highly systematic correlation between these individual characteristics and the likelihood of these shocks occurring. It is also informative that we are able to study four different types of shocks, with some that could be perceived as less influenced by individual choice, conditional on a detailed set of controls (e.g., hospitalization or disability), than others (e.g., promotion).

Note also that the shocks that move social position the most are also those that have the largest effects on fairness views. As we have four different shocks, we can tentatively exploit the fact that they move social positions to different extents and estimate the implied impact of social position on fairness views under the assumption that the only channel through which the shocks acted on views was through social position. Put differently, we can do a suggestive IV-type analysis, in which we instrument for current position using the occurrence of these shocks. Appendix Table A-14 shows that the pooled IV results that use all four shocks at once are close in magnitude to the baseline correlations from Table 4. Using the shocks as instruments one by one yields broadly consistent effects as well, except for hospitalization, which is both very frequent and shifts income

respondent switched from a job position as regular employee in the pre-shock period to a management position in the following period. Note that we do not include the vote in the last general election in the benchmark table, since it is from 2015 and therefore not measured in the pre-shock period. Since it can nevertheless serve as a proxy for past political views, we show the results controlling for party fixed effects in Table A-12.

Table 6: Historic shocks, unfairness, importance of effort and political views

	Current	Unfairness of inequality					Importance	Right-	N	Affected
	position	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing		%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Unemployment	-12.2***	0.20***	0.23***	0.21***	0.18***	0.20***	-0.11*	-0.061	7537	5.03
	(0.78)	(0.051)	(0.050)	(0.050)	(0.049)	(0.052)	(0.052)	(0.049)		
Disability	-21.9***	0.30*	0.54***	0.42**	0.27*		-0.31*	-0.25*	9246	0.61
	(2.31)	(0.13)	(0.13)	(0.13)	(0.13)		(0.13)	(0.13)		
Hospitalization	-1.83***	0.093**	0.079**	0.089**	0.060*	0.039	-0.010	-0.018	4749	55.5
	(0.49)	(0.029)	(0.028)	(0.028)	(0.028)	(0.028)	(0.029)	(0.028)		
Promotion	8.51***	-0.12**	-0.11**	-0.12**	-0.17***	-0.21***	0.14**	0.19***	7970	6.66
	(0.74)	(0.045)	(0.044)	(0.045)	(0.044)	(0.044)	(0.045)	(0.043)		
Pre-shock position FE	✓	✓	✓	✓	✓	✓	✓	✓		
Controls	✓	✓	✓	✓	✓	✓	✓	✓		

Notes: All outcomes z-scores. Each cell in the table is a separate regression of the column outcome on the row regressor and the controls indicated in the bottom part of the table. The explaining variables are all indicators that equal 1 if the respondent experienced the shock between 2012 and 2017. In each row, we exclude respondents who already experienced this type of shock in the pre-period (2008-2011). For *Unemployment*, we only use respondents who were in the workforce in the entire period. For *Disability*, we do not estimate the effect on fairness within sector, because very few disabled people work. *Controls* included in all regressions are a treatment indicator, cohort, gender, municipality, education and sector fixed effects (incl. unemployed/not in workforce), all measured in 2008. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

position only by a little (the "first stage" is weak). The magnitude of the effects of social position on fairness views from this suggestive IV is thus very consistent with the simple OLS correlations. Of course, the exclusion restriction is not necessarily satisfied here. Indeed, while these shocks do shift social position, there could be other channels through which they affect views too, over and above social position.

3.4 Survey Experimental Variation in Social Position: Correction of Misperceptions

In this section, we analyze the causal impact of changes in perceived position on fairness views. As described in Section 1.2, we informed a random half of the sample (the treatment group) about their true social positions in the five large reference groups before asking about their views on fairness, effort versus luck, and political attitudes.[15]

Table 7 shows the main experimental results. The outcome variables are the same as in Tables 4-6. The rows here show the coefficients on an indicator variable for having a positive misperception of one's position within the given reference group (i.e., overestimating one's position), and on the interactions of treatment status with having a positive or a negative misperception for the reference group under consideration. In line with the correlations in Table 4, respondents with positive misperceptions of their position in any given reference group in general believe inequality to be less unfair, conditional on position fixed effects. When they are informed about their misperception, their views on inequality revert back to being more aligned with those of respondents at the same income position who did not initially overestimate their position (i.e., the coefficients on treatment status interacted with positive misperceptions tend to cancel out those on having a positive misperception).

Since the treatment is showing the positions within all reference groups, the effect is a composite of learning about all these positions. Therefore, Appendix Table A-15 shows that, if we restrict the analysis to respondents who had either only positive misperceptions (i.e., overestimated their position) or only negative misperceptions for all reference groups, the coefficients are even larger and more significant. This makes sense given that the treatment corrected the position misperceptions for these respondents consistently in the same direction for all reference groups.

Respondents who start with a negative misperception for a given reference group do not change their fairness views, even after they are informed that they are, in fact, ranked higher than they thought. Appendix Table A-15 confirms that this remains the case even if we restrict the sample to respondents who had either only negative or only positive misperceptions across all reference groups. The effect of correcting misperceptions is thus asymmetric, with "bad news" weighing more heavily than "good news" on respondents.

The last two columns show that the treatment has no significant effects on the role of effort

[15] Due to the wish to treat all respondents fairly, the other half of the sample (the control group) was informed about their true positions only *after* these outcome questions, with no possibility to go back and change their answers. Hence, their answers to the outcome questions cannot be affected by this information.

Table 7: Survey information experiment and unfairness, importance of effort and political view

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Positive misperception	-0.132***	-0.131***	-0.133***	-0.108***	-0.267***	0.112**	0.117***
	(0.034)	(0.033)	(0.033)	(0.031)	(0.034)	(0.034)	(0.034)
T × Positive	0.154***	0.082*	0.099**	0.060*	0.089**	-0.010	-0.013
	(0.037)	(0.036)	(0.035)	(0.030)	(0.031)	(0.038)	(0.037)
T × Negative	0.023	0.022	0.028	0.044	0.005	0.006	-0.027
	(0.024)	(0.024)	(0.025)	(0.027)	(0.028)	(0.024)	(0.024)
N	9331	9331	9331	9331	8854	9331	9331
Position FE	✓	✓	✓	✓	✓	✓	✓

Notes: All outcomes are z-scores. *Positive misperception* is an indicator that equals 1 if the perceived position is larger than the actual position within the reported reference group specified in each column. For the *Importance of effort* and *Right-wing* outcomes, we use cohort misperception. $T \times$ *Positive* is an interaction of the treatment indicator and the *Postive misperception* indicator. $T \times$ *Negative* is an interaction of the treatment indicator and an indicator for having a misperception ≤ 0. In the regressions we also include a constant term. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

versus luck and on political preferences. Similarly, we do not detect any significant effects on other views and attitudes (see Appendix Table A-16). Overall, these results suggest that changes in perceived social position have stronger effects on fairness than on other normative views, and that these effects are asymmetric.

The Appendix reports several robustness checks: The results are unaffected if we include controls (see Appendix Table A-17). The treatment information is based on people's reported income, not on their actual income, so one may potentially worry that the treatment effects could be affected by errors in people's reported income. However, this is not the case. As Appendix Table A-18 shows, restricting the sample to respondents who reported their own income accurately gives similar results. We also check that the heterogeneous treatment effect is indeed driven by the misperception, rather than by income per se. Appendix Table A-19 shows that the results are unchanged if we also include treatment-income interactions in the regressions.

4 Conclusion

Our results provide new answers to some of the long-standing questions asked in the Introduction. First, we find that people are overall well informed about social positions, although they have some systematic misperceptions. They tend to believe others are closer to themselves than they really are and, in this sense, perceive inequalities to be smaller than they are. This finding could be explained, for instance, by anchoring to one's own income or Bayesian shrinkage. Nevertheless, the main conclusion is that, with some exceptions, misperceptions are not large. They may seem large when assessing people's own position, as normally done in the literature, but this is in many cases due to a mechanical center bias when asking about ranks.

Second, we provide a number of results suggesting that people's fairness views are strongly related to their social position and change when their positions change. Fairness views correlate more strongly with current social positions than with past positions, and movements up or down in social positions caused by real-life shocks are also related to corresponding differences in people's fairness views. When informing people about their true positions in their reference groups, we observe changes in fairness views across all the reference groups, but with asymmetric effects: Those that are told that they are lower-ranked than they thought perceive inequality as more unfair. By contrast, those who are informed they are ranked higher than they thought do not change their views on fairness. Thus, when it comes to correcting misperceptions, bad news weigh more heavily than good news in people's minds.

Third, people consider inequalities conditional on the same level of education or work sector as most unfair. Exactly in these dimensions, where it matters most, people are least informed about inequality and lower-income people strongly overestimate their positions. It is an open question what drives this observed pattern, but it could have important implications for wage setting and career dynamics. One reason could be that people see education and type of work as choices of individuals that are key determinants of income. People from the same cohort, gender, or municipality can have very different education levels and types of work, and so it may be more expected that they earn different levels of income. To the contrary, inequality conditional on the key determinants of income (education and sector of work) may appear to be due to factors outside of people's control and, therefore, perceived as more unfair. Another reason could be that people have different aspirations across reference groups and that, hence, admitting that they have a low position within education group or sector could lead to more resentment. In any case, these different views on the fairness of inequality in various reference groups highlights the importance of decomposing changes in inequality into those happening within sectors or firms and those happening across, as done by, e.g., Card et al. (2013) and Song et al. (2019).

Are our results portable to other countries? Clearly, Denmark is one of the most equal countries in the world (Atkinson and Søgaard, 2016; Boserup et al., 2016; Jakobsen et al., 2020) and attitudes vary across countries (Alesina et al., 2001, 2018; Almås et al., 2020). Yet, because we analyze rank positions, relative inequality perceptions (e.g., differences between perceived and actual P95 levels compared to corresponding P50 levels) and relative fairness views across reference groups, it is not *a priori* clear that our results should be different in one direction or the other.

Key to our analysis and findings is the linking of large-scale survey data on perceived social positions and fairness to administrative records on actual social positions across time, life events and reference groups. We see this combination of subjective and objective information as a promising avenue to learn more about the determinants of perceptions and attitudes.

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APPENDIX

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A Survey

A.1 Survey link and questions in English

Link: https://cebi.eu.qualtrics.com/jfe/form/SV_6PcXP1t0Mw89iqp

Background and Political views

1. What is your birth year?
   Dropdown menu with years. Only 1969-1973 accepted.

2. What is your gender?
   Male; Female

3. How many siblings do you have with the same biological mother and father as you?
   0; 1; 2 or more

4. Which municipality did you live in at the beginning of 2017? Note that in the following options, some of the municipalities are grouped together.
   Dropdown menu with Danish municipalities

5. Which of the following categories best describes your highest educational level?
   Primary education; Upper secondary education; Vocational education and training; Short cycle higher education; Bachelor program or vocational bachelor education; Master program or PhD program

6. What was your employment status at the beginning of 2017?
   Full-time employment; Part-time employment; Self-employed; Unemployed; Not in the workforce

7. Which sector did you work in at the beginning of 2017? Note that we mean the sector which your workplace belongs to. For example, if you work with PR in a bank you should choose the sector "Finance and insurance" and not the sector "Information and communication".
   Construction; Real estate activities; Business services; Finance and insurance; Trade and transport; Manufacturing, raw material extraction and utilities; Information and communication; Culture, leisure and other services; Agriculture, forestry and fishing; Public administration, education, health and social work activities

8. Which party did you vote for in the last general election (in 2015)?
   Socialdemokratiet; Venstre, Danmarks Liberale Parti; Radikale Venstre; Enhedslisten - De Rød-Grønne; Det Konservative Folkeparti; Alternativet; SF - Socialistisk Folkeparti; Liberal Alliance; Kristendemokraterne; Dansk Folkeparti; Other; Did not vote; Do not wish to answer

9. How would you describe your attitude on economic policy?
   Very left-wing; Left-wing; Moderate; Right-wing; Very right-wing

Income

1. We will now ask you about your total income BEFORE tax in 2017. You should NOT include contributions to employer-managed pension schemes or mandatory pension contributions. When we later will inform you about your own position, it is important that you state your total income as precisely as possible. If you are in doubt about the amounts, you can view them on your annual statement for 2017 from SKAT under *Opgørelse af indkomst* below *Før AM-bidrag*. You can also see a description of the different categories below. Note: In the scheme below we ask you to please state the yearly amounts in entire thousand DKK. If you enter 1 this corresponds to 1,000 DKK.
   Salary and fees; Net profit from self-employment; Unemployment benefits, social assistance, study grants and pension payments

Perceptions

1. Instruction video

2. We will now ask you a question to see if you have understood the video's explanation of the ladder's different positions. Think about a person with an income where 73 out of 100 people have an income that is the same as or lower than this person's income. 27 out of 100 people have an income which is higher than this person's income. Select this person's position on the income ladder using the slider below.

3. What do you think the income for P50 was in 2017 for individuals born in [PIPED BIRTH YEAR]? Remember that P50 is the income, where half have an income that is the same as or lower than this income, and half have an income that is higher than this income. Remember also that income is before tax for the whole of 2017 and consists of salary, net profit from self-employment, other business income, unemployment benefits, transfers and payments from private and public pensions. Note: Please state your answer in entire thousand DKK. If you enter 1 it corresponds to 1,000 DKK

4. We will now ask you what you think the before tax income for P50 was in 2017 for the groups below which you are a part of. The first slider shows your answer from the previous question. You can use the other sliders to select what you think the income was for P50 for the different groups of people who were born the same year as you.
   One horizontal slider for each reference group. The slider for cohort is locked at the amount entered in the previous question.

5. What do you think the income for P95 was in 2017 for individuals born in [PIPED BIRTH YEAR]? Remember that P95 is the income where 95 out of 100 have an income that is the same as or lower than this income, and 5 out of 100 have an income that is higher than this

income. Please state your answer in entire thousand DKK. If you enter 1 it corresponds to 1,000 DKK

6. We will now ask you what you think the before tax income for P95 was in 2017 for the groups below which you are a part of. The first slider shows your answer from the previous question. You can use the other sliders to select what you think the income was for P95 for the different groups of people who were born the same year as you.
   One horizontal slider for each reference group. The slider for cohort is locked at the amount entered in the previous question.

7. Rank among all people born in [PIPED BIRTH YEAR]. You previously reported that you had a yearly income in 2017 of [PIPED INCOME] DKK before tax. We will now ask you to report where you think this income placed you on the income ladder in 2017 for people who were born in [PIPED BIRTH YEAR]. Use the slider to select your position. Later, we will inform you about your true position.

8. Rank among [PIPED GENDER]. Now, think about all [PIPED GENDER] born in [PIPED BIRTH YEAR]. Use the slider to select where you think you were placed on the income ladder in 2017 for this group of people. Later, we will inform you about your true position.

9. Rank within [PIPED MUNICIPALITY] municipality. Now, think about people who also lived in [PIPED MUNICIPALITY] municipality at the beginning of 2017 and were born in [PIPED BIRTH YEAR]. Use the slider to select where you think you were placed on the income ladder in 2017 for this group of people. Later, we will inform you about your true position.

10. Rank within the educational level [PIPED EDUCATION]. Now, think about people whose educational level also was [PIPED EDUCATION] at the beginning of 2017 and were born in [PIPED BIRTH YEAR]. Use the slider to select where you think you were placed on the income ladder in 2017 for this group of people. Later, we will inform you about your true position.

11. Rank within the sector [PIPED SECTOR]. Now, think about people who also worked in the sector [PIPED SECTOR] at the beginning of 2017 and were born in [PIPED BIRTH YEAR]. Use the slider to select where you think you were placed on the income ladder in 2017 for this group of people. Later, we will inform you about your true position.

12. Think about your [FOR WOMEN: mother's. FOR MEN: father's] total income in the year where you turned 15. Compared to [FOR WOMEN: mothers. FOR MEN: fathers] of children, who were also born in [PIPED BIRTH YEAR], where do you think your [FOR WOMEN: mother. FOR MEN: father] was placed on the income ladder in the year where you turned 15?

13. Is your income higher or lower than [FOR REPONDENTS WITH ONE SIBLING: your brother's/sister's income? FOR RESPONDENTS WITH 2 OR MORE SIBLINGS: the average income of your siblings?]
    Higher; The same; Lower

14. Think about your co-workers at the beginning of 2017. By co-workers, we mean the people who had the same workplace as you at the beginning of 2017. A workplace usually has the same address so if you for instance worked in a chain store then your co-workers are those who worked in the same store as you and not all the people, who were employed in the same firm. How many people worked at your workplace at the beginning of 2017 incl. you? If you do not remember the exact number then report your best guess.

15. Imagine that we rank you and your colleagues by your income in 2017 such that the person with the lowest income is number 1 and the person with the highest income is number [PIPED # COWORKERS]. What do you think your position was in this rank in 2017?

16. Think about your neighbors at the beginning of 2017. By neighbors, we mean the people who lived on the same road as you, if you lived in a house, or the people living on the same stairwell as you, if you lived in an apartment. Think only about the people, who were between 25 and 65 years old. How many people lived on the same road or on the same stairwell as you, including your own household, at the beginning of 2017? If you do not remember the exact number then report your best guess.

17. Imagine that we rank you and your neighbors by your income in 2017 such that the person with the lowest income is number 1 and the person with the highest income is number [PIPED # NEIGHBORS]. What do you think your position was in this rank in 2017?

18. Think about your schoolmates when you were 15 years old. By schoolmates, we mean everybody at your school who was born in [PIPED BIRTH YEAR], and not just the people in your class. How many schoolmates were you including yourself? If you do not remember the exact number then report your best guess.

19. Imagine that we rank you and your schoolmates by your income in 2017, such that the person with the lowest income is number 1 and the person with the highest income is number [PIPED # SCHOOLMATES]. What do you think your position was in this rank in 2017?

Treatment

For the treatment group this block appears here. For the control group it appears after the block "Outcomes".

For each reference group, cohort/gender/municipality/educational level/sector, we provide the following information on separate pages along with a visualization of the difference:

You GUESSED that you were on position PXX.
Based on the income you reported, your TRUE position is PXX.
You are actually X positions higher/lower on the ladder than you thought.

Outcomes

1. On a scale from 1 to 7 where 1 is "Completely fair", 4 is "Neither fair nor unfair" and 7 is "Completely unfair", indicate to what extent you think that it is fair or unfair that there are differences in income among people born the same year as you WITHIN the following groups that you are yourself a part of?

   (a) Differences in income among people born in [PIPED BIRTH YEAR]

   (b) Differences in income among [PIPED GENDER] born in [PIPED BIRTH YEAR]

   (c) Differences in income among people living in [PIPED MUNICIPALITY] municipality

   (d) Differences in income among people with the educational level [PIPED EDUCATION]

   (e) Differences in income among people working in the sector [PIPED SECTOR]

2. Now, think about people born the same year as you WITHIN these groups (indicated below). On a scale from 1 to 7 where 1 is "Only luck", 4 is "Equally important", and 7 is "Only effort", indicate to what extent you think that differences in income are caused by differences in peoples' efforts over their lifetime or rather by luck? By luck, we mean conditions, which you have no control over. By effort, we mean conditions, which you can control.

   (a) Reason for different incomes among people born in [PIPED BIRTH YEAR]?

   (b) Reason for different incomes among [PIPED GENDER] born in [PIPED BIRTH YEAR]?

   (c) Reason for different incomes among people living in [PIPED MUNICIPALITY] municipality?

   (d) Reason for different incomes among people with the educational level [PIPED EDUCATION]?

   (e) Reason for different incomes among people working in the sector [PIPED SECTOR]?

3. Which party would you vote for if there was a general election today?
   Socialdemokratiet; Venstre, Danmarks Liberale Parti; Radikale Venstre; Enhedslisten - De Rød-Grønne; Det Konservative Folkeparti; Alternativet; SF - Socialistisk Folkeparti; Liberal Alliance; Kristendemokraterne; Dansk Folkeparti; Nye Borgerlige; Other; Do not wish to answer

4. Below, you see six statements which you can agree or disagree with. On a scale from 1 to 7 where 1 is "Completely agree", 4 is "Neither agree nor disagree", and 7 is "Completely disagree", indicate to what extent you agree or disagree with each statement.

(a) Income inequality is a problem in Denmark

(b) The government should increase redistribution of income by increasing taxes and transfers to reduce inequality

(c) I am generally satisfied with my life

(d) My work has generally paid off

(e) People with high incomes have worked hard for their income and deserve it

(f) If a person is poor this is mainly due to lack of effort from his or her side

Outro

1. It is important for our study that we only use responses from people, who have given the survey their full attention. You will automatically participate in the lottery no matter what you answer, but we would like to know how much attention you have given the survey.
   1 I barely gave the survey any attention; ... ; 7 I gave the survey my full attention

2. Do you think that the survey was biased?
   Yes, it was right-winged; Yes, it was left-winged; No, it was neutral

3. If you have any comments about the survey, then you are welcome to write them here:

A.2 Instruction video link and script

Link: https://www.dropbox.com/s/ya1z0nlmii5tkpo/Instruktionsvideo.m4v?dl=0

We will now ask you some questions regarding the distribution of income between Danes born the same year as you.

It may be difficult to answer, but we ask you to try your best.

There are differences between peoples' incomes. Some people have a high income, others have a low income.

The ladder to the left illustrates **how the incomes are distributed between Danes** born the same year as you.

This is also called the income distribution.

Think of 100 people born the same year as you.

They are ranked according to their income such that the person with the lowest income is at the bottom of the ladder and the person with the highest income is at the top of the ladder.

Look at the person next to the first rung of the ladder.

5 out of 100 people (i.e. 5 %) have an income which is the same as or **lower** than the income of this person.

We call this P5, because the person has position 5 on the income ladder.

The person on the middle rung has position 50.

Exactly half of all people (i.e. 50 %) born the same year as you have an income which is the same as or **lower** than the income of this person and **exactly half** have an income which is **higher** than the income of this person.

We call the position in the middle for P50.

Remember that P50 is the position in the middle since we will use this several times in the following questions.

The person next to the top rung has position 95.

95 out of 100 (i.e. 95 %) have an income which is the same as or **lower** than the income of this person and only 5 out of 100 people born the same year as you (i.e. 5 %) have an income which is higher than the income of this person.

Remember what P95 indicates since we are going to use this several times.

Shortly, we will now ask you what you think the income is for P50 and P95, respectively, for Danes born the same year as you

Next, we will ask you what you think **your position** is on the ladder.

You are welcome to watch the video again if you are not sure of the meaning of the different positions.

A.3 Survey screenshots

FIGURE A-1: INCOME QUESTION

We will now ask you about your **total income BEFORE tax in 2017**. You should **NOT** include contributions to employer-managed pension schemes or mandatory pension contributions. When we later will inform you about your own position, it is important that you state your total income as precisely as possible. If you are in doubt about the amounts, you can view them on your annual statement for 2017 from SKAT under *Opgørelse af indkomst* below **Før AM-bidrag**. You can also see a description of the different categories below.

Note: In the scheme below we ask you to please state the **yearly** amounts in **entire thousand DKK**. If you enter 1 this corresponds to 1,000 DKK.

Salary and fees		thousand DKK
Net profit from self-employment		thousand DKK
Unemployment benefits, social assistance, study grants and pension payments		thousand DKK
Total	0	thousand DKK

Examples

Salary and fees: Taxable wage income before tax and before labor market contribution and fees. You should include:

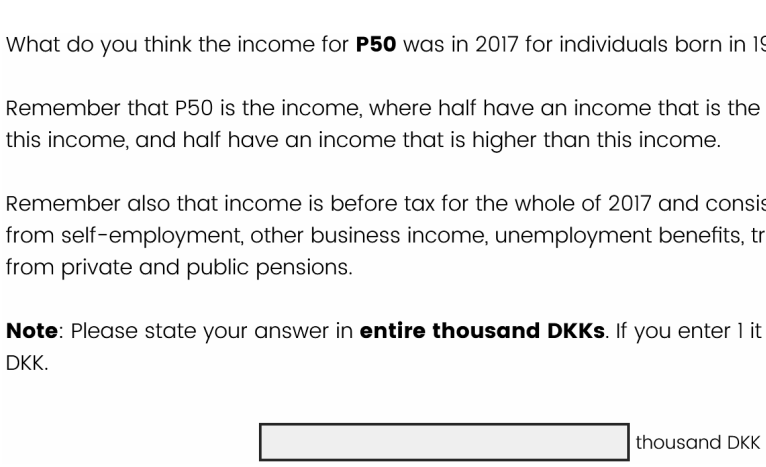
- Value of fringe benefits
- Taxable foreign wage
- Wage during sickness and maternity/paternity leave
- Fees from board duties, consultancy work, talks etc.
- Value of stock options, severance pay and anniversary bonus

On your tax statement this corresponds to box 11 + 12 + 14.

Net profit from self-employment: Net profit from self-employment after capital income and expenses. On your tax statement this corresponds to box 111 minus box 112.

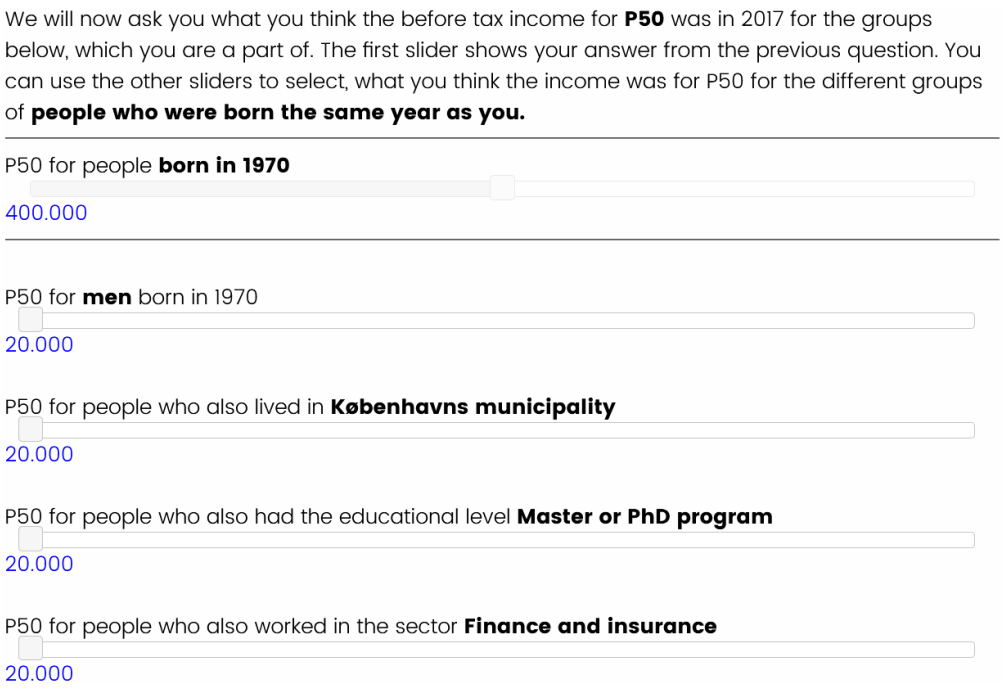
Unemployment benefits, social assistance, study grants and pension payments: Unemployment benefits, cash benefits, sickness benefits, maternity/paternity benefits, study grants, payments from private pensions, public pensions and disability pensions. On your tax statement this corresponds to box 16.

Figure A-2: Elicitation of cohort P50 perception



Notes: The figure shows a screenshot from the survey for a person who reported being born in 1971.

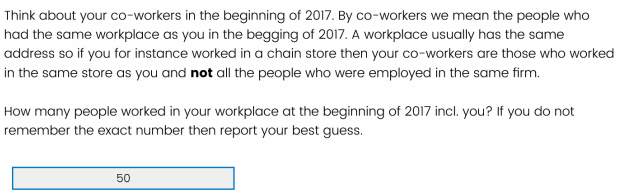
Figure A-3: Elicitation of large reference group P50 perceptions



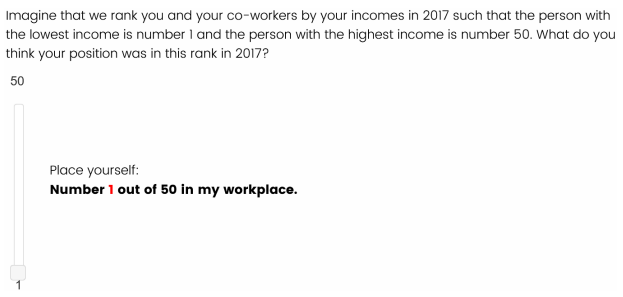
Notes: The top slider shows the piped answer to the question in figure A-2 and cannot be moved. The sliders go from 20,000 to 8,069,000 in 200 steps according to $Y = 20000 * EXP(0.03 * Step)$. In the middle position the slider has the value 402,000.

FIGURE A-4: ELICITATION OF NUMBER OF CO-WORKERS AND POSITION AMONG CO-WORKERS

(A) NUMBER



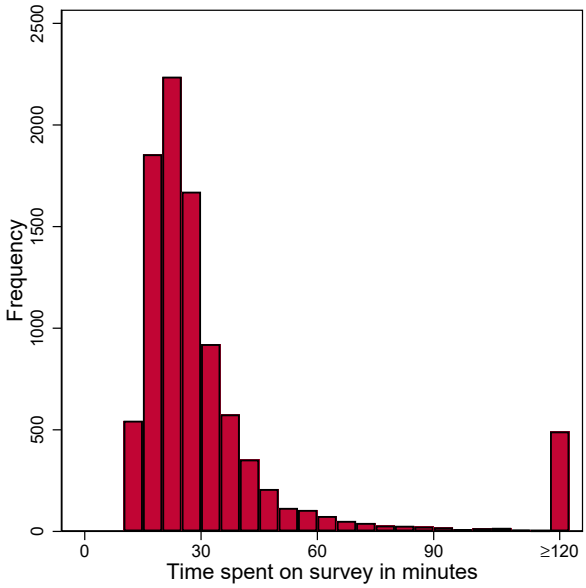
(B) POSITION



Notes: The panels show screenshots from two pages in the survey. On the first page in this example, the respondent reports having 50 co-workers (the box is empty as default). On the second page, this number is piped as the max of the slider, and when the respondent moves the slider with the cursor the red position number changes accordingly.

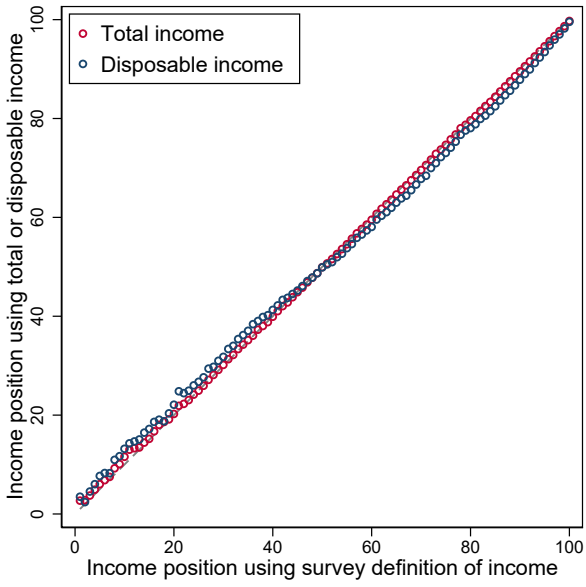
B Data Collection, Survey Design and Administrative Data

FIGURE A-5: FULL DISTRIBUTION OF TIME SPENT ON ANSWERING THE SURVEY



Notes: The figure shows the distribution of time spent on the survey for the analysis sample. The bin width is 5 minutes and the distribution is censored above 120 minutes.

FIGURE A-6: COMPARISON OF POSITION USING DIFFERENT INCOME DEFINITIONS



Notes: The figure uses all individuals born from 1969 to 1973 observed in the income register data. N=389,759. We use total income and disposable income as defined by Statistics Denmark.

Table A-1: Attrition analysis

	Not in sample	
Panel A		
Treatment	0.011	(0.008)
Male	-0.083***	(0.008)
Age	0.001	(0.003)
Married	-0.021**	(0.008)
Ref.: Middle 40%		
Bottom 50 %	0.149***	(0.009)
Top 10 %	-0.060***	(0.012)
Ref.: Master programs		
Primary education	0.157***	(0.017)
Upper secondary edu.	0.017	(0.019)
Vocational education	0.086***	(0.012)
Short cycle higher edu.	0.014	(0.017)
Bachelor programs	0.026*	(0.012)
Ref.: Nothern Jutland		
Copenhagen	0.016	(0.015)
Sealand	-0.000	(0.016)
Southern Denmark	0.007	(0.015)
Middle Jutland	-0.014	(0.015)
Observations	13667	
Panel B		Share
Not in the final sample		0.312
Drop out at consent question		0.010
Drop out at income question		0.102
Drop out before treatment		0.242
Drop out after treatment		0.012
Screened out		0.049

Notes: Respondents who dropped out before the treatment, were not assigned to either the treatment or control group. We randomly assign these individuals to one of the groups. The number of observations in the regression in Panel A is 19 lower than total number of people who started the survey. This is because we miss educational information for these individuals. The sum of *Drop out before treatment*, *Drop out after treatment* and *Screened out* sum to 30.3%. The last 0.9% are people who are assigned to the control but do not complete the survey. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A-2: Treatment balancing

	Control	Treatment	Difference	
Actual cohort position	64.003	64.370	-0.367	(0.513)
Treatment information	-5.812	-6.048	0.237	(0.335)
Cohort misperception	-5.767	-6.064	0.297	(0.353)
Left-wing	0.219	0.222	-0.003	(0.009)
Right-wing	0.236	0.241	-0.004	(0.009)
Male	0.511	0.518	-0.007	(0.010)
Age	47.058	46.998	0.060*	(0.029)
Primary education	0.077	0.075	0.001	(0.005)
Upper secondary education	0.061	0.054	0.007	(0.005)
Vocational education	0.317	0.312	0.005	(0.010)
Short cycle higher education	0.090	0.091	-0.001	(0.006)
Bachelor programs	0.264	0.274	-0.010	(0.009)
Master programs	0.190	0.193	-0.003	(0.008)
Self-employed	0.038	0.036	0.003	(0.004)
Employee	0.902	0.904	-0.001	(0.006)
Unemployed	0.011	0.013	-0.001	(0.002)
Private sector	0.660	0.657	0.003	(0.010)
Not in work force	0.048	0.048	-0.000	(0.004)
Copenhagen	0.087	0.086	0.001	(0.006)
Sealand	0.237	0.229	0.008	(0.009)
Southern Denmark	0.199	0.215	-0.016	(0.008)
Middle Jutland	0.312	0.308	0.004	(0.010)
Nothern Jutland	0.164	0.161	0.003	(0.008)
N			9415	

Notes: Column 1 and 2 show the group means of the variables. Column 3 shows the difference. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

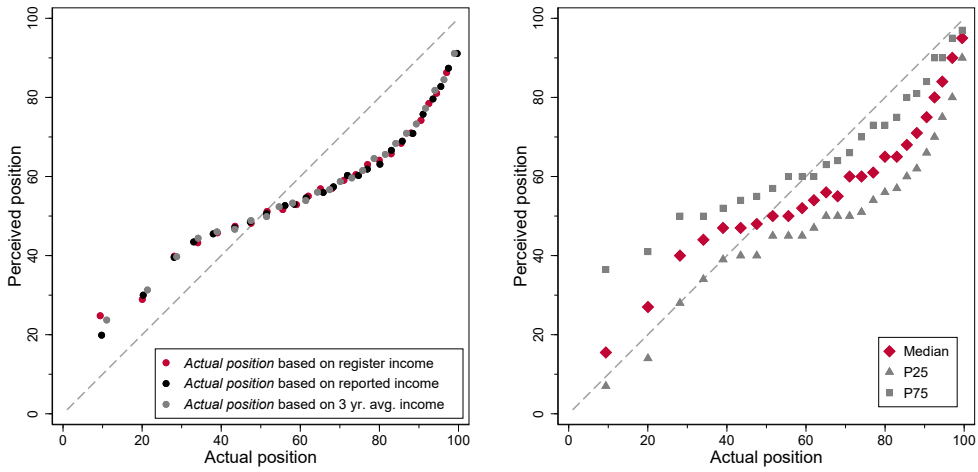
Table A-3: Match between survey response and register data

	N	Share
Correct cohort	9,415	1.00
Correct gender	9,415	1.00
Correct municipality	9,239	0.98
Correct level of education	6,958	0.74
Correct sector	6,768	0.72
All correct	4,952	0.53

C Perceptions and Misperceptions about Social Positions

FIGURE A-7: PERCEIVED POSITION WITHIN COHORT

(A) ACTUAL INCOME MEASURES (B) MOMENTS



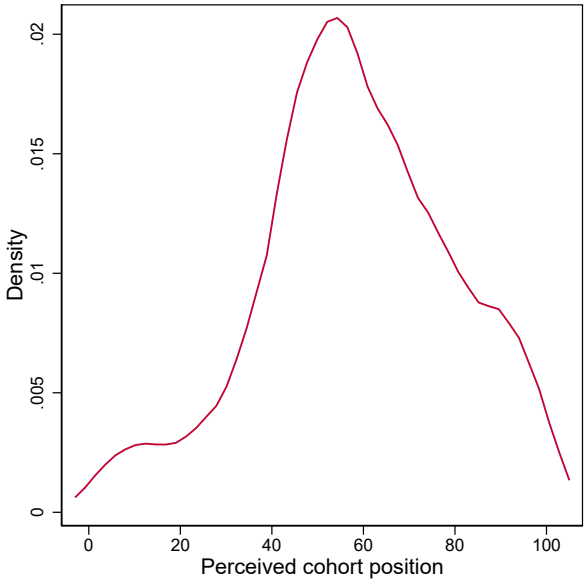
Notes: The left panel is a bin scatter of the average perceived position by actual position (in 25 equally-sized bins). Actual position is either based on the actual income observed on the tax return, the income reported in the survey, or a three-year average of actual income. The right panel shows the 25th, 50th and 75th percentile of perceived position by bins of actual income position.

Table A-4: Accuracy of perceptions regressed on individual characteristics

	A. Top 20% most inaccurate			B. Top 20% most accurate		
	Position	P50	P95	Position	P50	P95
Male	-0.04***	-0.06***	-0.04***	0.04***	0.02*	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Left-wing	-0.02*	0.00	0.03**	0.01	0.00	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Right-wing	-0.03**	-0.01	-0.00	0.03**	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Middle Jutland	-0.02	0.01	0.03	-0.01	0.00	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Southern Denmark	-0.03	0.01	0.03	0.00	-0.01	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Sealand	-0.01	0.04**	0.02	0.01	-0.00	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Copenhagen Area	-0.02	0.02	0.01	-0.01	-0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Vocational education	-0.06**	-0.04	-0.00	0.01	-0.00	0.04
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Upper secondary edu.	-0.03*	-0.03*	-0.02	0.01	0.03	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Short cycle higher edu.	-0.05**	-0.07***	-0.04	0.02	0.02	0.06**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Bachelor programs	-0.08***	-0.06**	-0.02	0.04*	0.02	0.04*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Masters programs and PhD	-0.15***	-0.11***	-0.01	0.10***	0.05**	0.06**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Construction	0.03	-0.01	-0.01	0.00	-0.04	0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Real estate activities	0.04	-0.03	-0.07	-0.00	-0.06	0.02
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Business service	0.06*	0.01	-0.01	-0.04	-0.02	0.01
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
Finance and insurance	-0.01	-0.02	-0.06*	0.05	-0.05	0.04
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Trande and transport	0.06*	0.01	-0.02	-0.02	-0.03	-0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Manufacturing	0.04	0.00	-0.03	-0.02	-0.03	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)
Information and communication	-0.02	-0.02	-0.03	0.00	-0.02	0.00
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Culture and leisure	0.01	-0.03	-0.04	0.07*	0.02	0.02
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Agriculture	0.08	-0.10*	-0.06	-0.04	0.04	0.07
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Public adm., edu. and health	0.03	-0.02	-0.03	-0.01	-0.01	0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
N	9415	9415	9415	9415	9415	9415
R^2	0.087	0.034	0.025	0.079	0.036	0.029
Cohort FE	✓	✓	✓	✓	✓	✓
Actual position FE	✓	✓	✓	✓	✓	✓

Notes: In Panel A (respectively, Panel B), the outcomes are indicator variables equal to 1 if the respondent is among the 20% of respondents with the largest (respectively, smallest) misperceptions for each variable. The *Actual position FE* is fixed effects for all 100 positions in the income distribution. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

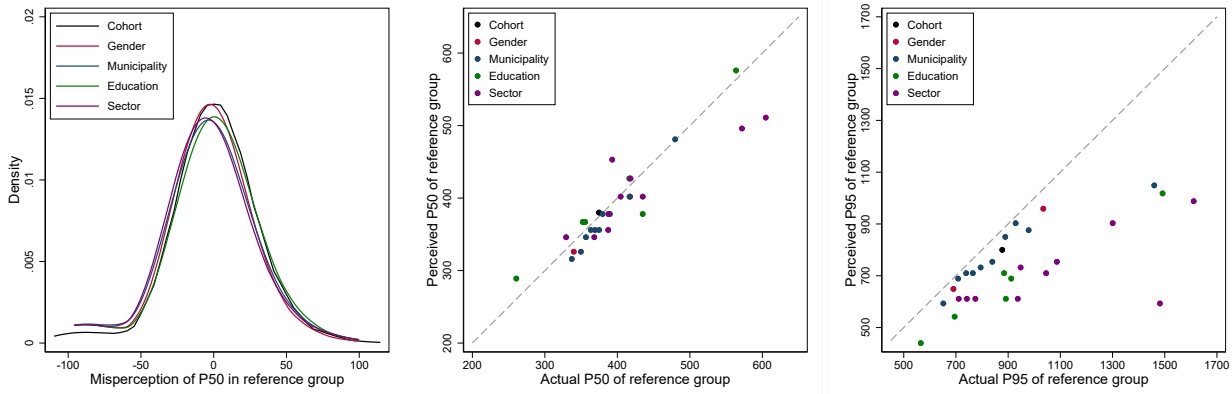
Figure A-8: Distribution of perceived cohort position



Notes: The panel shows a density plot and is constructed using Epanechnikov kernels with a bandwidth of 5.

Figure A-9: Distribution of P50 misperceptions and median perceived P50 and P95 incomes for large reference groups

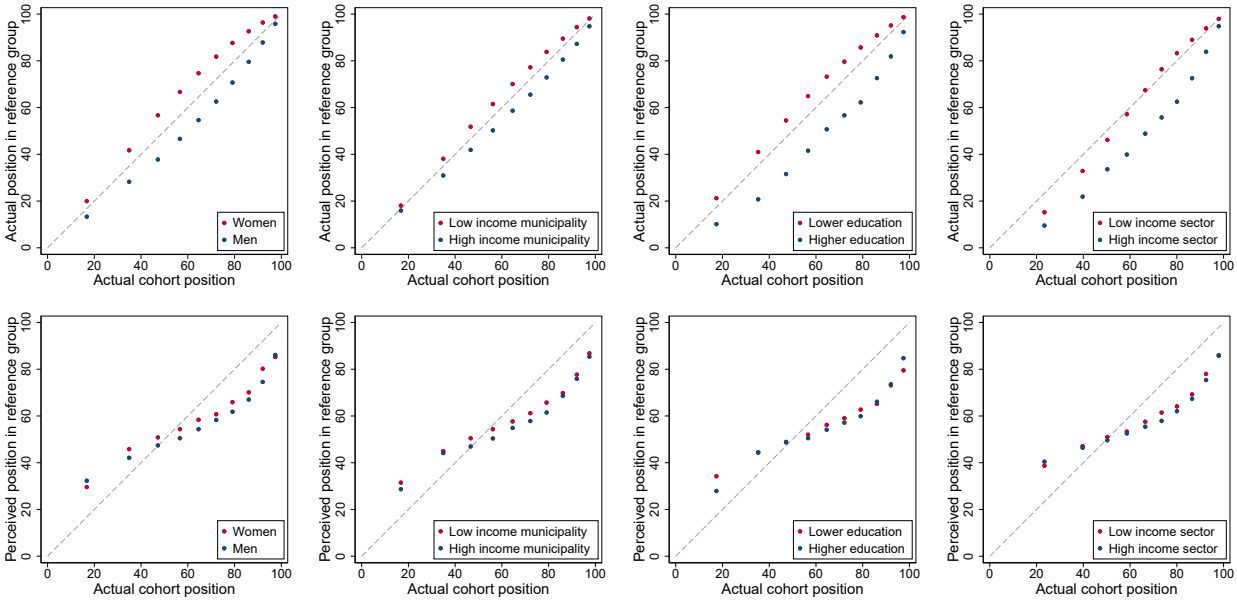
Distribution P50 P95



Notes: In the left panel, we show the distributions of P50 misperceptions in the large reference groups. The distributions are smoothed using epanechnikov kernels with a bandwidth of 15. In the middle and right panels, we show bin medians instead of bin means using the same sample as in figure 5. For gender, we show one scatter for men and one for women. For municipality we divide the respondents into 10 similar sized groups based on the actual municipality P50 and P95 income and plot one scatter for each group. For education and sector we show one scatter for each educational level or sector.

FIGURE A-11: CORRELATION BETWEEN ACTUAL COHORT POSITION AND ACTUAL VERSUS PERCEIVED POSITION WITHIN REFERENCE GROUPS

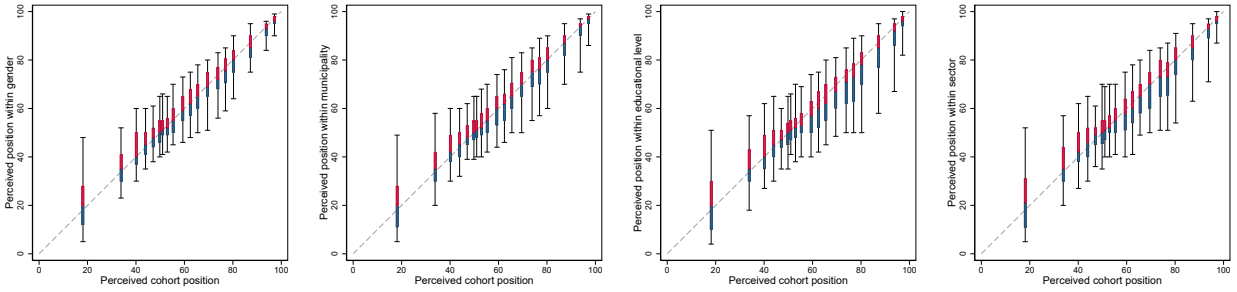
(A) GENDER (B) MUNICIPALITY (C) EDUCATION (D) SECTOR



Notes: The top panels plot *actual* reference group positions by actual cohort positions, while the bottom panels plot *perceived* reference group positions by actual cohort positions. The high/low income split for municipality is based on the median of within cohort in sample actual municipality P50 income. This is also the case for sector. For education, *Higher education* is short cycle higher education, bachelor programs and master programs.

FIGURE A-10: VARIATION IN PERCEIVED POSITION ACROSS LARGE REFERENCE GROUPS

(A) GENDER (B) MUNICIPALITY (C) EDUCATION (D) SECTOR

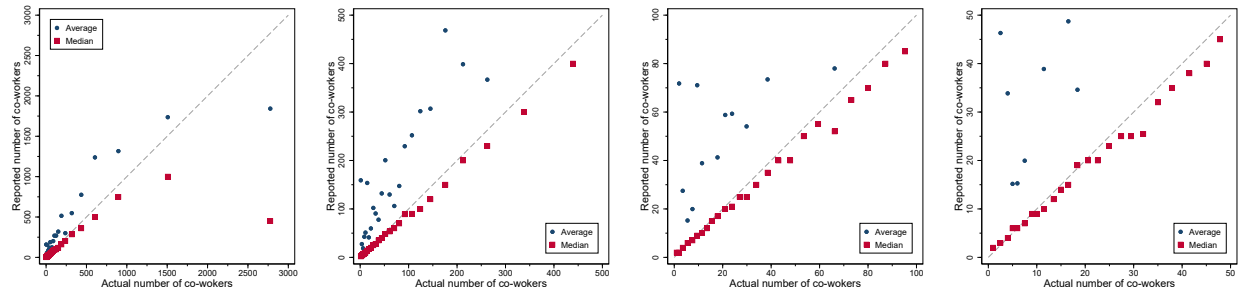


Notes: This figure shows 5th, 25th, 50th, 75th and 95th percentile of reported position within the large reference group by bins of perceived cohort position.

FIGURE A-12: ACTUAL AND REPORTED NUMBER OF PEOPLE IN SMALL REFERENCE GROUPS

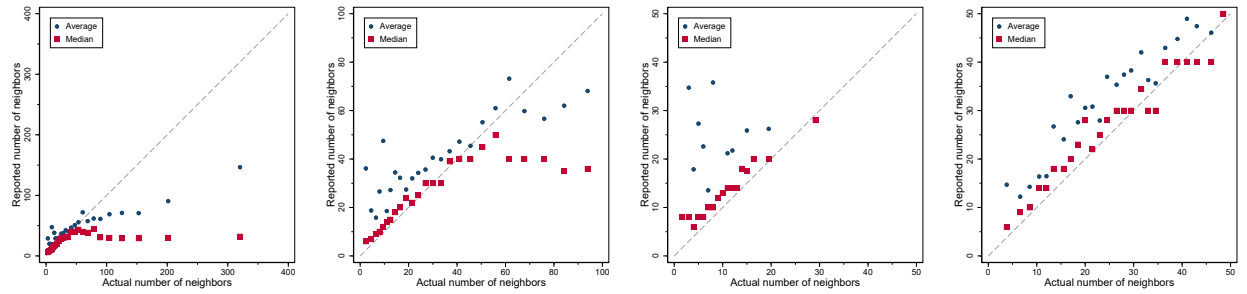
(A) CO-CORKERS

< 4000 < 500 < 100 < 50

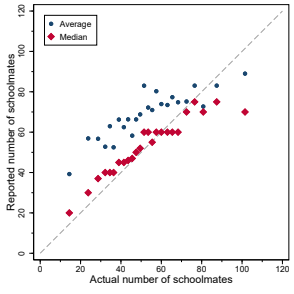


(B) NEIGHBORS

< 500 < 100 < 50 (APARTMENTS) < 50 (HOUSES)



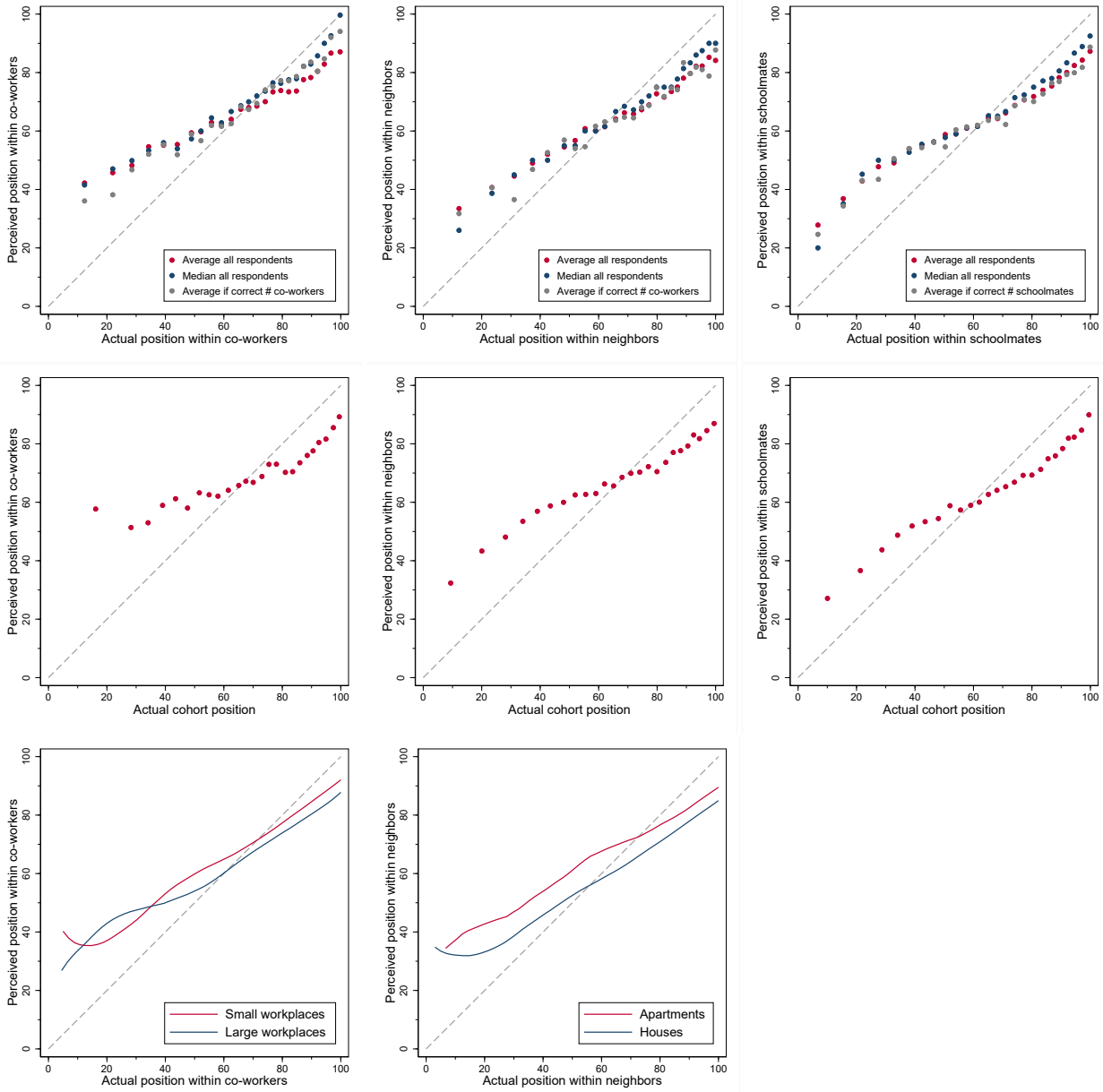
(C) SCHOOLMATES



Notes: The figures show bin scatters of the reported number of co-workers by the actual number of co-workers. In each panel, the sample is restricted to observations where the *Actual number of co-workers* is below a certain threshold. All observations are used to calculate the bin averages but the panels only show the averages if they are smaller than the threshold. There are 25 bins in each panel and there is the same number of observations behind each bin. The bin averages are only plotted if they are lower than the maximum actual number. For *Schoolmates*, the figure is based on respondents enrolled in "Grundskole" (Basic School) at age 15. The figure excludes observations from one very large school.

Figure A-13: Perceived position in small reference groups

Co-workers | Neighbors | Schoolmates

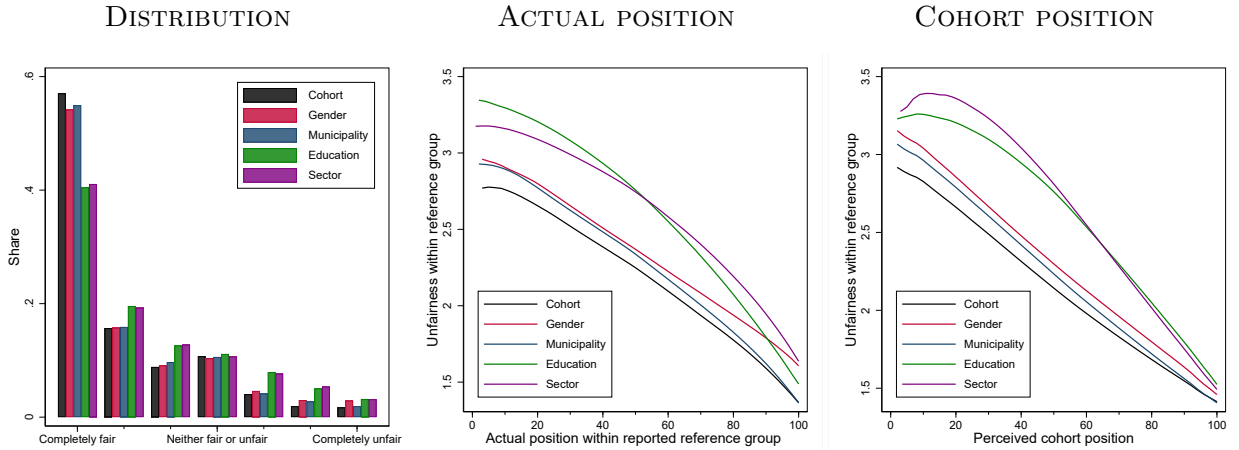


Notes: There are 25 bins in each panel. They are of equal size, except the top bin for co-workers and neighbors in the top panels, which have more observations. The top panels show similar patterns as in figure 8 using medians instead of averages or restricting the sample to respondents who reports a number of people in the small reference group that matches the number observed in the register data ± 10%. In the middle panels, we use actual cohort position instead actual position within the small reference group. Again, we see a pattern similar to figure 8. In the bottom panels, the local linear polynomials have a bandwidth of 10 and are based on the respondents who report the correct number of people in the reference group ±10%. Small workplaces have 10 to 100 employees. Large workplaces have more than 100 employees.

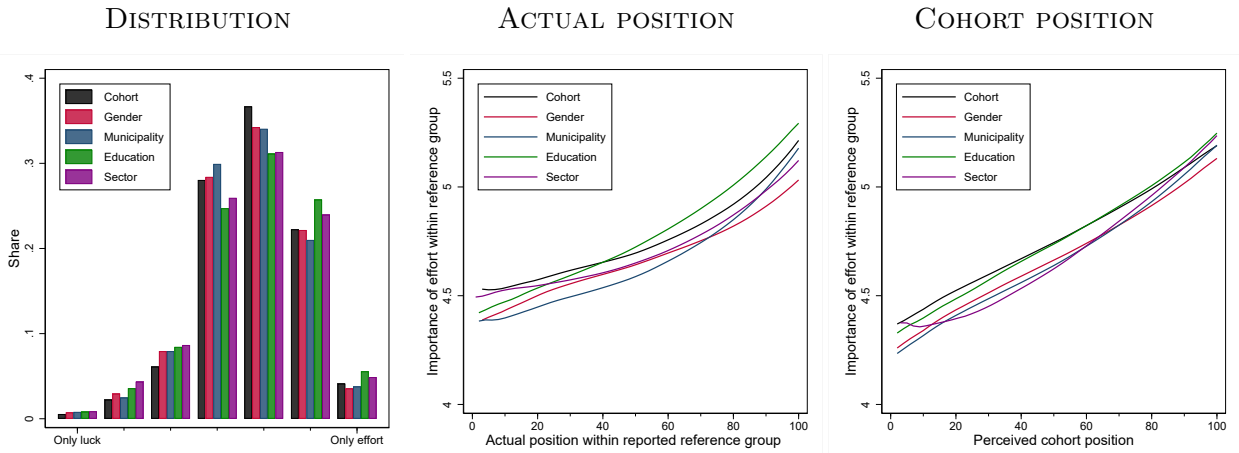
D Relationship Between Social Positions and Fairness Views

FIGURE A-14: UNFAIRNESS OF INEQUALITY AND IMPORTANCE OF EFFORT WITHIN LARGE REFERENCE GROUPS: DISTRIBUTION AND BY POSITION

(A) FAIRNESS



(B) LUCK VS. EFFORT



Notes: The figure only uses responses from the control group. The local linear polynomials have a bandwidth of 20. The left column panels show the raw distribution of the answers on the 7 point scale. In the middle column panels, we use actual position within each reference group instead of perceived position as in figure 10. In the right column panels, we use perceived cohort position.

Table A-5: Inequality views by actual position and position misperception

	Ineq. not prob.	Less redist.	Less satis.	Work not paid off	Rich not deserve	Poor's own fault
Panel A: No controls						
Position	2.32***	2.07***	-1.22***	-2.20***	-1.45***	-1.08***
	(0.12)	(0.13)	(0.11)	(0.11)	(0.11)	(0.11)
Misperception	0.95***	0.78***	-0.38*	-1.08***	-0.83***	-0.69***
	(0.18)	(0.19)	(0.16)	(0.16)	(0.16)	(0.16)
Panel B: With controls						
Position	1.17***	1.15***	-0.83***	-1.36***	-1.07***	-0.57***
	(0.08)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Misperception	0.50***	0.46***	-0.32**	-0.70***	-0.60***	-0.44***
	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
N	4690	4690	4690	4690	4690	4690
Outcome mean	4.08	4.52	2.32	2.53	3.19	4.78
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)

Notes: In the table we only use the control group respondents. All outcomes are z-scores. *Position* denotes the actual cohort position from percentile 1 to 100 divided by 100. A coefficient of 1 means that going from the bottom of the distribution to the top increases the outcome by one standard deviation. Similarly, *Misperception* is the difference between perceived and actual cohort position divided by 100. *Controls* includes cohort fixed effects, an indicator for men, municipality fixed effects, educational level fixed effects and sector (incl. unemployed/not in workforce) fixed effects. *Outcome mean* is the mean of the non-standardized outcome variable. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A-6: Pairwise correlations of historic income positions

	-20 yr.	-15 yr.	-10 yr.	-5 yr.	This yr.
-20 yr.	1.00	0.41	0.29	0.22	0.22
-15 yr.	0.41	1.00	0.62	0.54	0.51
-10 yr.	0.29	0.62	1.00	0.70	0.65
-5 yr.	0.22	0.54	0.70	1.00	0.78
This yr.	0.22	0.51	0.65	0.78	1.00

Notes: Based on the full cohorts born between 1969 and 1973. We only include individuals we observe in all years. N=356,556.

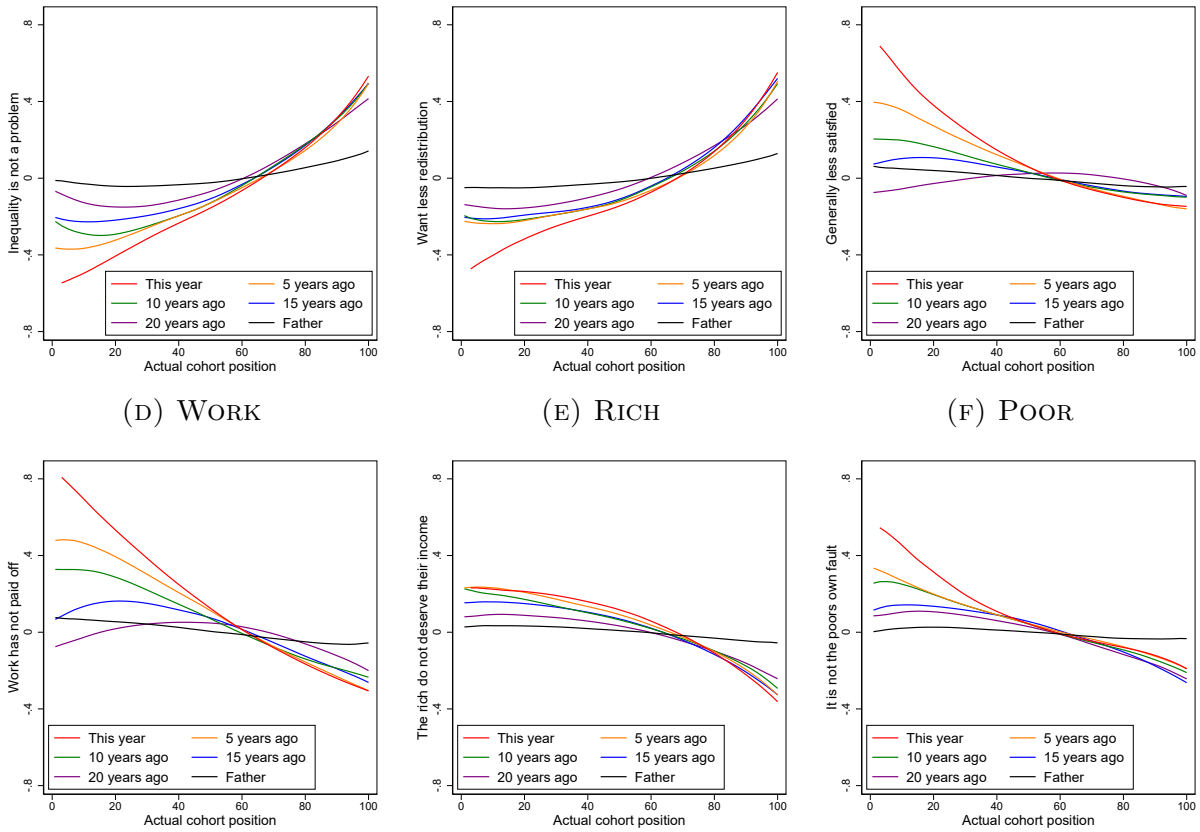
TABLE A-7: TRANSITION MATRIX OF INCOME POSITION 20 YEARS AGO AND TODAY

	Quintile today					
	1	2	3	4	5	Total
Quintile 20 years ago						
1	5.2	3.2	3.1	3.9	4.4	19.8
2	5.2	4.7	3.5	3.3	3.2	19.9
3	3.4	6.0	4.9	3.4	2.3	20.1
4	2.0	4.0	5.5	5.0	3.5	20.1
5	1.5	2.1	3.8	5.4	7.3	20.1
Quintile 10 years ago						
1	9.5	4.4	2.0	1.5	1.0	18.3
2	4.0	8.7	4.8	1.9	0.7	20.1
3	1.9	4.4	8.0	4.9	1.3	20.5
4	1.2	1.8	4.7	8.6	4.2	20.6
5	0.8	0.7	1.3	4.2	13.4	20.5
Total	17.4	20.1	20.8	21.1	20.7	100.0

Notes: Based on the full cohorts born between 1969 and 1973. We only include individuals we observe in all years. The columns do not sum to 20% each because immigrants are included when the income percentiles are generated but not in the table, since we do not observe them historically. N=356,556.

FIGURE A-15: HISTORY OF PAST SOCIAL POSITIONS AND INEQUALITY VIEWS

(A) INEQUALITY (B) REDISTRIBUTION (C) SATISFACTION



(D) WORK (E) RICH (F) POOR

Notes: Bandwidth for local linear polynomials is 20. For *Father*, the x-axis is the father's position among fathers when the respondent was 15 years old. In all panels, the y-axis is the z-score for the survey answers. Sample restricted to the control group.

Table A-8: History of past social positions, unfairness, importance of effort and political view without controls

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Position father	-0.050	-0.027	-0.063	-0.040	-0.047	-0.023	0.052
	(0.036)	(0.036)	(0.036)	(0.035)	(0.036)	(0.036)	(0.035)
Position -20 yr.	-0.153***	-0.183***	-0.150***	-0.308***	-0.265***	0.169***	0.557***
	(0.037)	(0.037)	(0.037)	(0.036)	(0.037)	(0.037)	(0.036)
Position -15 yr.	-0.228***	-0.217***	-0.182***	-0.228***	-0.236***	0.171***	0.376***
	(0.048)	(0.047)	(0.047)	(0.047)	(0.048)	(0.048)	(0.047)
Position -10 yr.	-0.099	-0.155**	-0.145*	-0.290***	-0.269***	0.205***	0.197***
	(0.057)	(0.057)	(0.057)	(0.056)	(0.057)	(0.058)	(0.056)
Position -5 yr.	-0.110	-0.093	-0.159*	-0.077	-0.113	-0.009	-0.094
	(0.069)	(0.068)	(0.068)	(0.068)	(0.070)	(0.069)	(0.068)
Position this yr.	-0.739***	-0.725***	-0.764***	-0.716***	-0.858***	0.527***	0.406***
	(0.068)	(0.068)	(0.068)	(0.067)	(0.071)	(0.069)	(0.067)
Observations	9046	9046	9046	9046	8575	9046	9046
Controls							

Notes: All outcomes are z-scores. *Importance of effort* is in the cohort dimension. *Position father* is the repondent's father's income rank when the respondent was 15 years old compared to other fathers of 15 year olds. All positions used as explaining variables have been re-scaled to go from 0.1 to 1. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE A-9: HISTORY OF PAST SOCIAL POSITIONS, UNFAIRNESS, IMPORTANCE OF EFFORT AND POLITICAL VIEW USING 5-YEAR AVERAGE INCOME POSITIONS

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Pos. -20 to -16	-0.224***	-0.188**	-0.187**	-0.205***	-0.198***	0.197***	0.566***
	(0.058)	(0.057)	(0.058)	(0.056)	(0.057)	(0.059)	(0.055)
Pos. -15 to -11	-0.143	-0.145*	-0.131	-0.132	-0.121	0.143	0.130
	(0.073)	(0.072)	(0.072)	(0.070)	(0.072)	(0.074)	(0.070)
Pos. -10 to -6	-0.097	-0.096	-0.137	-0.161	-0.145	0.084	0.034
	(0.091)	(0.089)	(0.089)	(0.087)	(0.089)	(0.091)	(0.086)
Pos. -5 to -1	-0.264*	-0.205	-0.266*	-0.263*	-0.259*	0.129	-0.000
	(0.113)	(0.112)	(0.112)	(0.109)	(0.113)	(0.114)	(0.108)
Position this yr.	-0.515***	-0.509***	-0.513***	-0.528***	-0.634***	0.460***	0.470***
	(0.092)	(0.090)	(0.090)	(0.088)	(0.092)	(0.092)	(0.087)
Observations	9388	9388	9388	9388	8895	9388	9388
Controls	✓	✓	✓	✓	✓	✓	✓

Notes: All outcomes are z-scores. *Importance of effort* is in the cohort dimension. *Pos. -20 to -16*, *Pos. -15 to -11*, *Pos. -10 to -6* and *Pos. -5 to -1* are five year average cohort positions. All positions used as explaining variables have been re-scaled to go from 0.1 to 1. *Controls* includes a treatment indicator, cohort fixed effects, an indicator for men, municipality fixed effects, educational level fixed effects and sector (incl. unemployed/not in workforce) fixed effects. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A-10: History of past social positions and inequality views

	Inequal. not prob.	Less redist.	Less satis.	Work not paid off	Rich don't deserve	Not poors own fault
Position father	0.087*	0.115**	-0.006	0.009	-0.029	-0.019
	(0.035)	(0.036)	(0.038)	(0.037)	(0.037)	(0.037)
Position -20 yr.	0.142***	0.136***	0.000	-0.017	-0.147***	-0.110**
	(0.040)	(0.041)	(0.042)	(0.041)	(0.042)	(0.041)
Position -15 yr.	0.087	0.190***	-0.103*	-0.114*	-0.169***	-0.077
	(0.046)	(0.047)	(0.049)	(0.048)	(0.049)	(0.048)
Position -10 yr.	0.112*	0.040	0.061	-0.021	0.023	0.070
	(0.055)	(0.057)	(0.059)	(0.058)	(0.058)	(0.058)
Position -5 yr.	0.062	0.012	-0.206**	-0.282***	-0.208**	-0.051
	(0.066)	(0.068)	(0.071)	(0.069)	(0.070)	(0.069)
Position this yr.	0.694***	0.700***	-0.455***	-0.714***	-0.551***	-0.261***
	(0.070)	(0.072)	(0.075)	(0.073)	(0.074)	(0.073)
Observations	9036	9036	9036	9036	9036	9036
Controls	✓	✓	✓	✓	✓	✓

Notes: All outcomes are z-scores. *Importance of effort* is in the cohort dimension. *Position father* is the repondent's father's income rank when the respondent was 15 years old compared to other fathers of 15 year olds. All positions used as explaining variables have been re-scaled to go from 0.1 to 1. *Controls* includes a treatment indicator, cohort fixed effects, an indicator for men, municipality fixed effects, educational level fixed effects and sector (incl. unemployed/not in workforce) fixed effects. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A-11: Historic shocks and inequality views

	Inequal. not prob.	Less redist.	Less satis.	Work not paid off	Rich don't deserve	Not poors own fault	N	Affected %
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unemployment	-0.16**	-0.12*	0.15**	0.17***	0.11*	-0.029	7531	5.03
	(0.050)	(0.050)	(0.052)	(0.051)	(0.052)	(0.051)		
Disability	-0.29*	-0.44***	0.29*	0.37**	0.26	0.50***	9238	0.60
	(0.13)	(0.13)	(0.14)	(0.13)	(0.14)	(0.13)		
Hospitalization	-0.035	-0.012	0.076**	0.075**	0.057*	0.066*	4746	55.6
	(0.028)	(0.028)	(0.029)	(0.029)	(0.029)	(0.028)		
Promotion	0.19***	0.20***	-0.13**	-0.10*	-0.17***	-0.052	7964	6.65
	(0.043)	(0.044)	(0.045)	(0.045)	(0.045)	(0.045)		
Pre-shock position FE	✓	✓	✓	✓	✓	✓		
Controls	✓	✓	✓	✓	✓	✓		

Notes: All outcomes are z-scores. Each cell in the table is a separate regression of the column outcome on the row regressor and the controls indicated in the bottom part of the table. The explaining variables are all indicators that equal 1 if the respondent experienced the shock between 2012 and 2017. In each row, we exclude respondents who experienced the shock between 2008 and 2011. For *Unemployment*, we only use respondents who were in the workforce in the entire period. *Controls* includes cohort fixed effects, an indicator for men, municipality fixed effects, educational level fixed effects and sector (incl. unemployed/not in workforce) fixed effects, all measured in 2008, and a treatment indicator. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A-12: Historic shocks, unfairness, importance of effort and political views with last vote fixed effects

	Unfairness of inequality					Importance	Right-	N	Affected
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing		%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Unemployment	0.17***	0.20***	0.18***	0.15**	0.18***	-0.088	-0.036	7537	5.03
	(0.050)	(0.049)	(0.049)	(0.048)	(0.050)	(0.051)	(0.034)		
Disability	0.15	0.40**	0.28*	0.13		-0.19	0.030	9246	0.61
	(0.13)	(0.13)	(0.13)	(0.12)		(0.13)	(0.087)		
Hospitalization	0.090**	0.076**	0.086**	0.059*	0.039	-0.0093	-0.021	4749	55.5
	(0.028)	(0.028)	(0.028)	(0.027)	(0.027)	(0.029)	(0.019)		
Promotion	-0.068	-0.066	-0.066	-0.11**	-0.16***	0.098*	0.072*	7970	6.66
	(0.044)	(0.044)	(0.044)	(0.043)	(0.043)	(0.045)	(0.030)		
Pre-shock position FE	✓	✓	✓	✓	✓	✓	✓		
Controls	✓	✓	✓	✓	✓	✓	✓		
Last vote FE	✓	✓	✓	✓	✓	✓	✓		

Notes: All outcomes z-scores. Each cell in the table is a separate regression of the column outcome on the row regressor and the controls indicated in the bottom part of the table. The explaining variables are all indicators that equal 1 if the respondent experienced the shock between 2012 and 2017. In each row, we exclude respondents who already experienced this type of shock in the pre-period (2008-2011). For *Unemployment*, we only use respondents who were in the workforce in the entire period. For *Disability*, we do not estimate the effect on fairness within sector, because very few disabled people work. *Controls* included in all regressions are cohort, gender, municipality, education and sector fixed effects (incl. unemployed/not in workforce), all measured in 2008, and a treatment indicator. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE A-13: HISTORIC SHOCKS, UNFAIRNESS, IMPORTANCE OF EFFORT AND POLITICAL VIEW WITHOUT CONTROLS

	Current	Unfairness of inequality					Importance	Right-	N	Affected
	position	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing		%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Unemployment	-12.3***	0.17**	0.19***	0.18***	0.098	0.13*	-0.069	0.024	7537	5.03
	(0.81)	(0.051)	(0.050)	(0.050)	(0.050)	(0.052)	(0.051)	(0.051)		
Disability	-24.8***	0.32*	0.56***	0.44***	0.26*		-0.31*	-0.17	9246	0.61
	(2.40)	(0.13)	(0.13)	(0.13)	(0.13)		(0.13)	(0.13)		
Hospitalization	-2.20***	0.11***	0.098***	0.11***	0.080**	0.065*	-0.022	-0.046	4749	55.5
	(0.51)	(0.029)	(0.028)	(0.028)	(0.028)	(0.028)	(0.029)	(0.029)		
Promotion	8.86***	-0.13**	-0.12**	-0.13**	-0.16***	-0.22***	0.15**	0.20***	7970	6.66
	(0.77)	(0.045)	(0.044)	(0.045)	(0.044)	(0.045)	(0.045)	(0.045)		
Pre-shock position FE	✓	✓	✓	✓	✓	✓	✓	✓		
Controls										

Notes: All outcomes are z-scores. Each cell in the table is a separate regression of the column outcome on the row regressor and the controls indicated in the bottom part of the table. The explaining variables are all indicators that equal 1 if the respondent experienced the shock between 2012 and 2017. In each row, we exclude respondents who experienced the shock between 2008 and 2011. For *Unemployment*, we only use respondents who were in the workforce in the entire period. For *Disability*, we do not estimate the effect on fairness within sector, because very few disabled people work. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE A-14: HISTORIC SHOCKS, UNFAIRNESS, IMPORTANCE OF EFFORT AND POLITICAL VIEW USING 2SLS

	Unfairness of inequality					Importance	Right-	N	Affected
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing		%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Unemployment	-1.60***	-1.77***	-1.71***	-1.34***	-2.34***	0.87*	0.50	7537	5.03
	(0.41)	(0.39)	(0.41)	(0.37)	(0.60)	(0.42)	(0.39)		
Disability	-1.35*	-2.31***	-1.84**	-1.27*		1.42*	1.14*	9246	0.61
	(0.60)	(0.58)	(0.57)	(0.59)		(0.61)	(0.57)		
Hospitalization	-5.11**	-3.84*	-4.81*	-3.45	-2.64	0.55	0.97	4749	55.5
	(1.93)	(1.55)	(1.87)	(1.77)	(2.32)	(1.56)	(1.48)		
Promotion	-1.45**	-1.31**	-1.36**	-1.69***	-1.99***	1.69**	2.28***	7970	6.66
	(0.52)	(0.50)	(0.50)	(0.43)	(0.43)	(0.53)	(0.52)		
Pooled	-1.61***	-1.93***	-1.75***	-1.49***	-2.15***	1.25***	1.08***	29502	12.2
	(0.34)	(0.33)	(0.33)	(0.30)	(0.35)	(0.31)	(0.31)		
Pre-shock position FE	✓	✓	✓	✓	✓	✓	✓		
Controls	✓	✓	✓	✓	✓	✓	✓		

Notes: All outcomes are z-scores. Each cell in the table is a separate 2SLS regression of the column outcome on current position instrumented using the row regressor and the controls indicated in the bottom part of the table. The instruments are all indicators that equal 1 if the respondent experienced the shock between 2012 and 2017. In each row, we exclude respondents who experienced the shock between 2008 and 2011. For *Unemployment*, we only use respondents who were in the workforce in the entire period. For *Disability*, we do not estimate the effect on fairness within sector, because very few disabled people work. *Controls* includes cohort fixed effects, an indicator for men, municipality fixed effects, educational level fixed effects and sector (incl. unemployed/not in workforce) fixed effects, all measured in 2008, and a treatment indicator. Standard errors in parentheses. In the pooled regression we cluster the standard errors at the individual level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A-15: Survey information experiment and unfairness, importance of effort and political view with same treatment direction across all reference groups

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Positive misperception	-0.149**	-0.065	-0.134**	-0.229***	-0.186***	0.146**	0.120*
	(0.053)	(0.052)	(0.052)	(0.051)	(0.056)	(0.054)	(0.052)
T × Positive	0.205***	0.112*	0.159**	0.134**	0.150**	-0.027	-0.027
	(0.050)	(0.050)	(0.050)	(0.048)	(0.051)	(0.051)	(0.049)
T × Negative	0.038	0.013	0.032	0.037	0.010	0.029	-0.044
	(0.035)	(0.035)	(0.035)	(0.034)	(0.035)	(0.036)	(0.035)
N	4701	4701	4701	4701	4385	4701	4701
Position FE	✓	✓	✓	✓	✓	✓	✓

Notes: All outcomes are z-scores. *Positive misperception* is an indicator that equals 1 if the perceived position is larger than the actual position. $T \times$ *Positive* and $T \times$ *Negative* are interactions of the treatment indicator and the positive and 0 or negative misperception indicators. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A-16: Survey information experiment and inequality views

	Inequal. not prob.	Less redist.	Less satis.	Work not paid off	Rich don't deserve	Not poors own fault
Positive misperception	0.121***	0.113***	-0.082*	-0.155***	-0.148***	-0.125***
	(0.033)	(0.034)	(0.035)	(0.034)	(0.034)	(0.034)
T × Positive	-0.021	0.027	-0.007	0.031	0.047	0.016
	(0.036)	(0.037)	(0.038)	(0.037)	(0.038)	(0.037)
T × Negative	-0.012	0.013	0.016	0.015	-0.008	0.020
	(0.023)	(0.024)	(0.024)	(0.024)	(0.024)	(0.024)
N	9323	9323	9323	9323	9323	9323
Position FE	✓	✓	✓	✓	✓	✓

Notes: All outcomes are z-scores. *Positive misperception* is an indicator that equals 1 if the perceived position is larger than the actual position. $T \times$ *Positive* and $T \times$ *Negative* are interactions of the treatment indicator and the positive and 0 or negative misperception indicators. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE A-17: SURVEY INFORMATION EXPERIMENT AND UNFAIRNESS, IMPORTANCE OF EFFORT AND POLITICAL VIEW WITH CONTROLS

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Positive misperception	-0.134***	-0.070*	-0.107**	-0.081**	-0.184***	0.118***	0.122***
	(0.034)	(0.033)	(0.033)	(0.031)	(0.033)	(0.034)	(0.033)
T × Positive	0.170***	0.082*	0.103**	0.065*	0.091**	-0.020	-0.036
	(0.037)	(0.035)	(0.035)	(0.029)	(0.030)	(0.037)	(0.035)
T × Negative	0.022	0.029	0.025	0.041	0.005	0.007	-0.023
	(0.024)	(0.024)	(0.024)	(0.026)	(0.027)	(0.024)	(0.023)
N	9331	9331	9331	9331	8854	9331	9331
Position FE	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓

Notes: All outcomes are z-scores. *Positive misperception* is an indicator that equals 1 if the perceived position is larger than the actual position. $T \times$ *Positive* and $T \times$ *Negative* are interactions of the treatment indicator and the positive and 0 or negative misperception indicators. *Controls* includes cohort fixed effects, an indicator for men, municipality fixed effects, educational level fixed effects and sector (incl. unemployed/not in workforce) fixed effects. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE A-18: SURVEY INFORMATION EXPERIMENT AND UNFAIRNESS, IMPORTANCE OF EFFORT AND POLITICAL VIEW IF ACTUAL AND REPORTED INCOME MATCH

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Positive misperception	-0.065	-0.111**	-0.120**	-0.077*	-0.221***	0.016	0.057
	(0.041)	(0.040)	(0.039)	(0.037)	(0.041)	(0.042)	(0.042)
T × Positive	0.137**	0.137**	0.106*	0.036	0.078*	0.053	-0.055
	(0.046)	(0.045)	(0.043)	(0.036)	(0.038)	(0.046)	(0.046)
T × Negative	0.027	0.001	0.023	0.013	-0.010	0.017	-0.030
	(0.027)	(0.028)	(0.027)	(0.031)	(0.032)	(0.027)	(0.027)
N	6660	6537	6539	6272	5873	6660	6660
Position FE	✓	✓	✓	✓	✓	✓	✓

Notes: In this table, we only use respondents whose reported income generate treatment information that is at most five positions from the information they would have received if the reported and actual income exactly matched. All outcomes are z-scores. *Positive misperception* is an indicator that equals 1 if the perceived position is larger than the actual position. $T \times$ *Positive* and $T \times$ *Negative* are interactions of the treatment indicator and the positive and 0 or negative misperception indicators. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE A-19: SURVEY INFORMATION EXPERIMENT AND UNFAIRNESS, IMPORTANCE OF EFFORT AND POLITICAL VIEW WITH INTERACTION OF TREATMENT AND HIGH INCOME

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Positive misperception	-0.130***	-0.134***	-0.121***	-0.091**	-0.253***	0.070	0.112**
	(0.036)	(0.035)	(0.034)	(0.034)	(0.037)	(0.036)	(0.036)
T × Positive	0.157***	0.076	0.123**	0.082*	0.105**	-0.076	-0.021
	(0.042)	(0.041)	(0.041)	(0.033)	(0.035)	(0.042)	(0.042)
T × Negative	0.029	0.008	0.077	0.101*	0.051	-0.150**	-0.047
	(0.051)	(0.051)	(0.050)	(0.049)	(0.055)	(0.051)	(0.051)
T × High income	-0.006	0.016	-0.058	-0.068	-0.051	0.181***	0.023
	(0.052)	(0.052)	(0.050)	(0.048)	(0.053)	(0.052)	(0.052)
N	9331	9331	9331	9331	8854	9331	9331
Position FE	✓	✓	✓	✓	✓	✓	✓

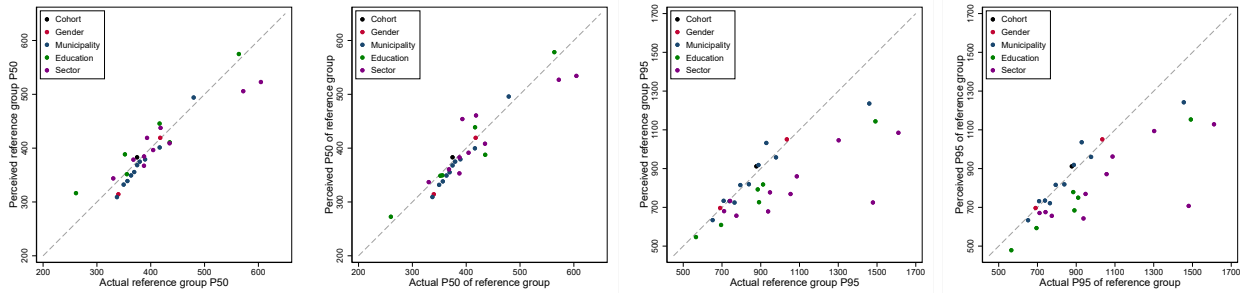
Notes: All outcomes are z-scores. *Positive misperception* is an indicator that equals 1 if the perceived position is larger than the actual position. $T \times$ *Positive* and $T \times$ *Negative* are interactions of the treatment indicator and the positive and 0 or negative misperception indicators. $T \times$ *High income* is an interaction of the treatment indicator and an indicator that equals 1 if the individual has a position in the group above 50. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

E Large Reference Groups: Using Actual Groups and Restricted Sample

FIGURE A-16: PERCEIVED P50 AND P95 INCOMES FOR LARGE REFERENCE GROUPS USING ACTUAL GROUPS AND RESTRICTED SAMPLE

(A) P50 (B) P95

ACTUAL GROUPS REF. GROUPS MATCH ACTUAL GROUPS REF. GROUPS MATCH

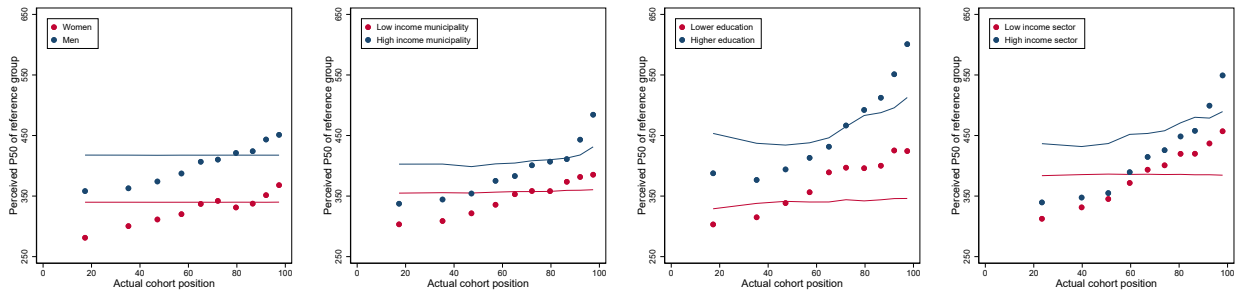


Notes: In the first and third panels, we use actual reference group instead of reported reference group. In the second and fourth panels, we restrict the sample and only include respondents in each reference group if the reported group matches the group observed in the register data. For gender, we show one scatter for men and one for women. For municipality we divide the respondents into 10 similar sized groups based on the actual municipality P50 and P95 income and plot one scatter for each group. For education and sector we show one scatter for each educational level or sector. The scatters show the means of the reported P50 or P95 winzorized at the 5th and 95th percentile within the group.

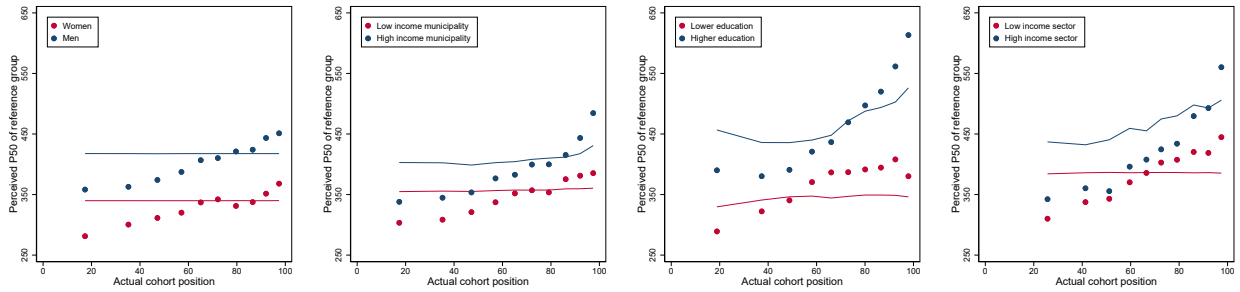
FIGURE A-17: PERCEIVED P50 INCOMES FOR LARGE REFERENCE GROUPS USING ACTUAL GROUPS AND RESTRICTED SAMPLE

(A) ACTUAL REFERENCE GROUPS

GENDER MUNICIPALITY EDUCATION SECTOR



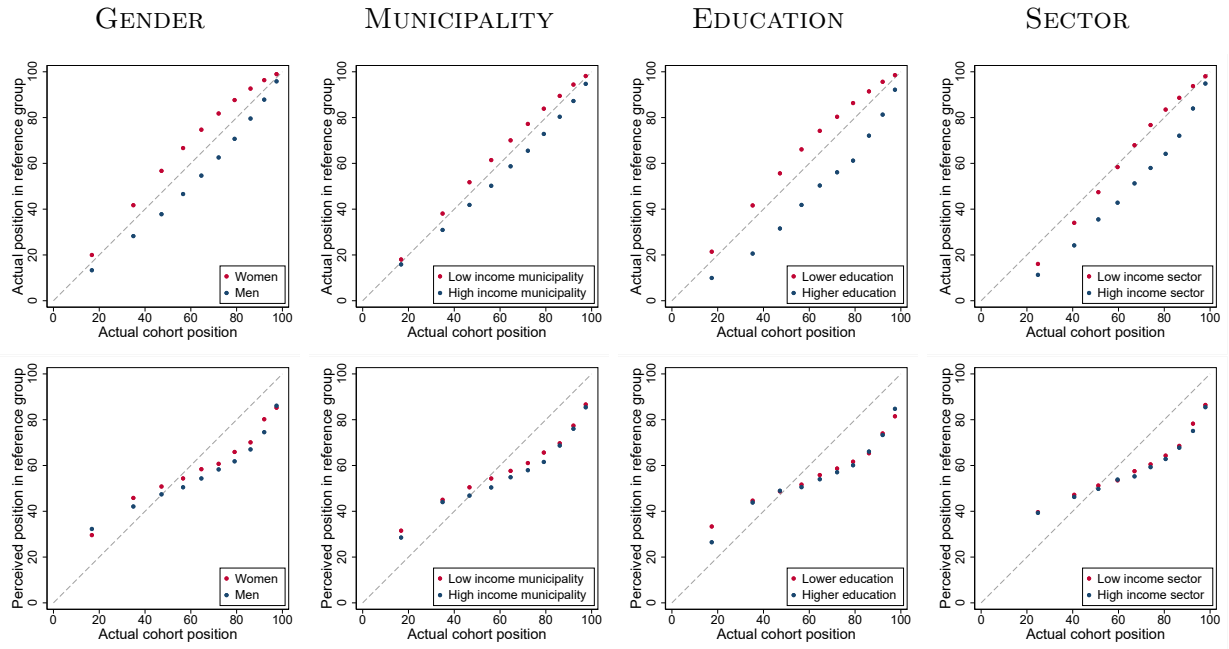
(B) REFERENCE GROUPS MATCH



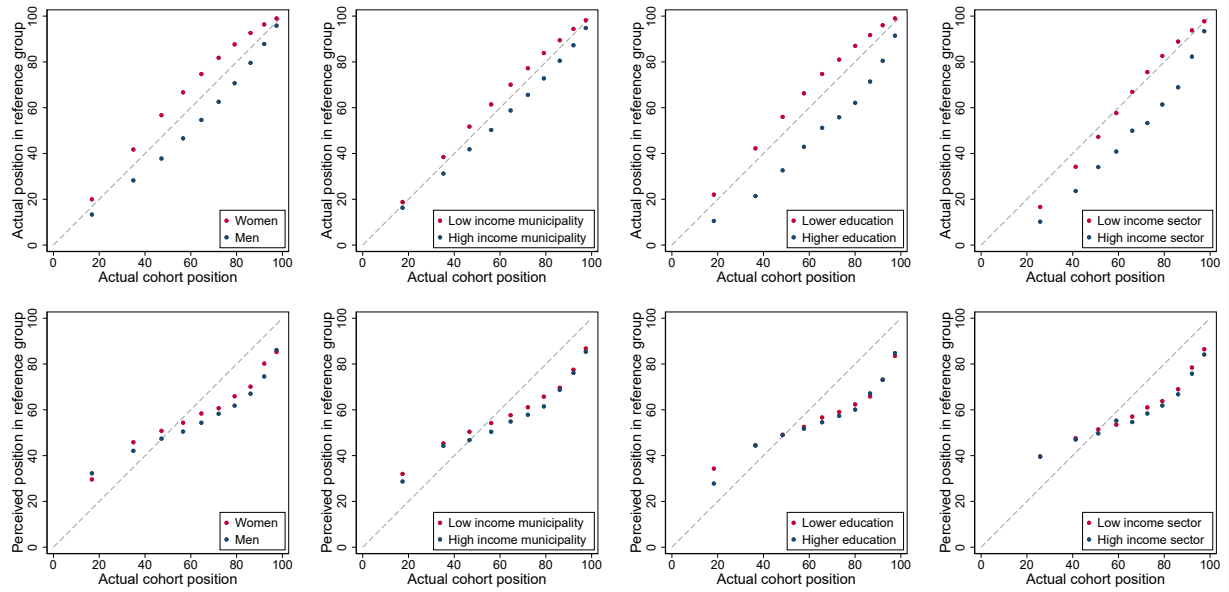
Notes: In the top panels, we use actual reference group instead of reported reference group. For each reference group, the bottom panels only include respondents whose reported reference group matches the actual reference group. The solid lines indicate the actual average P50 for each group within the bin. The high/low income split for municipality is based on the median of within cohort in sample actual municipality P50 income. This is also the case for sector. For education, *Higher education* is short cycle higher education, bachelor programs and master programs.

FIGURE A-18: CORRELATION BETWEEN ACTUAL COHORT POSITION AND WITHIN LARGE REFERENCE GROUPS USING ACTUAL GROUPS AND RESTRICTED SAMPLE

(A) ACTUAL REFERENCE GROUP



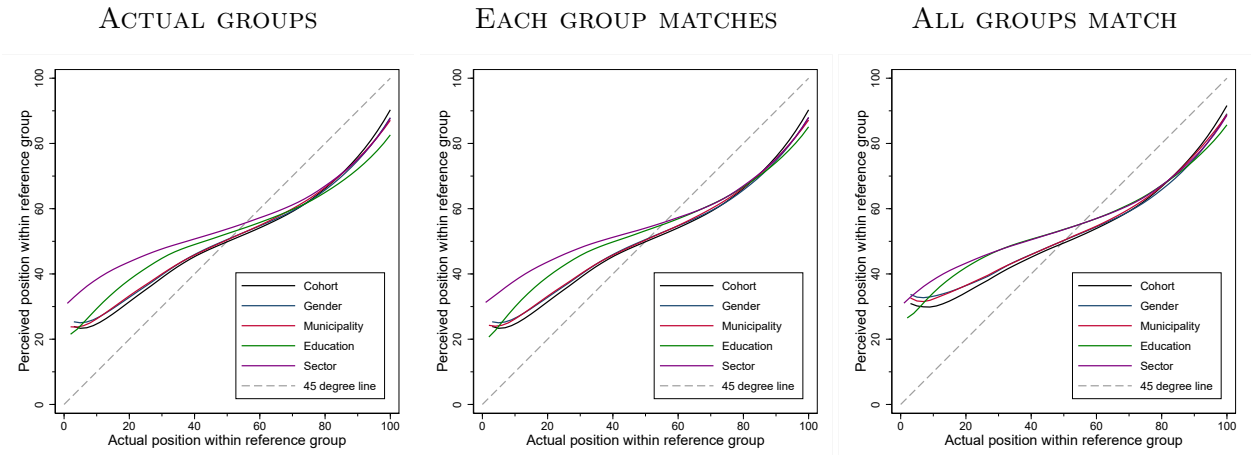
(B) REFERENCE GROUPS MATCH



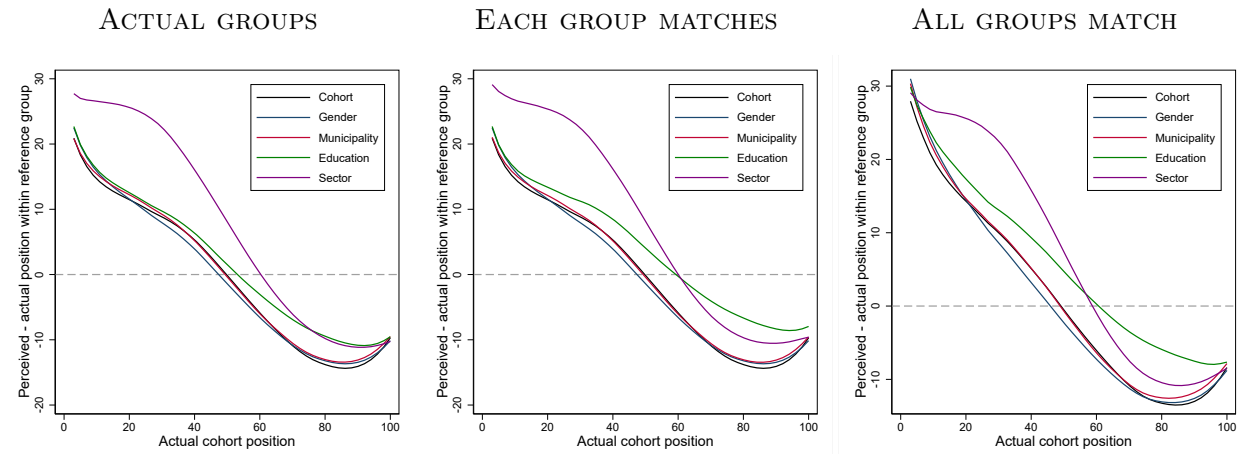
Notes: In Panel A, we use actual reference groups instead of reported reference groups. For each reference group, the figures in Panel B only include respondents whose reported reference group matches the actual reference group. The high/low income split for municipality is based on the median of within cohort in sample actual municipality P50 income. This is also the case for sector. For education, *Higher education* is short cycle higher education, bachelor programs and master programs.

Figure A-19: Perceived and actual position for large reference groups using actual groups and restricted sample

(a) Within Reference Group



(b) Within Cohort

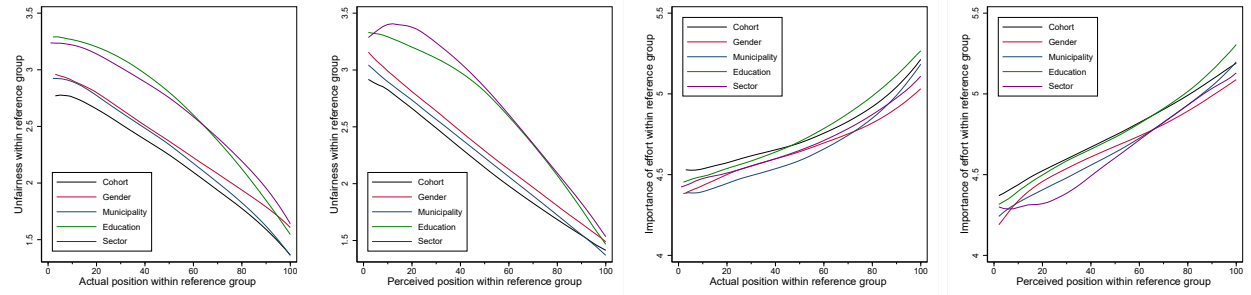


Notes: In the left panels, we use actual reference groups instead of reported reference groups. In the middle panels, we only use respondents in each reference group if the reported group matches the group observed in the register data. In the right panels, only respondents where all reported groups match the groups in the register data are included and the sample is the same across groups. The local linear polynomials have a bandwidth of 10.

FIGURE A-20: VIEW ON FAIRNESS AND EFFORT VS. LUCK WITHIN LARGE REFERENCE GROUPS USING ACTUAL GROUPS AND RESTRICTED SAMPLE

(A) FAIRNESS (B) LUCK VS. EFFORT

ACTUAL GROUPS REF. GROUPS MATCH ACTUAL GROUPS REF. GROUPS MATCH



Notes: The figure only uses responses from the control group. The local linear polynomials have a bandwidth of 20. In the first and third panels, we use actual reference groups instead of reported reference groups. In the second and fourth panels, we only include respondents for each group if the reported group matches the group observed in the register data.

TABLE A-20: UNFAIRNESS, IMPORTANCE OF EFFORT AND POLITICAL VIEW BY ACTUAL POSITION AND POSITION MISPERCEPTION USING ACTUAL REFERENCE GROUPS

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Panel A: No controls							
Position	-1.18***	-1.13***	-1.27***	-1.38***	-1.44***	0.82***	0.90***
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Misperception	-0.38***	-0.61***	-0.48***	-0.43***	-0.83***	0.44***	0.49***
	(0.10)	(0.09)	(0.09)	(0.08)	(0.09)	(0.10)	(0.10)
Panel B: With controls							
Position	-1.09***	-1.01***	-1.10***	-1.04***	-1.22***	0.92***	0.99***
	(0.09)	(0.08)	(0.08)	(0.08)	(0.08)	(0.09)	(0.08)
Misperception	-0.40***	-0.41***	-0.41***	-0.28***	-0.54***	0.47***	0.54***
	(0.10)	(0.10)	(0.09)	(0.09)	(0.09)	(0.10)	(0.10)
N	4692	4692	4692	4692	4332	4692	4692

Notes: In the table, we only use the control group respondents and use actual reference groups instead of reported groups. All outcomes are z-scores. *Position* denotes the actual position within reference group from percentile 1 to 100 divided by 100. Similarly, *Misperception* is the difference between perceived and actual position within the reference group divided by 100. *Controls* includes cohort fixed effects, an indicator for men, municipality fixed effects, educational level fixed effects and sector (incl. unemployed/not in workforce) fixed effects. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE A-21: UNFAIRNESS, IMPORTANCE OF EFFORT AND POLITICAL VIEW BY ACTUAL POSITION AND POSITION MISPERCEPTION USING RESTRICTED SAMPLE

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Panel A: No controls							
Position	-1.18***	-1.13***	-1.28***	-1.45***	-1.46***	0.82***	0.90***
	(0.07)	(0.07)	(0.07)	(0.08)	(0.09)	(0.07)	(0.07)
Misperception	-0.38***	-0.61***	-0.48***	-0.52***	-0.93***	0.44***	0.49***
	(0.10)	(0.09)	(0.09)	(0.10)	(0.11)	(0.10)	(0.10)
Panel B: With controls							
Position	-1.09***	-1.01***	-1.10***	-1.12***	-1.19***	0.92***	0.99***
	(0.09)	(0.08)	(0.09)	(0.09)	(0.10)	(0.09)	(0.08)
Misperception	-0.40***	-0.41***	-0.41***	-0.39***	-0.58***	0.47***	0.54***
	(0.10)	(0.10)	(0.09)	(0.10)	(0.11)	(0.10)	(0.10)
N	4692	4692	4600	3453	3218	4692	4692
Outcome mean	2.01	2.16	2.08	2.60	2.58	4.81	7.10
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.05)

Notes: In the table we only use the control group respondents and for each reference group, we only include respondents whose reported group matches the group reported in the register data. All outcomes are z-scores. *Position* denotes the actual position within reference group from percentile 1 to 100 divided by 100. Similarly, *Misperception* is the difference between perceived and actual position within the reference group divided by 100. *Controls* includes cohort fixed effects, an indicator for men, municipality fixed effects, educational level fixed effects and sector (incl. unemployed/not in workforce) fixed effects. *Outcome mean* is the mean of the non-standardized outcome variable. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A-22: History of past social positions, unfairness, importance of effort and political view using restricted sample

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Position father	-0.059	-0.051	-0.070	-0.112**	-0.025	0.025	0.147***
	(0.037)	(0.037)	(0.037)	(0.042)	(0.044)	(0.037)	(0.035)
Position -20 yr.	-0.122**	-0.097*	-0.118**	-0.103*	-0.148**	0.061	0.263***
	(0.042)	(0.041)	(0.041)	(0.046)	(0.049)	(0.042)	(0.039)
Position -15 yr.	-0.203***	-0.169***	-0.147**	-0.143**	-0.081	0.131**	0.268***
	(0.048)	(0.048)	(0.048)	(0.053)	(0.058)	(0.049)	(0.046)
Position -10 yr.	-0.085	-0.100	-0.119*	-0.195**	-0.177*	0.206***	0.163**
	(0.058)	(0.057)	(0.058)	(0.066)	(0.071)	(0.058)	(0.055)
Position -5 yr.	-0.108	-0.096	-0.143*	-0.109	-0.205*	0.037	-0.015
	(0.070)	(0.068)	(0.069)	(0.078)	(0.086)	(0.070)	(0.066)
Position this yr.	-0.655***	-0.618***	-0.646***	-0.683***	-0.729***	0.540***	0.479***
	(0.074)	(0.073)	(0.073)	(0.085)	(0.094)	(0.074)	(0.070)
Observations	9046	9046	8878	6698	6164	9046	9046
Controls	✓	✓	✓	✓	✓	✓	✓

Notes: For each reference group, we only include respondents if the reported group matches the group observed in the register data. All outcomes are z-scores. *Position father* is the repondent's father's income rank when the respondent was 15 years old compared to other fathers of 15 year olds. All positions used as explaining variables have been re-scaled to go from 0.1 to 1. *Controls* includes a treatment indicator, cohort fixed effects, an indicator for men, municipality fixed effects, educational level fixed effects and sector (incl. unemployed/not in workforce) fixed effects. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE A-23: HISTORIC SHOCKS, UNFAIRNESS, IMPORTANCE OF EFFORT AND POLITICAL VIEW USING RESTRICTED SAMPLE

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Unemployment	0.20***	0.23***	0.21***	0.18**	0.24***	-0.11*	-0.061
	(0.051)	(0.050)	(0.051)	(0.059)	(0.069)	(0.052)	(0.049)
Observations	7537	7537	7397	5599	5498	7537	7537
Affected %	5.03	5.03	4.96	4.80	3.62	5.03	5.03
Disability	0.30*	0.54***	0.42**	0.36*		-0.31*	-0.25*
	(0.13)	(0.13)	(0.14)	(0.15)		(0.13)	(0.13)
Observations	9246	9246	9073	6841		9246	9246
Affected %	0.61	0.61	0.57	0.61		0.61	0.61
Hospitalization	0.093**	0.079**	0.091**	0.054	0.0084	-0.010	-0.018
	(0.029)	(0.028)	(0.029)	(0.033)	(0.034)	(0.029)	(0.028)
Observations	4749	4749	4662	3543	3257	4749	4749
Affected %	55.5	55.5	55.5	55.5	54.3	55.5	55.5
Promotion	-0.12**	-0.11**	-0.12**	-0.19***	-0.21***	0.14**	0.19***
	(0.045)	(0.044)	(0.045)	(0.051)	(0.054)	(0.045)	(0.043)
Observations	7970	7970	7832	5950	5622	7970	7970
Affected %	6.7	6.7	6.7	6.7	6.4	6.7	6.7
Pre-shock position FE	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓

Notes: For each reference group, we only include respondents if the reported group matches the group observed in the register data. All outcomes are z-scores. Each cell in the table is a separate regression of the column outcome on the row regressor and the controls indicated in the bottom part of the table. The explaining variables are all indicators that equal 1 if the respondent experienced the shock between 2012 and 2017. In each row, we exclude respondents who experienced the shock between 2008 and 2011. For *Unemployment*, we only use respondents who were in the workforce in the entire period. For *Disability*, we do not estimate the effect on fairness within sector, because very few disabled people work. *Controls* includes cohort fixed effects, an indicator for men, municipality fixed effects, educational level fixed effects and sector (incl. unemployed/not in workforce) fixed effects, all measured in 2008, and a treatment indicator. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A-24: Survey information experiment and unfairness, importance of effort and political view using actual reference groups

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Positive misperception	-0.132***	-0.131***	-0.131***	-0.140***	-0.249***	0.112**	0.117***
	(0.034)	(0.033)	(0.033)	(0.032)	(0.034)	(0.034)	(0.034)
T × Positive	0.154***	0.082*	0.097**	0.079*	0.087**	-0.010	-0.013
	(0.037)	(0.036)	(0.035)	(0.031)	(0.032)	(0.038)	(0.037)
T × Negative	0.023	0.022	0.030	0.033	0.013	0.006	-0.027
	(0.024)	(0.024)	(0.025)	(0.026)	(0.027)	(0.024)	(0.024)
N	9331	9331	9331	9331	8647	9331	9331
Position FE	✓	✓	✓	✓	✓	✓	✓

Notes: In the table, we use actual reference groups observed in the register data instead of reported reference groups. All outcomes are z-scores. *Positive misperception* is an indicator that equals 1 if the perceived position is larger than the actual position. $T \times$ *Positive* and $T \times$ *Negative* are interactions of the treatment indicator and the positive and 0 or negative misperception indicators. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

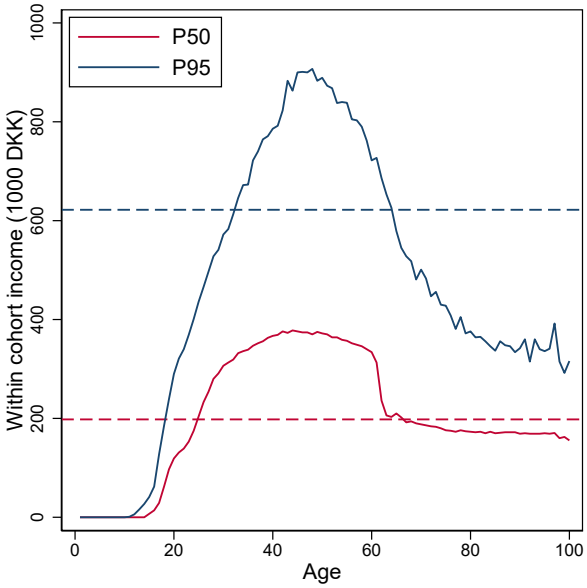
Table A-25: Survey information experiment and unfairness, importance of effort and political view using restricted sample

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Positive misperception	-0.132***	-0.131***	-0.131***	-0.168***	-0.277***	0.112**	0.117***
	(0.034)	(0.033)	(0.033)	(0.036)	(0.040)	(0.034)	(0.034)
T × Positive	0.154***	0.082*	0.100**	0.058	0.098**	-0.010	-0.013
	(0.037)	(0.036)	(0.035)	(0.034)	(0.038)	(0.038)	(0.037)
T × Negative	0.023	0.022	0.034	0.019	0.001	0.006	-0.027
	(0.024)	(0.024)	(0.025)	(0.031)	(0.033)	(0.024)	(0.024)
N	9331	9331	9156	6901	6356	9331	9331
Position FE	✓	✓	✓	✓	✓	✓	✓

Notes: For each reference group, we only use respondents if the reported group matches the group observed in the register data. All outcomes are z-scores. *Positive misperception* is an indicator that equals 1 if the perceived position is larger than the actual position. $T \times$ *Positive* and $T \times$ *Negative* are interactions of the treatment indicator and the positive and 0 or negative misperception indicators. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

F Moments in the Income Distribution

Figure A-21: Within cohort P50 and P95 by age



Notes: This figure shows the within cohort P50 and P95 income based on a 10% sample of the full population in Denmark. We use the same income definition as in the survey which excludes early retirement benefits, since the cohorts surveyed are not yet eligible for this benefit. The age cut-off for early retirement benefits is 60 and therefore we see a sharp drop at this age. We include pension payments, since we cannot disentangle old age pension and disability pension.

Table A-26: Moments in the full income distribution

	Income distribution percentiles				
	P5	P25	P50	P75	P95
Full population	0	57	198	358	622
Adult population	36	158	261	394	670
Working age population	39	217	333	447	751
45-50 year olds	112	262	373	502	896

Notes: This table shows different moments of the income distribution in 1,000 DKK based of different definitions of the population. The moments are based on a 10% sample of the full population in Denmark in 2017. *Adult population* are individuals from age 18 and up. *Working age population* are from age 25 to 65.

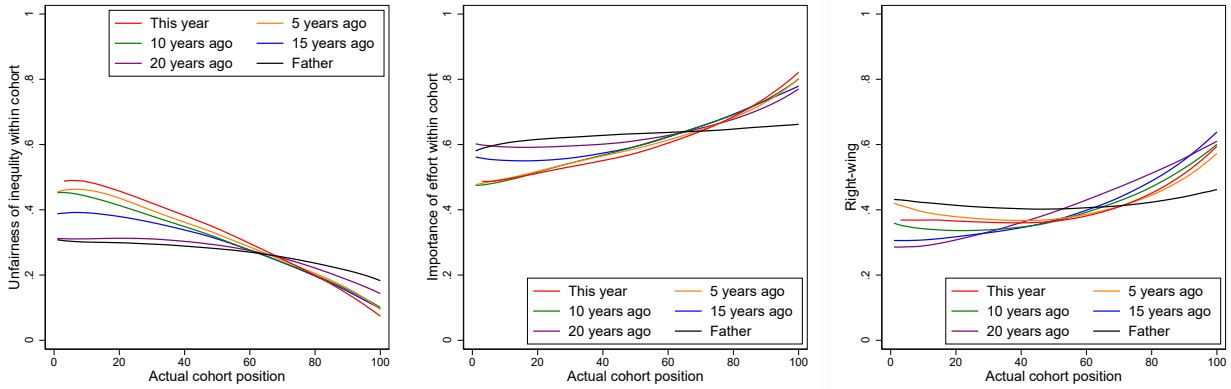
G Using Indicator Outcome Variables

Table A-27: Unfairness, importance of effort and political view by actual position and position misperception using indicator outcomes

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Panel A: No controls							
Position	-0.52***	-0.51***	-0.57***	-0.65***	-0.69***	0.45***	0.32***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)
Misperception	-0.18***	-0.25***	-0.22***	-0.20***	-0.42***	0.24***	0.18***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)
Panel B: With controls							
Position	-0.51***	-0.48***	-0.52***	-0.52***	-0.59***	0.45***	0.35***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Misperception	-0.19***	-0.18***	-0.19***	-0.16***	-0.30***	0.25***	0.19***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)
N	4692	4692	4692	4692	4452	4692	4692
Outcome mean	.27	.30	.29	.40	.40	.63	.41
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)

Notes: The sample is restricted to control group respondents. All outcomes are indicators that equal 1 if the outcome z-score is larger than 0. *Position* denotes the actual position within the reference group from percentile 1 to 100 divided by 100. Similarly, *Misperception* is the difference between perceived and actual position within the reference group divided by 100. *Controls* are cohort, municipality, education, gender, and sector fixed effects (including unemployed/not in workforce). *Outcome mean* is the mean of the indicator outcome variable. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

FIGURE A-22: HISTORY OF PAST SOCIAL POSITIONS, UNFAIRNESS, IMPORTANCE OF EFFORT, AND POLITICAL VIEWS USING INDICATOR OUTCOMES



Notes: Bandwidth for local linear polynomials is 20. For *Father*, the x-axis is the father's position among fathers when the respondent was 15 years old. All outcomes are indicators that equal 1 if the outcome z-score is larger than 0. Sample restricted to the control group.

Table A-28: History of past social positions, unfairness, importance of effort, and political view using indicator outcomes

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Position father	-0.023	-0.021	-0.028	-0.051**	-0.047**	0.021	0.060***
	(0.016)	(0.017)	(0.017)	(0.018)	(0.018)	(0.018)	(0.018)
Position -20 yr.	-0.038*	-0.035	-0.028	-0.062**	-0.062**	0.027	0.132***
	(0.018)	(0.019)	(0.019)	(0.020)	(0.020)	(0.020)	(0.020)
Position -15 yr.	-0.089***	-0.075***	-0.068**	-0.059**	-0.061**	0.064**	0.093***
	(0.021)	(0.022)	(0.022)	(0.023)	(0.023)	(0.023)	(0.023)
Position -10 yr.	-0.045	-0.054*	-0.072**	-0.080**	-0.088**	0.069*	0.075**
	(0.026)	(0.026)	(0.026)	(0.028)	(0.028)	(0.028)	(0.028)
Position -5 yr.	-0.035	-0.027	-0.038	-0.032	-0.036	0.056	-0.053
	(0.031)	(0.032)	(0.031)	(0.033)	(0.034)	(0.034)	(0.033)
Position this yr.	-0.311***	-0.314***	-0.322***	-0.356***	-0.397***	0.246***	0.202***
	(0.033)	(0.034)	(0.033)	(0.035)	(0.036)	(0.036)	(0.035)
Observations	9046	9046	9046	9046	8575	9046	9046
Controls	✓	✓	✓	✓	✓	✓	✓

Notes: All outcomes are indicators that equal 1 if the outcome z-score is larger than 0. *Position* denotes the cohort position from percentile 1 to 100 divided by 100. A coefficient of 1 means that going from the bottom of the distribution to the top increases the outcome by one standard deviation. *Importance of effort* is for income differences within cohort. *Position father* is the respondent's father's income rank when the respondent was 15 years old compared to other fathers of 15 year olds. *Controls* includes a treatment indicator, cohort, municipality, gender, education, and sector fixed effects (including unemployed/not in workforce). Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE A-29: HISTORIC SHOCKS, UNFAIRNESS, IMPORTANCE OF EFFORT AND POLITICAL VIEWS USING INDICATOR OUTCOMES

	Unfairness of inequality					Importance	Right-	N	Affected
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing		%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Unemployment	0.082***	0.093***	0.074**	0.073**	0.070**	-0.068**	-0.0048	7537	5.03
	(0.023)	(0.023)	(0.023)	(0.025)	(0.026)	(0.025)	(0.025)		
Disability	0.090	0.15*	0.17**	0.11		-0.16*	-0.049	9246	0.61
	(0.059)	(0.061)	(0.060)	(0.063)		(0.065)	(0.064)		
Hospitalization	0.036**	0.031*	0.033*	0.028*	0.017	-0.0080	-0.011	4749	55.5
	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)		
Promotion	-0.057**	-0.056**	-0.057**	-0.089***	-0.13***	0.072**	0.070**	7970	6.66
	(0.020)	(0.021)	(0.021)	(0.022)	(0.022)	(0.022)	(0.021)		
Pre-shock position FE	✓	✓	✓	✓	✓	✓	✓		
Controls	✓	✓	✓	✓	✓	✓	✓		

Notes: All outcomes are indicators that equal 1 if the outcome z-score is larger than 0. Each cell in the table is a separate regression of the column outcome on the row regressor and the controls indicated in the bottom part of the table. The explaining variables are all indicators that equal 1 if the respondent experienced the shock between 2012 and 2017. In each row, we exclude respondents who experienced the shock between 2008 and 2011. For *Unemployment*, we only use respondents who were in the workforce in the entire period. For *Disability*, we do not estimate the effect on fairness within sector, because very few disabled people work. *Controls* included in all regressions are cohort, gender, municipality, education and sector fixed effects (incl. unemployed/not in workforce), all measured in 2008, and a treatment indicator. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

TABLE A-30: SURVEY INFORMATION EXPERIMENT AND UNFAIRNESS, IMPORTANCE OF EFFORT AND POLITICAL VIEW USING INDICATOR OUTCOMES

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Positive misperception	-0.056***	-0.049**	-0.069***	-0.052***	-0.135***	0.051**	0.040*
	(0.015)	(0.015)	(0.015)	(0.015)	(0.016)	(0.017)	(0.017)
T × Positive	0.061***	0.030	0.036*	0.027	0.039**	-0.001	-0.003
	(0.017)	(0.017)	(0.016)	(0.015)	(0.015)	(0.018)	(0.019)
T × Negative	0.001	0.010	0.001	0.035**	0.007	0.003	-0.001
	(0.011)	(0.011)	(0.011)	(0.013)	(0.013)	(0.012)	(0.012)
N	9331	9331	9331	9331	8854	9331	9331
Position FE	✓	✓	✓	✓	✓	✓	✓

Notes: All outcomes are indicators that equal 1 if the outcome z-score is larger than 0. *Positive misperception* is an indicator that equals 1 if the perceived position is larger than the actual position. $T \times$ *Positive* and $T \times$ *Negative* are interactions of the treatment indicator and the positive and 0 or negative misperception indicators. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

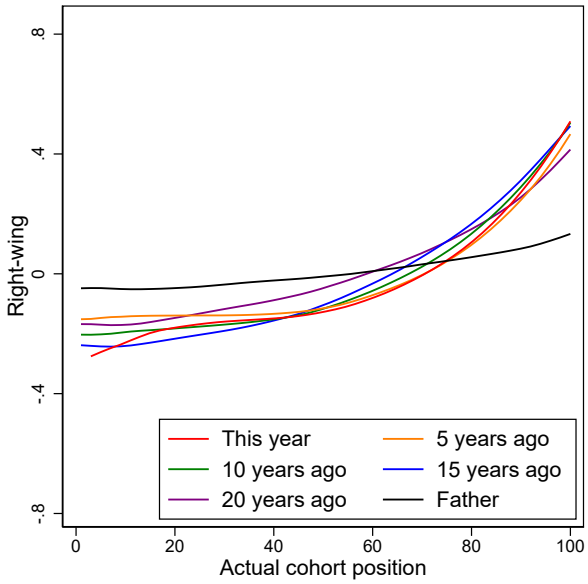
H Using Economic Policy View as the "Right-wing" Outcome

Table A-31: Unfairness, importance of effort and political view by actual position and position misperception using economic policy view as right-wing outcome

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Panel A: No controls							
Position	-1.18***	-1.13***	-1.27***	-1.36***	-1.42***	0.82***	0.91***
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Misperception	-0.38***	-0.61***	-0.48***	-0.38***	-0.86***	0.44***	0.45***
	(0.10)	(0.09)	(0.09)	(0.08)	(0.09)	(0.10)	(0.10)
Panel B: With controls							
Position	-1.09***	-1.01***	-1.09***	-1.03***	-1.19***	0.92***	0.86***
	(0.09)	(0.08)	(0.08)	(0.08)	(0.08)	(0.09)	(0.09)
Misperception	-0.40***	-0.41***	-0.42***	-0.30***	-0.61***	0.47***	0.43***
	(0.10)	(0.10)	(0.09)	(0.09)	(0.09)	(0.10)	(0.10)
N	4692	4692	4692	4692	4452	4692	4692
Outcome mean	2.01	2.16	2.09	2.54	2.53	4.81	3.01
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.01)

Notes: The sample is restricted to control group respondents. All outcomes are z-scores. *Position* denotes the actual position within the reference group from percentile 1 to 100 divided by 100. Similarly, *Misperception* is the difference between perceived and actual position within the reference group divided by 100. *Controls* are cohort, municipality, education, gender, and sector fixed effects (including unemployed/not in workforce). *Outcome mean* is the mean of the non-standardized outcome variable. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

FIGURE A-23: HISTORY OF PAST SOCIAL POSITIONS, UNFAIRNESS, IMPORTANCE OF EFFORT, AND POLITICAL VIEWS USING ECONOMIC POLICY VIEW AS RIGHT-WING OUTCOME



Notes: Bandwidth for local linear polynomials is 20. For *Father*, the x-axis is the father's position among fathers when the respondent was 15 years old. The outcomes is the standardized z-score of the economic policy view variable. Sample restricted to the control group.

Table A-32: History of past social positions, unfairness, importance of effort, and political view using economic policy view as right-wing outcome

	Unfairness of inequality					Importance	Right-
	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing
Position father	-0.059	-0.051	-0.068	-0.081*	-0.075*	0.025	0.122***
	(0.037)	(0.037)	(0.037)	(0.036)	(0.037)	(0.037)	(0.036)
Position -20 yr.	-0.122**	-0.097*	-0.108**	-0.113**	-0.131**	0.061	0.141***
	(0.042)	(0.041)	(0.041)	(0.040)	(0.041)	(0.042)	(0.041)
Position -15 yr.	-0.203***	-0.169***	-0.148**	-0.126**	-0.139**	0.131**	0.268***
	(0.048)	(0.048)	(0.048)	(0.047)	(0.048)	(0.049)	(0.047)
Position -10 yr.	-0.085	-0.100	-0.117*	-0.186***	-0.162**	0.206***	0.197***
	(0.058)	(0.057)	(0.057)	(0.056)	(0.057)	(0.058)	(0.057)
Position -5 yr.	-0.108	-0.096	-0.152*	-0.108	-0.130	0.037	-0.030
	(0.070)	(0.068)	(0.069)	(0.067)	(0.069)	(0.070)	(0.068)
Position this yr.	-0.655***	-0.618***	-0.647***	-0.678***	-0.761***	0.540***	0.358***
	(0.074)	(0.073)	(0.073)	(0.071)	(0.074)	(0.074)	(0.072)
Observations	9046	9046	9046	9046	8575	9046	9046
Controls	✓	✓	✓	✓	✓	✓	✓

Notes: All outcomes are z-scores. *Position* denotes the cohort position from percentile 1 to 100 divided by 100. *Position father* is the respondent's father's income rank when the respondent was 15 years old compared to other fathers of 15 year olds. *Controls* includes a treatment indicator, cohort, municipality, gender, education, and sector fixed effects (including unemployed/not in workforce). Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A-33: Historic shocks, unfairness, importance of effort and political views using economic policy view as right-wing outcome

	Current	Unfairness of inequality					Importance	Right-	N	Affected
	position	Cohort	Gender	Mun.	Edu.	Sector	of effort	wing		%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Unemployment	-12.2***	0.20***	0.23***	0.21***	0.18***	0.20***	-0.11*	-0.049	7537	5.03
	(0.78)	(0.051)	(0.050)	(0.050)	(0.049)	(0.052)	(0.052)	(0.050)		
Disability	-21.9***	0.30*	0.54***	0.42**	0.27*		-0.31*	-0.26*	9246	0.61
	(2.31)	(0.13)	(0.13)	(0.13)	(0.13)		(0.13)	(0.13)		
Hospitalization	-1.83***	0.093**	0.079**	0.089**	0.060*	0.039	-0.010	-0.0082	4749	55.5
	(0.49)	(0.029)	(0.028)	(0.028)	(0.028)	(0.028)	(0.029)	(0.028)		
Promotion	8.51***	-0.12**	-0.11**	-0.12**	-0.17***	-0.21***	0.14**	0.17***	7970	6.66
	(0.74)	(0.045)	(0.044)	(0.045)	(0.044)	(0.044)	(0.045)	(0.044)		
Pre-shock position FE	✓	✓	✓	✓	✓	✓	✓	✓		
Controls	✓	✓	✓	✓	✓	✓	✓	✓		

Notes: All outcomes z-scores. Each cell in the table is a separate regression of the column outcome on the row regressor and the controls indicated in the bottom part of the table. The explaining variables are all indicators that equal 1 if the respondent experienced the shock between 2012 and 2017. In each row, we exclude respondents who experienced the shock between 2008 and 2011. For *Unemployment*, we only use respondents who were in the workforce in the entire period. For *Disability*, we do not estimate the effect on fairness within sector, because very few disabled people work. *Controls* included in all regressions are cohort, gender, municipality, education and sector fixed effects (incl. unemployed/not in workforce), all measured in 2008, and a treatment indicator. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.