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ORIGINAL RESEARCH

Misperceptions, Income Positions, and Attitudes Toward EU Inequality: A Cross-Country Survey Experiment

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Abstract

We examine the relationship between misperceptions, income positions, and attitudes toward inequality at the supranational level of the EU. Conducting surveys in four EU member states (Germany, Italy, Poland, and Sweden), we confirm that Europeans misperceive their own income position in the EU. Once we account for these misperceptions, we find for all four countries that the lower their income rank, the more citizens assess EU income differences as unjust and are supportive of an EU minimum wage. When we inform a randomized subsample about their misperceived EU income position, those who learn that they are richer than they initially thought assess EU income differences as less unjust. The experiment unveils differences across countries: The general result is driven by respondents in Italy, Poland, and Sweden, whereas information on income misperceptions has opposing effects in Germany. This difference in the treatment reactions of the Germans is very robust and cannot be explained by their identification with the EU, trust in the EU, altruistic motives, political orientation, or socio-demographics.

Keywords Misperceptions · Income · Inequality · European Union · Survey experiment

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1 Introduction

To this day, large economic differences persist between the member states of the European Union. The EU addresses these differences with redistribution instruments such as the Cohesion Fund, which supports relatively poor member states through investments in, e.g., their infrastructure or environment. While there is broad agreement at the political level to promote greater convergence between member states, we know little about how their citizens assess the inequalities among each other. How does a Swedish citizen, living in a relatively rich country, perceive and assess EU inequality compared to a Polish citizen, who lives in a relatively poor country?

Theoretical models like the Meltzer-Richard model (Meltzer & Richard, 1981) predict a negative association of income and inequality aversion. These models, however, rely on the assumption that individuals have full information about their own income position. More recent empirical research on the national level questions this and shows that many individuals substantially misperceive their income position within their country. This indicates a tendency of misperceptions toward the center, a 'center tendency', where individuals with lower income tend to overestimate their income position, while those with higher income tend to underestimate it (e.g., Bublitz, 2022; Cruces et al., 2013; Engelhardt and Wagener, 2018; Karadja et al., 2017). Building on these studies, we test if relative income positions underlie the formation of attitudes toward inequality in a greater entity like the EU and what role income misperceptions play for analyzing these attitudes.

We collected data from the four EU member states Germany, Italy, Poland, and Sweden in March 2020. In an online survey, respondents reported their income, their perceived own national and EU income positions, as well as their EU identity and standard socio-demographics. A core feature of the survey is a randomized experiment that informed a subsample of respondents in each country about their actual income position within the EU. After the treatment, all respondents were asked to assess income differences in their country as well as in the EU. In addition to that, they were asked to state whether they are in favor of or against the introduction of an EU minimum wage, a policy measure that is widely discussed in the EU and tackles income differences between EU citizens.

Our findings reveal that a center tendency of misperceptions is also visible at the EU level. This means Europeans with lower income perceive a higher rank in the EU than is actually the case, whereas those with a higher income perceive themselves too low. These misperceptions play a central role in the relationship between income and attitudes toward EU inequality. Europeans regard income differences in the EU as less unjust and are less in favor of an EU minimum wage, the higher they rank in the EU income distribution. However, and in line with the misperception literature, this association only holds, once we account for the substantial misperceptions that Europeans have of their own income position in the EU. Our experiment reveals that information about their misperception shifts attitudes toward EU inequality. Respondents who learn that they have a higher income position in the EU than they initially thought, tend to consider income differences in the EU as less of a problem. However, we do not obtain a treatment effect on the support for an EU minimum wage. This indicates that the information treatment did not affect respondents' preferences for the presented policy measure as it did for their general attitudes toward inequality.

For each country, we find the center tendency of misperceptions and a negative relationship between income position and aversion to EU inequality. However, we find country differences in how respondents react to the information treatment. Respondents from Italy, Poland, and

Sweden drive the general treatment effect described above. German respondents differ in their treatment response and consider income differences in the EU as less – instead of more – of a problem when they learn to be poorer. In the same vein, German respondents who learn that they stand lower (higher) in the EU are less (more) in favor of an EU minimum wage. Additional analyses reveal that this difference in the treatment reactions of the Germans is very robust and cannot be explained by, e.g., their identification with the EU, trust in the EU, altruistic motives, political position, or socio-demographics.

Our paper contributes to studies on interpersonal and cross-country comparisons within the EU. Delhey and Kohler (2006) and Lahusen and Kiess (2019), for instance, show that Europeans use foreign countries as a reference group and that cross-country comparisons affect their life satisfaction. Bublitz et al. (2022) find that EU citizens have a good understanding of the existing economic disparities across EU countries and a perspective on inequality that goes beyond the national frame of reference. Results of these studies thus indicate that EU citizens compare themselves with their EU co-citizens. Our findings reveal that cross-national income comparisons also play a socio-political role; i.e., EU citizens form their attitudes toward EU inequality based on where they rank themselves relative to their co-citizens in other member states.

We also contribute to the growing literature on income misperceptions by focusing for the first time on EU income misperceptions and their relation to attitudes toward EU inequality. To our knowledge, only Fehr et al. (2022) pursue a similar approach by testing whether informing respondents simultaneously about their national and global position affects their redistributive preferences. While they partly replicate findings from previous studies on the national level, the information treatment has no effect on preferences for global redistribution. In contrast, our paper focuses on the EU, a lower but still supranational level, and a region for which established redistribution channels exist and with which EU citizens have a better picture and a closer relationship. Moreover, and in contrast to their study, we find that information on their misperceptions shifts Europeans' attitudes toward EU inequality, though with cross-country differences. This finding plausibly reflects that EU citizens are more strongly embedded within the EU, and less so globally. Moreover, our study is one of the few in the misperception literature (Bublitz, 2022; Hoy & Mager, 2021) that conduct cross-national surveys, which enhances the external validity of our findings.

At the policy level, our paper strongly relates to recurring debates on EU social and labor market policies. The EU has recently agreed on a framework on adequate minimum wages in all member states, seeking to increase the minimum wage protection for employed persons. Our paper contributes to this and future debates by analyzing to what extent EU citizens are in favor of an EU minimum wage that would go beyond the current legislation. Furthermore, we know little about how EU citizens assess relative income disparities within the EU. Our paper therefore gives important insights into how EU citizens actually think about European convergence via reducing income inequalities across member states.

Our paper proceeds as follows: Sect. 2 presents the theoretical background. Section 3 describes our data and descriptive statistics. Section 4 presents the results and Sect. 5 concludes.

2 Theoretical Background

2.1 Income and Attitudes Toward Inequality

Relative income positions play an important role in many economic models that predict attitudes toward income inequality. A prominent example is the Meltzer-Richard model (Meltzer & Richard, 1981), which assumes that individuals are in favor of redistribution and exhibit a stronger stance against income inequality when their income is lower than society's average income. The Relative Deprivation model (Clark & D'Ambrosio, 2015), in turn, predicts that individuals compare themselves with all of their co-citizens in society (not only 'the average') and feel the more deprived, the lower their income is relative to that of their co-citizens who are doing better. The Fehr-Schmidt model (Fehr & Schmidt, 1999) assumes that individuals prefer equitable over non-equitable outcomes particularly when inequality is disadvantageous to them, i.e., when they are economically worse off than others (for the formalization of the models, see Appendix B).

Figure 1 depicts the models' theoretical predictions graphically. The black curve with a solid line shows a typically right-skewed income distribution of individual *i*'s society with individual *i*'s income x_i, the average income μ of this distribution, and another individual *j*'s income x_j. In this scenario, individual *i* will prefer less inequality because (1) she has a lower than average income μ (Meltzer-Richard model), (2) she feels deprived relative to all co-citizens in society who have an income that is higher than her own income x_i (Relative Deprivation model), and (3) she views inequality between her and individual *j* as her own disadvantage (Fehr-Schmidt model). What all three models have in common is that they predict a negative relationship between income and their concern about inequality, based on a logic of self-interest: The higher (lower) their income, the less (more) individuals are negatively affected by inequality and, thus, the weaker (stronger) their aversion to it.

Empirical research, however, has found no clear evidence for a negative relationship between income and attitudes toward inequality. Some research results are line with the general model predictions (e.g., Alesina & La Ferrara, 2005; Alesina & Giuliano, 2011;

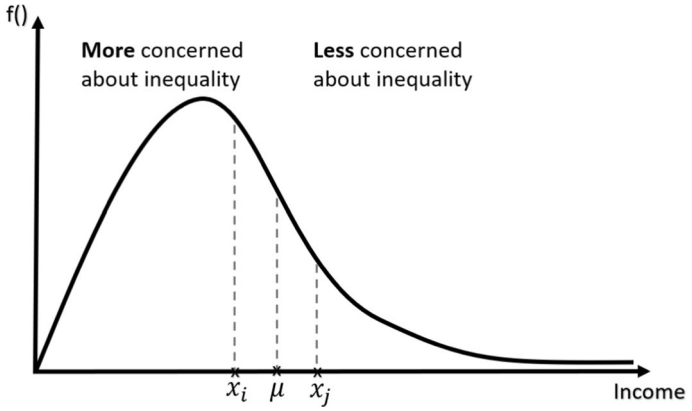

Fig. 1 Income and attitudes toward inequality. *Notes*: The figure displays the relationship between income and attitudes toward inequality, based on the Meltzer-Richard model, the Relative Deprivation model, and the Fehr-Schmidt model. The curve denotes the income distribution of individual *i*'s society. x_i denotes individual *i*'s income, μ the average income, and x_j denotes another individual *j*'s income

Franko et al., 2013; Guillaud, 2013) but an even larger number of studies shows heterogeneity in the relationship between income and attitudes across, e.g., countries with different welfare schemes (Dion & Birchfield, 2010; Beramendi & Rehm, 2016), the income distribution (Bernasconi, 2006; Kambayashi & Lechevalier, 2022), or individuals' political knowledge and interest (Stiers et al., 2022). In summary, the significance of income for attitudes toward inequality varies widely.

2.2 Center Tendency of Misperceptions

An important reason for the empirical results differing from the predictions of the models could be that all three models are based on the strong assumption that individuals have sufficient knowledge about the distribution of income in their society. Recent literature questions this assumption and shows that a majority of individuals misperceive their income position in their own country. In a pioneer study in the greater region of Bueno Aires (Argentina), Cruces et al. (2013) find that low-income individuals tend to overestimate their position and higher-income individuals tend to underestimate it. We illustrate this center tendency (i.e., the tendency toward the center) of misperceptions with Fig. 2.[1] The figure depicts an income distribution divided into percentiles, ranging from 0-100. Individual i represents in this figure a person with a lower actual income position who perceives a higher income rank and therefore overestimates her position ($x_i^P > x_i^A$). On the contrary, individual j has a higher actual income position but perceives a lower income rank and therefore underestimates her position ($x_j^P < x_j^A$). This center tendency of misperceptions has been confirmed for many countries, such as Denmark (Hvidberg et al., 2023), Germany (Engelhardt & Wagener, 2018; Fehr et al., 2022), Russia (Bublitz, 2022), Spain (Fernández-Albertos & Kuo, 2018), or Sweden (Karadja et al., 2017).

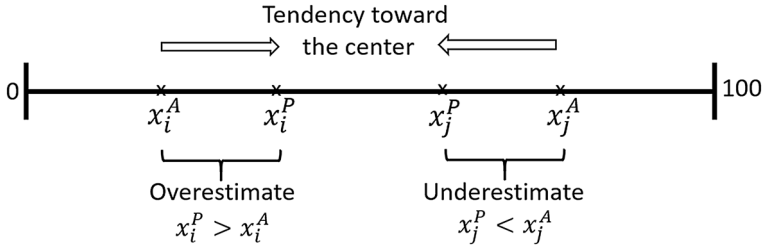

Fig. 2 Center tendency of misperceptions. *Notes*: The figure displays the tendency of misperceptions toward the center. The horizontal line denotes an income distribution divided into percentiles, ranging from 0-100. Individual i represents a low-income person with an actual income position x_i^A who perceives to have the position x_i^P. Individual j represents a higher-income person with an actual income position x_i^A who perceives to have the position x_i^P

[1] Scholars have used different terms to explain the systematic pattern by which misperceptions arise; e.g., 'centre bias' (Hvidberg et al., 2023), 'median bias' (Hoy & Mager, 2021), or 'middle-class bias' (Evans & Kelley, 2004; Fehr et al., 2022). However, these are theory-based concepts that imply certain mechanisms behind the formation of misperceptions. On the contrary, Fig. 2 depicts only the pattern of lower-income individuals overestimating their income position and higher-income individuals underestimating it, without claiming that this is due to any particular mechanism. For further investigations on the formation of income misperceptions at EU level, see Bublitz et al. (2022).

The existence of misperceptions and the systematic pattern of a center tendency should affect the relationship between income and attitudes. Despite that lower income typically triggers greater concerns about inequality, the fact that low-income individuals overestimate their position, and therefore perceive a higher rank, could weaken or negate the negative relationship between income and their attitudes. The same reasoning holds for higher-income individuals who tend to underestimate their position.

Moreover, most of the literature on income misperceptions has conducted survey experiments to analyze the effect of informing respondents about their misperceptions on their attitudes toward inequality at national level. In a meta-analysis of these experiments, Ciani et al. (2021) combine results from different countries. They show that, on the aggregate level, individuals adapt their attitudes after the information treatment in line with the theories' prediction of a negative relationship between income and inequality attitudes: Individuals who learn that they rank lower than they initially thought (that is, who overestimated their position) tend to show more aversion to inequality, while those who learn that they rank higher (that is, who underestimated their position) tend to show less aversion.

2.3 From the National to the EU Level

We discussed theoretical models that assume a negative relationship between income and inequality attitudes at the national level and presented more recent studies that highlight the importance of misperceptions, which individuals have of their own income position, for this relationship. Building on both strands of research, our paper shifts the perspective from the national to the cross-national level of the EU. Specifically, we investigate the extent to which Europeans' relative income positions in the EU are related to their attitudes toward EU inequality, and the role misperceptions play here.

We analyze to what extent their misperceptions of their own EU income position affect the relationship between income and attitudes in two ways:

(1) We analyze how *accounting for misperceptions* affects the relationship between their EU income position and attitudes toward EU inequality, i.e., whether it is stronger or only occurs when we consider the distorting effect that misperceptions can have on this relationship. Based on the presented theory, we predict that individuals who rank lower (higher) in the EU income distribution are more (less) concerned about EU inequality.
(2) Using experimental data, we investigate how *informing about misperceptions* of their own income rank changes Europeans' attitudes. We assume that individuals should be more (less) opposed to EU inequality when learning that they rank lower (higher) than initially thought, in line with the predicted negative relationship between income and attitudes.

3 Data and Methods

3.1 Survey Characteristics

Our data were collected within the research project "Socioeconomic analyses of perceptions of (re-)distribution in Europe (SOECBIAS)" (Beblo et al., 2023a). The project analyzes income (mis-)perceptions at the EU level and their impact on preferences for EU social policies. Based on quota samples (groups defined by gender, age, education, and

income), the survey was implemented and conducted by YouGov Deutschland in March 2020 in the four EU member states Germany, Italy, Poland, and Sweden. We carefully chose the four countries to represent European countries with different economic, cultural and historical backgrounds. Sweden and Germany are member states that rank economically higher in the EU (with median equivalized incomes of 25,005 Euro and 23,699 Euro, respectively), Italy is close to the EU average (17,554 Euro), while Poland ranks significantly lower (7,150 Euro).[2] The data collection is described in Beblo et al. (2023b).

In the survey, we started with questions about respondents' socio-political orientations, followed by detailed questions on their actual and perceived income positions. Respondents in all countries were first asked to select their income sources from a list of different income types to remind them of all types of income that their household might have had in the previous year (2019). Respondents were then asked to state their yearly net household income. The exact wording of the income questions is provided in a technical appendix (Appendix **C**). We used respondents' stated income to calculate their actual income positions (in percentiles) in their own country and in the EU, based on the income data of EU-SILC.

We chose disposable yearly income because all incomes (not only their monthly earnings) matter for inequality. We asked about household (not individual) income because we assume that individuals pool and share their incomes within their household and we did not necessarily ask the primary earner in the household. In line with the canonical literature on national income perceptions (e.g., Cruces et al., 2013; Kuziemko et al., 2015; Hoy and Mager, 2021; Bublitz, 2022), we did not adjust income for household size due to two main reasons: First, as evidenced by Cruces et al. (2013: 103), "individuals compare incomes in terms of total monthly household levels". Consequently, asking individuals about their total (and not adjusted) household income seems more intuitive. Second, the question about respondents' actual income position is already complex, even more so for their EU income position. We therefore decided not to request respondents to additionally adjust for income by household size, in order not to 'overburden' respondents.

Afterwards, respondents were asked to estimate how many percent of their country's and the EU population had a total yearly net household income that was lower than theirs in 2019. We explicitly asked respondents to estimate their position based on the total yearly net household income they had just reported. Answers to these questions denote their perceived national and EU income position. We use both variables to calculate their income misperception by subtracting their actual from their perceived income position, in line with the operationalization of previous studies (e.g., Cruces et al., 2013; Karadja et al., 2017). Thus, respondents overestimate their income position when they estimate their position to be higher than it actually is, and they underestimate their position when they estimate their position to be lower than it actually is.

Following a randomization procedure, one group of respondents was provided with information regarding their actual EU income position, which was determined by the total household income they had previously indicated. Respondents in the control group received no information and serve as the reference group to investigate whether information on respondents' own EU income position affects their attitudes toward EU inequality. The treatment was very similarly designed to previous experimental research on misperceptions (e.g., Karadja et al., 2017; Bublitz, 2022; Hvidberg et al., 2023). The major

[2] Data on countries' median equivalized net household incomes are for the year 2019 and obtained via Eurostat (indicator: ilcdi04).

difference is that we inform respondents about their cross-national income position and not their national position. The similarity in the treatment designs allows us to compare our findings from the EU level with findings from previous studies at national level. Appendix Figure A1 depicts a screenshot of the treatment.

After the treatment, we elicited attitudes toward inequality with three questions. First, we asked all respondents the more general question whether they agree that income differences in their own country and within the EU are just. The answers range on a 5-point Likert scale from 1 ("agree strongly") to 5 ("disagree strongly"). Thus, the higher the value, the more respondents assess income differences as unjust, i.e., the higher their aversion to inequality. We use the question about their attitudes toward national inequality as a benchmark for analyzing their EU inequality attitudes. In particular, this allows to measure the extent to which they find inequality in the EU more or less of a problem than at the national level. This variable additionally allows us to test whether we can reproduce the negative relationship between income and attitudes toward national inequality found in previous studies and to better compare these studies to our results at the EU level.

In addition, we also measure whether respondents are in favor of a specific policy that tackles these income differences. Respondents were asked to state if they would support the introduction of an EU minimum wage with answering categories ranging from 1 ("strongly against") to 5 ("strongly in favor"). We explained to the respondents that such a minimum wage would be adjusted to reflect the living costs in each EU member state and would guarantee each employed European a minimum standard of living. We chose the EU minimum wage as it is a widely known labor market policy in all European countries and combats income inequality by raising the incomes of employed persons at the bottom of the income distribution. The policy also tackles cross-country inequalities in the EU. As poorer member states have so far very low or no statutory minimum wages, their citizens would particularly benefit from the introduction of an EU minimum wage. Furthermore, it was a widely discussed policy measure within the EU at the time we implemented the survey. Consequently, respondents' attitudes toward an EU minimum wage measure their support for a real policy that is put into practice in the near future.

In the regression analyses, all dependent variables are standardized to z-scores (with a mean of zero and a standard deviation of one) for better interpretation. Apart from standard sociodemographic characteristics (age, gender, education, and employment status), we additionally control in our regression models for EU identity (respondent identifies first or only as EU citizens). As our data collection was carried out during the first wave of the COVID-19 pandemic, we also include a variable about individual COVID-19 affectedness (asking whether respondents or anyone in their close surroundings was infected with the virus) to control for potential consequences of the pandemic on policy preferences. Summary statistics of the covariates are provided in the Appendix Table A1.

We use data of the control group as well as the treatment group, the latter being the group that received information about their actual EU income position. We omit respondents with missing data in any of the included variables, resulting in a total sample size of 2239 respondents. The sample size is similarly large for each country (551 respondents in Germany, 576 in Italy, 496 in Poland, and 616 in Sweden). The missing values relate mostly to reported income and income perceptions at the national and the EU level, which are around one third of the initial sample. The missing values do not harm our treatment

Table 1 Attitudes toward national and EU inequality by country

	All (1)	DEU (2)	ITA (3)	POL (4)	SWE (5)
Nat income differences are unjust	3.58	3.62	3.75	3.64	3.35†
Disagree strongly (1)–agree strongly (5)	(1.12)	(1.12)	(1.09)	(1.16)	(1.09)
EU Income Differences are unjust	3.56	3.67	3.70	3.22†	3.61
Disagree strongly (1)–agree strongly (5)	(1.11)	(1.08)	(1.07)	(1.18)	(1.07)
Support for EU Minimum Wage	3.59	3.60	3.75	3.77	3.29†
Strongly against (1)–strongly in favor (5)	(1.18)	(1.17)	(1.08)	(1.15)	(1.24)

Notes: Mean values with standard deviations in parentheses, restricted to respondents in the control group. †denotes significant country differences ($p < 0.05$), compared to each other country. Survey weights are applied

design as in each country, we find evidence for almost perfect randomization between the treatment and the control group. The only exceptions are a five-percentage points smaller number of German respondents in the treatment group who indicated that their surrounding was affected by COVID-19 (13% in the control group) and a three-percentage points larger number of Swedish respondents in the treatment group who reported an EU identity (5% in the control group) (see Appendix Table A1). We account for these negligible imbalances with control variables in our regression analyses. To adjust for sample deviations from the overall population concerning the quotation characteristics (i.e., gender, age, education, and income), we also apply survey weights in our analyses (though deviations are small, as shown in Beblo et al., 2023b).

3.2 Descriptive Statistics

Table 1 shows descriptive statistics on respondents' attitudes toward income inequality. We concentrate here on the control group to obtain estimates that are not affected by the treatment. On average, respondents are slightly more likely to agree that income differences in their own country are unjust, with a mean value of 3.58 over all countries. Compared to German and Polish respondents, Italians (mean value: 3.75) assess income differences in their country as most unjust. In contrast, Swedes (mean value: 3.35) evaluate national income differences as significantly less unjust than respondents in each other country.

Taking all countries together, we find that attitudes toward EU income differences are, with a mean value of 3.56, quite similar to attitudes toward national income differences. Looking at the countries separately, respondents in Germany, Italy, and Sweden on average assess income differences in the EU as similarly unjust. However, and possibly surprising, Polish respondents assess the differences in the EU as significantly less unjust than all other respondents (mean value: 3.22), although Poland is the economically poorest country within our country sample. This finding provides suggestive evidence that people living in poorer countries do not automatically assess inequality as more unjust than people in richer countries.

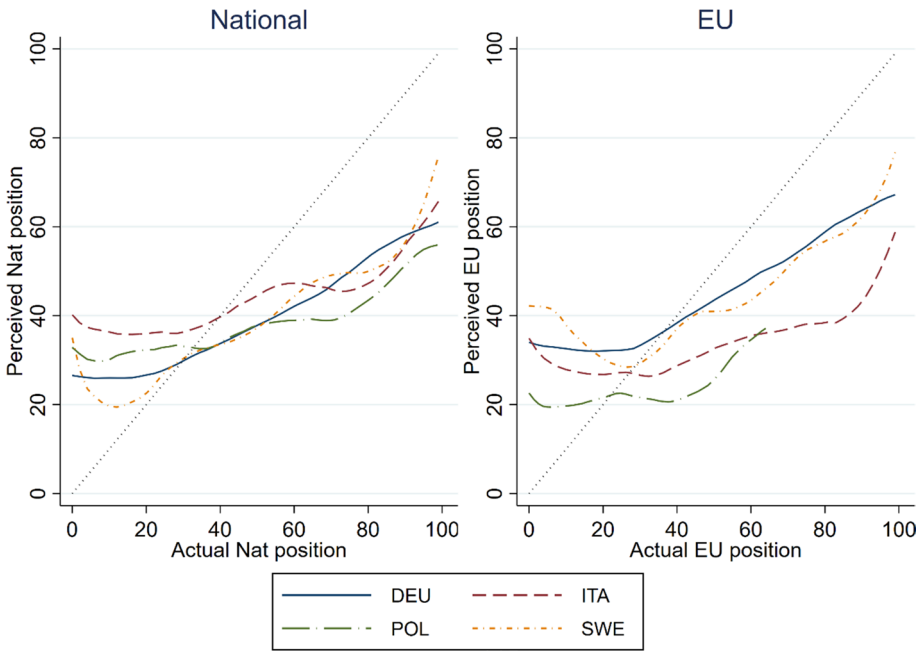

Fig. 3 Perceived and actual position at national and EU level. *Notes*: The left panel depicts the perceived national income position as a function of the actual national income position for each country. The right panel plots the perceived EU income position against the actual EU income position. The curves are smoothed using epanechnikov kernels with a bandwidth of 10. The curve for Poland in the right panel is cut at the 65th actual percentile, since over 93% are between the 1st and 65th percentile

Over all countries, respondents show slight support for the introduction of an EU minimum wage, with a mean value of 3.59. Here, too, are country-specific differences: Polish and Italian respondents, who are to gain the most on average from its introduction, are also the most in favor of an EU minimum wage, with a mean value of 3.77 for Poland and 3.75 for Italy respectively. The support in Germany (mean value: 3.60) is a bit lower, and it is significantly lower in Sweden (mean value: 3.29). These differences may also be reminiscent of the country-specific history with minimum wages. The existence of an above-average level of statutory minimum wage in Germany plausibly renders its citizens less supportive of an EU minimum wage than their Polish and Italian counterparts. The Swedes, in turn, have already a relatively high minimum wage based on collective bargaining, and may be afraid that they would pay for wage increases in other countries.

Overall, this section reveals heterogeneity in inequality attitudes across countries that only partly mirrors what one would expect based on the countries' different economic situations. This finding suggests a rather complex picture at the country level regarding the relationship between income and attitudes toward EU inequality that may also reflect specific cultural and institutional settings of different member states. Leaving these country-level differences aside, our paper focuses on the individual level and analyzes individuals' attitudes within each country. Based on the theoretical background in Sect. 2, we examine the role of relative income positions for attitudes toward EU inequality and how income misperceptions affect this relationship.

4 Findings: Misperceptions, Income Positions and Attitudes Toward EU Inequality

4.1 National and EU Income Misperceptions

Figure 3 illustrates respondents' perceived income positions as a function of their actual income position at the national (left panel) and the EU level (right panel), including respondents from both the control and the treatment group. The left panel confirms, in accordance with previous studies, the center tendency of national income misperceptions: For each country, those who stand at the bottom of the national income distribution tend to overestimate their income position (the curves are on the left side of the 45-degree dot line). In contrast, respondents who rank higher tend to underestimate their income position, that is, they perceive a lower than actual national income position.

The right panel shows income misperceptions at the EU level. Here, the same pattern holds again for all four countries: Lower-income respondents overestimate and higher-income respondents underestimate their cross-national income position. Thus, we find for each country the center tendency of income misperceptions also at the EU level. A comparison of the curves in the left and right panels additionally reveals that income misperceptions are similarly high at the EU and national level.[3]

4.2 Accounting for Misperceptions

As shown in the previous section, respondents misperceive not only their national but also their European income position. In this section, we analyze the relationship between income positions and attitudes toward inequality and what effect misperceptions have on this relationship. We concentrate on respondents in the control group, i.e., respondents who did not receive information about their actual position. As a benchmark, we first analyze relative income positions at national level and their relationship with attitudes toward national inequality.

Results are shown in Table 2. Column 1 in panel a) shows that respondents' actual national income position negatively associates with how unjust they assess income differences in their country. Moving up 10 percentiles in the actual income distribution makes respondents assess national income differences as less unjust by 0.03 standard deviations. However, the estimate of this relationship between income position and attitudes might be too small because of the substantial amount of misperception respondents have about their income position. Due to the center tendency of misperceptions (depicted in Fig. 3), higher-income individuals tend to underestimate their position and should therefore regard income differences as more unjust, as they mis-rank themselves too low in the income distribution. The opposite holds for lower-income individuals, who perceive their rank as too high. This leads to a smaller coefficient in model 1, as long as we leave out the effect that income misperceptions have on the association between actual income positions and respondents' attitudes. In column 2, we therefore add variables on income misperceptions to the model and find that the coefficient more than doubles in size, which confirms our reasoning.

[3] For further analyses of the formation of EU income misperceptions in the four countries, see Bublitz et al. (2022).

Table 2 Attitudes toward national and EU inequality by income and misperception

	Nat diff. unjust		EU diff. unjust		Supp. EU wage	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel a) No Controls						
Actual Nat position	−0.325***	−0.752***				
	(0.114)	(0.173)				
Actual EU position			−0.149	−0.339*	−0.190	−0.446**
			(0.129)	(0.175)	(0.131)	(0.177)
Misperception	No	Yes	No	Yes	No	Yes
Panel b) With Controls						
Actual Nat position	−0.224*	−0.637***				
	(0.119)	(0.184)				
Actual EU position			−0.087	−0.308*	−0.097	−0.374**
			(0.138)	(0.184)	(0.132)	(0.178)
Misperception	No	Yes	No	Yes	No	Yes
Observations	1149	1149	1149	1149	1149	1149
Country FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Coefficients and robust standard errors (in parentheses) from OLS regressions with survey weights applied, restricted to respondents in the control group. Dependent variables are standardized to z-scores and denote in columns 1 and 2 attitudes toward national income differences, in columns 3 and 4 toward EU income differences, and in columns 5 and 6 support for an EU minimum wage. Independent variables are the actual national and EU income position, ranging from percentile 1 to 100 divided by 100. Columns with even numbers additionally include national (column 2) and EU (columns 4 and 6) misperception, defined by subtracting the actual from the perceived position divided by 100. Control variables in Panel b) are EU identity, gender, education, age, age^2, employment status, and surroundings affected by COVID-19. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

In a next step, we test if the negative relationship between respondents' income position and their attitudes also exists at the EU level. Results in columns 3 and 5 of panel a) reveal small negative and statistically insignificant associations between respondents' actual income position in the EU and their attitudes toward EU income differences as well as their support for an EU minimum wage. However, the association might be discounted toward zero by respondents' income misperceptions. In fact, adding EU income misperceptions to the model again more than doubles the size of the coefficients, as displayed in columns 4 and 6. We now find that respondents assess EU income differences as significantly less unjust (at 10%-level) and support an EU minimum wage significantly less (at 5%-level) when they rank higher in the EU income distribution. Moving up the EU income rank by 10 percentiles makes respondents assess EU income differences as less unjust by around 0.03 standard deviations and decreases respondents' support for an EU minimum wage by around 0.04 standard deviations. The results are robust to including control variables, as revealed in panel b).

Figure 4 illustrates potential cross-country differences in the relationship between respondents' relative income position and their respective inequality attitudes while accounting for misperceptions. In the previously reported results, we controlled for country level differences using country fixed effects. Now, we further examine the three attitudinal variables by regressing them on the actual income position interacted with each country. The three panels of Fig. 4 display the results for all three outcome variables. The

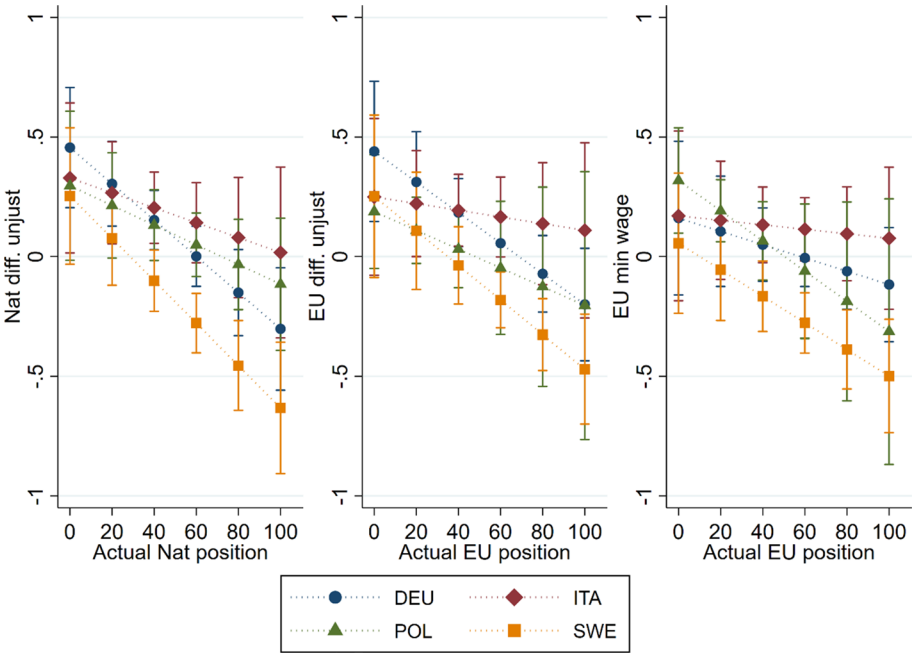

Fig. 4 Attitudes toward national and EU inequality by actual income position for each country. *Notes*: The figure depicts conditional marginal effects (with 95% confidence intervals) from OLS models regressing attitudes toward national income differences (left panel), attitudes toward EU income differences (middle panel), and support for an EU minimum wage (right panel) against the actual income position interacted with country dummies. Dependent variables are standardized to z-scores. Models include variables on income misperceptions and a number of control variables (EU identity, gender, education, age, age^2, employment status, and surroundings affected by COVID-19)

figure confirms in all countries the negative association between income rank and attitudes toward national income differences (left panel), EU income differences (middle panel), and the introduction of an EU minimum wage (right panel). The figure also shows that in Italy attitudes toward inequality within the EU are less associated with the actual EU position than in the other three countries. Italian respondents in all income groups tend to regard EU inequality as problematic. This finding suggests a widespread concern among Italians regarding their own economic situation and that of their country that is not moderated by their actual income level.

The results of Table 2 revealed the predicted negative association between actual income position and inequality attitudes at EU level, after accounting for respondents' income misperceptions. We argue that the changes in the coefficients result from the center tendency of misperceptions, i.e., individuals with lower income tend to over- and those with higher income tend to underestimate their own income position. Therefore, accounting for misperceptions should have the greatest effect on the attitudes of respondents at the bottom and the top of the income distribution. To test this, we categorize respondents into three income groups: low (lower than 30th percentile), medium (30th–69th percentile) and high (70th percentile or higher). We then regress each of the three variables regarding inequality attitudes on income group and some controls in the first set of models, and

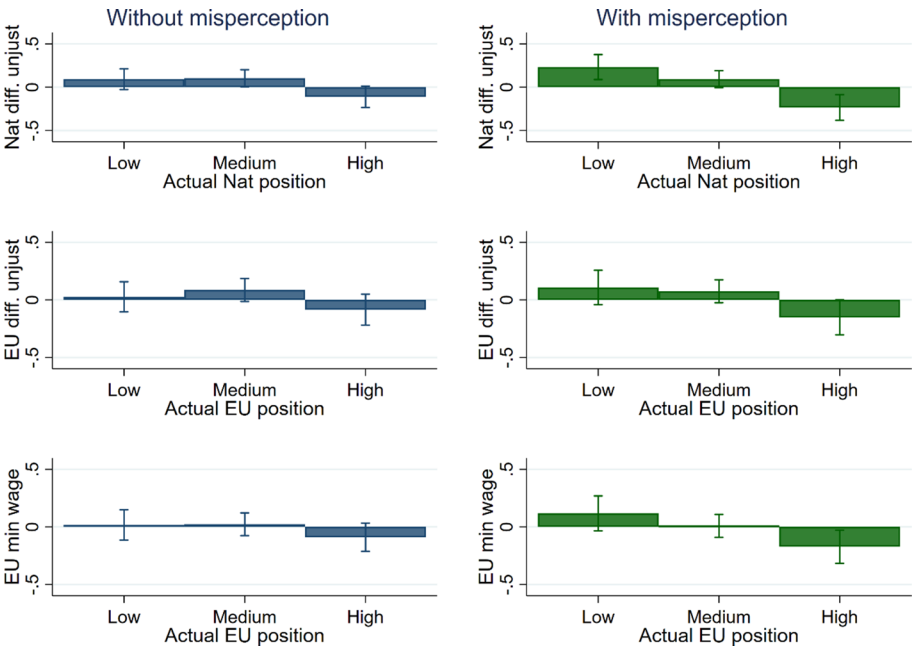

Fig. 5 Attitudes toward national and EU inequality by income group. *Notes*: The figure depicts marginal effects (with 95% confidence intervals) from OLS models regressing attitudes toward national income differences, EU income differences, and support for an EU minimum wage respectively on income group, without (left panel) and with (right panel) the inclusion of income misperceptions. Dependent variables are standardized to z-scores. Income groups are defined by actual position in national or EU income distribution (low: 0–29th percentile, medium: 30–69th percentile, high: 70–100th percentile). Control variables (EU identity, gender, education, age, age^2, employment status, and surroundings affected by COVID-19) and country dummies are included in all models

additionally on income misperceptions in the second one.[4] Figure 5 depicts the coefficients of the three income groups in two panels: The left panel displays the coefficients without accounting for misperceptions, while the right panel shows the coefficients with misperceptions included in the regression models. The results strongly support the proposed mechanism through which the center tendency of misperceptions influences individuals' attitudes toward inequality. Accounting for misperceptions in the regression models increases the coefficients of low- and high-income respondents. This means low-income (high-income) respondents assess national and EU income differences as even more (less) unjust and are more (less) in favor of an EU minimum wage. In contrast, attitudes among the medium-income group remain quite stable. This pattern is robust to using different thresholds for the categorization of the income groups (see Appendix Figure A2).

To sum up, findings of this section reveal for all four countries that individuals' relative income positions associate negatively with their aversion to inequality at both the national as well as the EU level, confirming our theoretical prediction. Consistent with the center tendency of misperceptions, the negative association between income position and

[4] We thank an anonymous referee who inspired these analyses.

Table 3 Effect of informing about misperception on attitudes toward EU inequality

	EU diff. unjust					
	All (1)	DEU (2)	ITA (3)	POL (4)	SWE (5)	w/o DEU (6)
Panel a)						
TRT: Underestimate	−0.099*	0.078	−0.254**	−0.193	−0.051	−0.154**
	(0.056)	(0.105)	(0.113)	(0.129)	(0.114)	(0.066)
TRT: Overestimate	0.033	−0.254*	0.032	0.247	−0.034	0.098
	(0.085)	(0.148)	(0.177)	(0.172)	(0.177)	(0.102)
	Supp. EU wage					
	All (1)	DEU (2)	ITA (3)	POL (4)	SWE (5)	w/o DEU (6)
Panel b)						
TRT: Underestimate	0.034	0.294***	0.137	−0.083	−0.188	−0.055
	(0.055)	(0.098)	(0.101)	(0.112)	(0.118)	(0.066)
TRT: Overestimate	−0.080	−0.393**	0.008	−0.052	0.105	0.001
	(0.085)	(0.155)	(0.166)	(0.148)	(0.186)	(0.102)
Observations	2239	551	576	496	616	1688
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes					Yes

Notes: Coefficients and robust standard errors (in parentheses) from OLS regressions with survey weights applied. Dependent variables are standardized to z-scores and denote in panel (a) attitudes toward EU income differences and in panel (b) the support for an EU minimum wage. Respondents in the treatment (TRT) group were informed about their actual EU income position. TRT: Underestimate (TRT: Overestimate) is the treatment effect among respondents who estimated an income position that is lower (higher) than their actual income position within the EU. All regressions include as control variables actual EU income position, EU identity, gender, education, age, age^2, employment status, and surroundings affected by COVID-19. *$p<0.10$, **$p<0.05$, ***$p<0.01$

attitudes holds at the cross-national level, though statistically significantly only when individuals' income misperceptions are taken into account. This confirms the importance of income misperceptions for attitudes toward inequality, in line with previous misperception literature.

4.3 Informing About Misperceptions

In this section, we test whether informing respondents about their income misperceptions influences their attitudes toward EU inequality. In Sect. 2, we hypothesized that the information treatment shifts their attitudes at the EU level similarly to their attitudes at the national level. Respondents who learn about a higher income position in the EU should be less concerned about EU inequality, while respondents who learn about a lower rank should show more aversion to it. Since we assume heterogeneous treatment effects along the direction of their misperception, we interact the treatment with a misperception dummy. The dummy denotes whether respondents overestimate or underestimate their income position in the EU. In the treatment group, those who overestimate their position are therefore

informed about a lower income position than they initially estimated, and those who underestimate it are informed about a higher position.

Table 3 shows the treatment effects for the group of respondents who underestimate their position and for those who overestimate their position. Results in column 1 of panel a) show for the complete sample that respondents who learn to have a higher income position in the EU than they initially thought, regard EU income differences as less unjust by 0.1 standard deviations. This is in line with our previous finding of a negative association between income rank and attitudes toward EU inequality and confirms our theoretical prediction. Consistently, the coefficient of the treatment among respondents who learn about a lower rank is positive, although much smaller and not statistically significant.

Results in columns 2–5 of panel a) reveal signs of coefficients for Italy, Poland, and Sweden that are in line with the findings across the countries. On the contrary, the signs of the coefficients for Germany are reversed. German respondents who learn that they stand lower in the EU than they initially thought regard EU income differences as significantly less unjust. When excluding Germany from the sample, as shown in column 6, we observe for respondents who underestimate their position in turn a stronger negative coefficient compared to the coefficient in column 1. Results of panel b) reveal no treatment effects on the support for an EU minimum wage among respondents in Italy, Poland, and Sweden. However, and consistent with the deviating finding in panel a), German respondents are less supportive of an EU minimum wage when they learn about a lower rank and more supportive when learning to rank higher. Therefore, the results also reveal cross-country heterogeneity in how respondents react to the treatment in terms of their policy preferences between Germany and the other three countries.

Some studies allow for a tolerance corridor in misperceptions, since respondents might only shift their attitudes when being informed about a substantially large misperception. In a first robustness check, we therefore restrict the sample to respondents who over- or underestimate their income position in the EU by more than 10 percentiles. In line with this reasoning, we find slightly larger treatment effects for each country. One exception is the treatment effect on attitudes toward EU income differences for Germans who learn about a lower income rank, which turns statistically insignificant (p-value: 0.145), plausibly stemming from the smaller sample size (see Appendix Table A2). In a second robustness check, we analyze the treatment effects only for respondents who misperceived their income position by less than 10 percentiles. This allows us to test whether respondents' attitudes change when simply being confirmed about a rather accurate estimate of their position. We do not find any significant effects (see Appendix Table A3), providing strong evidence that the treatment effects obtained in Table 3 are driven by the direction of misperceptions, i.e., learning about a lower or higher position in the EU income distribution.

To sum up, we find that information on their EU income misperception shifts respondents' attitudes in a way that only partly corroborates our theoretical prediction. Respondents in Italy, Poland, and Sweden regard EU income differences as less unjust when learning that they rank higher in the EU. However, they do not shift their support for an EU minimum wage. The latter finding is consistent with the misperception literature that finds treatment effects on more general attitudes toward inequality but less on individuals' specific preferences toward policies that might tackle it (e.g., Kuziemko et al., 2015). What stands out are the reversed treatment effects in Germany. German respondents regard EU income differences as even less unjust when learning about a lower EU income position. Furthermore, the German sample also shifts their attitudes toward an EU minimum wage in a reversed way to our theoretical prediction and in contrast to respondents from the other three countries, whose policy preferences remain unchanged.

4.4 Heterogeneity in Treatment Effects

Most studies on income misperceptions reveal heterogeneous reactions to the information provision. Although they find effects, these are regularly small (for a review, see Ciani et al., 2021) and only significant when divided in sub-groups of respondents who overestimate (e.g., Cruces et al., 2013; Fernández-Albertos and Kuo, 2018; Hvidberg et al., 2023) or underestimate (e.g., Karadja et al., 2017; Bublitz, 2022) their national income position or who have certain ideological views (e.g., Fehr et al., 2022). In that sense, our findings of heterogeneous treatment effects are consistent with the misperception literature. However, previous studies seldomly provide plausible or consistent mechanisms for their deviating findings nor test these mechanisms. Thus, we cannot build on canonical literature to provide a more conclusive interpretation of the cross-country differences obtained in our study. In this section, we therefore explore first potential mechanisms which may explain the country differences revealed in the previous section. We focus on Germany where the treatment has opposing effects to what the theory predicts.

Our analyses are guided by the theoretical assumption that individuals form their preferences based on self-interest. One important side effect of the standard treatment design is that respondents who are informed about a higher income position also learn that there exist more people who are poor than they initially thought. Specifically, the treatment could increase concerns about inequality, which may be particularly high at the EU level with large differences in the living conditions between EU citizens. In a similar vein, those who learn about a lower position may care less about the economic situation of their fellow EU citizens and are, consequently, more concerned about their own situation. The deviating results for Germany may therefore be driven by the extent to which Germans care about the well-being of their co-citizens in the EU. As a proxy for this concern, we utilize respondents' stated EU identity as a proxy and investigate whether the treatment effects vary among German participants based on their identification as EU citizens.

Another explanation for their concern about EU inequality may stem from their general concern for other people. We thus use a variable that asks respondents to rank as most, second most, and third most important what a child should learn to prepare herself for life (to obey, to be well-liked or popular, to think for himself/herself, to work hard, to help others when they need help). We define respondents as altruistic who indicate that children should learn 'to help others when they need help' (as most or second most important) and the others as non-altruistic. [5]

Results in Table 4 show the interaction effects along EU identity in panel a) and altruism in panel b), where we divide the German sample into those who under- and those who overestimate their EU income position. Results of panel a) reveal that none of the interactions are significant, which stands against our reasoning that the treatment effects could be driven by identification with the EU. In panel b), we test heterogeneity along altruistic motives. Column 2 shows that the treatment effect among Germans who learn about a higher rank are more in favor of an EU minimum wage when they are non-altruistic and significantly less so when they are altruistic, which is, however, contrary to what we suggested. All in all, the deviating treatment effects in Germany can neither be traced back to the sense of identification with the EU nor more general altruistic motives.

[5] Our operationalization of altruism aligns with the approach taken by Alesina and La Ferrara (2005) as we adopt a similar methodology to define and measure altruistic motives.

Table 4 Heterogeneity in treatment effects for Germany

	Underestimate		Overestimate	
	EU diff. unjust (1)	Supp. EU wage (2)	EU diff. unjust (3)	Supp. EU wage (4)
Panel a) EU identity				
TRT	0.075	0.282**	−0.339*	−0.423**
	(0.118)	(0.111)	(0.172)	(0.167)
EU identity	0.317*	0.558***	0.420	0.116
	(0.177)	(0.169)	(0.298)	(0.330)
TRT x EU identity	0.018	0.099	−0.223	−0.020
	(0.262)	(0.222)	(0.359)	(0.429)
Observations	384	384	167	167
Panel b) Altruism				
TRT	0.100	0.625***	−0.486*	−0.458
	(0.177)	(0.170)	(0.293)	(0.318)
Altruism	0.509***	0.600***	0.289	0.582**
	(0.145)	(0.153)	(0.254)	(0.282)
TRT x Altruism	−0.033	−0.492**	0.201	0.111
	(0.213)	(0.202)	(0.340)	(0.366)
Observations	382	382	166	166
Controls	Yes	Yes	Yes	Yes

Notes: Coefficients and robust standard errors (in parentheses) from OLS regressions with survey weights applied. Dependent variables are standardized to z-scores and denote in uneven columns attitudes toward EU income differences and in even columns support for an EU minimum wage. The treatment is interacted with a dummy for EU identity in panel a) and altruism in panel b). Observations are smaller in panel b) due to missing values on altruism. All regressions include as control variables actual EU income position, EU identity, gender, education, age, age^2, employment status, and surroundings affected by COVID-19. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

We also check for Germany the interaction between the treatment and two further proxies for EU identification: respondents' view that more political responsibility should be attributed to the EU and their political trust in the EU. In addition, we interact the treatment with respondents' political orientation and socio-demographics (working status, gender, age), which sometimes lead to heterogeneity in treatment effects (e.g., Fehr et al., 2022). Almost all of the interactions are again insignificant and thus suggest no plausible explanation for the deviating results in Germany (see Appendix Tables A4 and A5).

We also test heterogeneity in the treatment effects for Italy, Poland, and Sweden along EU identity and altruism. We find that almost all interactions are insignificant (see Appendix Table A6). The only significant effect is found for Sweden, where those who have non-altruistic motives are less supportive and those who are altruistic are more supportive of an EU minimum wage when learning about a higher income rank in the EU. This is in line with our earlier reasoning. Nonetheless, the results do not hint at any mechanisms that might be underlying the country difference between Germany and the other three countries.

To sum up, we find that *accounting for* income misperceptions confirms a negative relationship between relative income and aversion to EU inequality as predicted per theory. This holds for all four countries. However, *informing* respondents about their misperception changes attitudes in Italy, Poland, and Sweden, in line with our theory, while in

Germany it goes in the opposite direction of what we hypothesize. Testing heterogeneity in treatment effects, we find no mechanism that drives the deviating results in Germany, showing a robust difference between citizens from Germany and from the other three countries in their reactions to the information provision.

5 Discussion and Conclusion

Our paper is the first to leave the national perspective by investigating how EU citizens' relative income positions in the EU relate to their attitudes toward EU income inequality. Additionally, we study the impact of a misperceived one's own income position on this relationship. With a randomized online survey experiment conducted in the four EU member states Germany, Italy, Poland, and Sweden, we also test to which extent information about income misperceptions changes these attitudes. This is of relevance because citizens may use broader cross-national reference frames to assess inequality and form policy preferences.

Our findings show for all four countries that individuals' relative income positions negatively associate with their aversion to inequality at both national and EU level, once we account for the substantial misperceptions they have of their own income rank. Consistently, informing respondents about a higher income rank in the EU than they initially thought makes them assess EU income differences as less unjust. The treatment effects are driven by Italy, Poland, and Sweden. In Germany, in contrast, information about misperceptions influences attitudes in a reversed way: Informing the German respondents that they stand lower (higher) than initially thought makes them regard EU income differences as less unjust and less (more) supportive of an EU minimum wage. The deviating findings for Germany do not relate to differences in their EU identity, trust in the EU, altruistic motives, political orientation, or socio-demographics.

The scope of our study is limited by the available data. First, we conduct analyses in four EU countries that represent member states with different economic, cultural and historical backgrounds. Future research could explore the cross-country differences with a wider range of countries. It may then be possible to identify countries where individuals exhibit similar reactions to the treatment as we observed for Germany. Second, regarding the observed heterogeneity in the treatment effects, our data lack detailed measurements of EU support that capture cultural, social, or political nuances and that may shed light on the German results. Third, our study investigates Europeans' attitudes toward an EU minimum wage as one EU policy measure. This invites future studies to explore attitudes toward other EU policies, e.g., an unemployment benefit scheme, a minimum income benefit scheme, or instruments that are already in place such as the Cohesion Fund. Finally, differences in treatment effects may also be caused by a different understanding of whether the country is a payer for or recipient of EU support. Researchers could thus consider collecting data to assess the extent to which respondents perceive their country and/or themselves as contributors or beneficiaries of an EU minimum wage and other policy measures at the EU level.

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