Who Is High Income, Anyway? Social Comparison, Subjective Group Identification, and Preferences over Progressive Taxation

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Why are high-income and low-income earners not significantly polarized in their support for progressive income taxation? This article posits that the affluent fail to recognize that they belong to the high-income income group and this misperception affects their preferences over progressive taxation. To explain this mechanism theoretically, I introduce a formal model of subjective income-group identification through self-comparison to an endogenous reference group. In making decisions about optimal tax rates, individuals then use these subjective evaluations of their own income group and earnings of other groups. Relying on ISSP data, I find strong evidence for the model's empirical implications: most high-income earners support progressive taxation when they identify themselves with a lower group. Additionally, individuals who overestimate the earnings of the rich are more likely to support progressive taxation.

nvestigating the determinants of support for welfare provision has been one of the fundamental themes in political science. This centrality seems emblematic of Laswell's (1936) famous definition of politics as a process of determining "who gets what, when, and how." Although it has not received as much scholarly attention, of equal importance is "who pays what, when, and how." The size of the welfare budget and the number of recipients both depend on the revenue that the government raises through taxation. "Who gets?" and "who pays?" are not rival but complementary lines of inquiry for the size and the feasibility of the governmental provision of anti-poverty programs, direct transfers, public services, and social insurance. It is the disjunction between the receivers and payers, as well as the magnitude and direction of the net transfers between these groups, that define both the progressivity of the welfare system and, consequently, the intensity of class conflict.

In most welfare systems in advanced industrial countries, the current position of an individual in the income distribution determines the amount of benefits to which she is entitled. The link between income level and welfare-related gains, or losses, becomes even more significant when societies have very progressive statutory tax regimes, in other words, tax policies in which the tax rate increases as the taxable income increases. Figure 1 displays the income taxes and government transfers as a percentage of equivalized household disposable income by decile for the working-age individuals from 32 Organization for Economic Cooperation and Development (OECD) countries (Causa and Hermansen 2018). The light and dark bars represent the size of the government benefits received and income taxes paid, respectively, while the black line shows the net benefits from the welfare state. Holding the distribution of benefits constant, it is evident that households in the higher deciles of the income distribution disproportionately bear the costs of redistributive policies. On average, households in the lowest decile receive almost 30% of their disposable income as net benefits, while the households in the top decile give almost 30% of their income as net contributions. Thus, it is no coincidence that most scholarly work on preferences over redistribution treats personal income as the primary driver of tax preferences (Meltzer and Richard 1981).

However, empirical evidence shows that, on average, high-income individuals support progressive taxation as much as
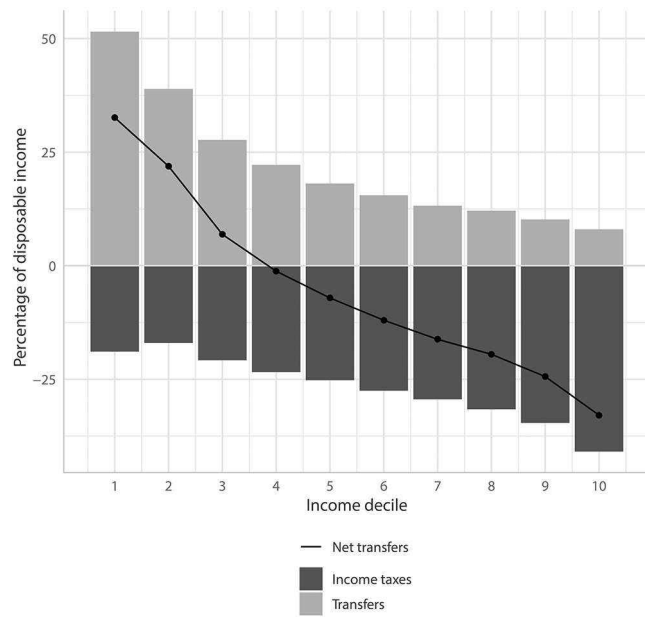
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Figure 1. Transfers received and personal income taxes paid across deciles as a percentage of equivalized household income, OECD average.

low-income individuals do. International Social Survey Programme's Social Inequality survey of 2009 reveals that almost 60% of American respondents with yearly household incomes higher than $110,000 support progressive taxation, whereas 63% of American respondents with annual incomes lower than $25,000 support progressivity. Similarly, over 75% of the French respondents with monthly household incomes higher than €4,500 agree that individuals with higher incomes should pay a larger share of their incomes in taxes, while around 80% of those with family incomes less than €800 express support for progressive tax (ISSP 2009). These data are a representative example of the findings of international public opinion surveys in general, implying that many high earners agree to be the net contributors to the welfare system around the world. More importantly, in most cases, the poor and the rich—in other words, both the winners and losers from the welfare state—agree that the tax system should be progressive.

This article seeks to explain this critical empirical regularity theoretically. Why is there not much polarization between the high and the low earners about progressive tax rates? Why do a significant share of high-income individuals support progressive taxation? In answering these questions, I add a perceptual dimension to existing models of preference formation over tax rates. I argue that preferences for progressive taxation are shaped by the interplay between own income, subjective income group identification, and perceptions of earnings of the rich. More specifically, I demonstrate that most people, even the affluent, support progressive tax rates when they believe it would be someone richer than them

who would disproportionately bear the extra tax burden. This belief is mostly driven by the difficulty in precisely identifying high-income individuals and their income. For most citizens being affluent is a fuzzy concept that is hard to define. Everyone—high-income and low-income individuals alike—is confident that Bill Gates or Mark Zuckerberg are among those with high income. Nobody would oppose the notion that an individual who lives on the Upper East Side in Manhattan, drives a Ferrari, and takes vacations on an exotic island would be considered rich. However, how do people classify the owners of the most beautiful house on their block or the person in their neighborhood who has a nice car? Who do they think are the high-income earners? More importantly, how do people assess their affluence?

Subjective income group identification and perceptions of other income groups are fundamental in shaping tax preferences for three reasons. First, without a doubt, one's objective income group is the primary determinant of her material benefits or losses from the welfare state. However, extensive research in social sciences has established that the connection between class identification and the actual class location is weak at best (Kingston 2000). Middle class remains most individuals' favored self-designation in survey responses. This tendency to misperceive objective income class should play a critical role in determining optimal tax structures. Second, individual perceptions about the affluence of the high-income group affect the expected benefits one hopes to gain from redistribution. Third, most works in political economy assume that citizens are correctly informed about statistical facts to make rational decisions. However, empirical evidence demonstrates that this assumption is surprisingly controversial. In light of this evidence, this article incorporates subjective income group identification's effects on the microfoundations of preferences over progressive taxation.

In exploring the causes of widespread support for progressive taxation, the paper also theoretically investigates why very few people who would be classified as high income think they belong to this group. One of the most enduring findings in political research is that most people consider themselves middle class (Evans and Kelley 2004; Evans, Kelley, and Kolosi 1992). Although this has been a significant empirical regularity recognized by most scholars, much less attention has been devoted to explaining the mechanisms through which this regularity occurs. I show that self-comparison to a reference group that contains disproportionately rich people creates the tendency to see oneself in the middle of the social hierarchy, independent of income level.

The rest of the article consists of four sections. First, I introduce the theoretical groundwork. I propose a model of perceptional income group identification through self-comparison

to an endogenous reference group. Second, I show that this process leads to subjective group identification and beliefs about the affluence levels of other groups. These subjective perceptions affect the link between an individual's income and her attitudes toward progressivity. Finally, I proceed to test these arguments empirically. Using the 2009 Social Inequality International Social Survey Programme (ISSP 2009), I find that individuals who overestimate the income of the rich place themselves in lower-income groups. Also, I find strong evidence that overestimating the income of the rich and underestimating one's position increase demand for progressive tax rates.

INFORMATION, SUBJECTIVE PERCEPTIONS, AND PREFERENCES

Most studies in political science assume that voters are income-maximizing individuals. This assumption has two significant empirical implications. First, individuals with similar income levels should have similar views on redistribution and taxation. If their income levels are identical, the same policy will maximize their benefits. Second, the rich and the poor should have polarized political preferences about the progressivity of the tax system. To maximize their economic self-interest, the rich should oppose purely redistributive welfare policies and a progressive tax code. Instead, they should express support for a flat or a regressive tax schedule. Conversely, the poor should support a progressive tax code (Beramendi and Rehm 2016).

Yet this line of theoretical research has encountered many empirical objections. Surprisingly, the rich and the poor do not necessarily hold polarized levels of support for the progressivity of tax rates. Investigating the respondents who agree with the statement that "people with high incomes should pay a larger/much larger share of their incomes in taxes than those with low incomes" in ISSP (2009), the different groups clearly show little polarization. Over 80% of the respondents in the first income decile express support for a progressive tax schedule, and about 70% of the respondents in the top decile do so. What is surprising is the small difference between the number of individuals who support progressive taxation in the richest and poorest groups. This finding is contradictory to the results of the canonical models of political science which posit that taxation is a constant source of the battle between the rich and the poor across time and policy domains.

One possible explanation is that people care about things other than material self-interest. Several influential contributions to the comparative politics literature have taken up the challenge of amending the utility function of the canonical model of redistribution. In particular, they incorporate another source of utility other than posttax and transfer income in the individual's utility function. These studies posit that

people's decisions, along with material self-interest, are affected by altruism (Dimick, Rueda, and Stegmueller 2016), religion (Stegmueller 2013), beliefs about what is fair (Alesina and Angeletos 2005), group loyalty (Shayo 2009), and distaste for inequality (Lü and Scheve 2016).

Another explanation is that the rich support redistribution when the welfare state benefits them. Moene and Wallerstein (2001) argue that the affluent may be willing to pay higher taxes if the fiscal system is oriented more toward insurance than redistribution. Beramendi and Rehm (2016, 2) contribute to this discussion by pointing out that "by determining who gives and who gains, the design of the tax and transfer system shapes citizens' expected net benefits and mediates the impact of income on preferences for redistribution." Similarly, Rehm, Hacker, and Schlesinger (2012) argue that high-income citizens with high risk support welfare policies. The central insight from these studies is that the policy and risk environment in which voters operate has potent effects in shaping their redistributive preferences.

One thing that both lines of literature have in common is the assumption of perfect information. Much of the existing scholarship on preferences over redistribution takes the notion of perfect information for granted. In these models, individuals are correctly informed about the income distribution, their position in that distribution, and the particulars of the fiscal system.

However, a critical insight emerging from empirical research is that voters substantially vary in how much they know. Gingrich (2014) shows that almost 40% of citizens in Portugal, Ireland, Italy, and Spain choose the "Don't know" option in the Eurobarometer survey when they are asked how much unemployment benefit they would get if they were to be laid off. Other recent evidence establishes that citizens have misperceptions about the level of income inequality (Gimpelson and Treisman 2018), and individuals also err in predicting their positions in the income distribution (Cruces, Perez-Truglia, and Tetaz 2013; Fernández-Albertos and Kuo 2018). In light of these empirical results, it is unrealistic to assume that all citizens can accurately calculate the expected benefits and losses.

In this paper, I introduce a different approach than the utility-function arguments by revisiting the informational assumptions. The disconnect between the informational requirements of theoretical models of the political economy of redistribution and documented voter ignorance has critical empirical implications that merit analytic consideration. When making decisions about tax rates, an individual will draw on her political knowledge, as well as perceptions, to appraise the set of possible policies. Her subjective perceptions might induce behavior that is observationally disparate from the

optimal choice that maximizes material payoff. This is true even if the individual only cares about benefits and losses from welfare policies. For example, a high-income citizen who wishes to maximize her material self-interest and who firmly believes that she belongs to the middle-income class might support progressive taxation, although in reality, under a progressive tax scheme, she might be a net contributor to the welfare system rather than a net beneficiary. Similarly, a high-income individual who identifies with the high-income group might agree to progressive taxation if she believes the other members of that group earn significantly more than she does.

Of course, I am not the first analyst to argue that subjective perceptions that emerge in the absence of information have important consequences for political choice. The mismatch between the informational requirements of democracy and most people's ability to meet these requirements has attracted much attention from political scientists. There has been an ongoing debate about whether democratic processes are destined to turn into a "tyranny of the experts" (Dahl 1967) or whether reasoned choice can be made without full information, through the ability to predict consequences of actions (Lupia and McCubbins 1998). In their seminal work, Lupia and McCubbins (1998) identify the specific conditions under which people with limited information can make reasoned democratic choices. Specifically, recent work in political economy has documented that citizens misperceive inequality levels (Cruces et al. 2013; Fernández-Albertos and Kuo 2018; Gimpelson and Treisman 2018; Kuziemko et al. 2015). However, little theoretical research has been done to identify these perceptions' sources. Why do a significant share of high-income respondents underestimate their rank? Why do the affluent think they belong to the middle class? Does this "identity crisis" affect their preferences over taxation? In the next section, I take on this challenge.

A MODEL OF GROUP IDENTIFICATION AND TAX PREFERENCES

This paper examines whether a model of social comparison, endogenous reference groups, and subjective income group identification, grounded primarily in evidence from social psychology, can help us understand patterns of support for progressive taxation in the absence of perfect information. I now offer a formalization that builds on the canonical Meltzer and Richard (1981) model. Starting with a model of decision-making with informed individuals, I extend the model to include uninformed individuals to highlight the difference between the two cases.

The basic premise of the model is that individuals only care about their material payoff from redistributive policies. There is a finite set of individuals, N, who compose a single nation;

$Y^N = \{y_1, y_2, \ldots y_N\}$ is the set of these individuals' incomes. For simplicity, I assume that there are two income groups: high-income individuals, denoted by H, and low-income individuals, denoted by L. These individuals are referred to as "low income" and "high income," but one should keep in mind that "low income" is a catch-all phrase that includes all those who are not "high income." I further assume an exogenously determined threshold income, y_t, such that individual i belongs to group L if $y_i \leq y_t$, and otherwise belongs to H. Let $\bar{y}_H$ be the average income of the high-income group and $\bar{y}_L$ be that of the low-income group. Additionally α_L is the proportion of low-income individuals and $1 - \alpha_Y$ is the proportion of high-income individuals in the nation.

I begin by supposing that individuals have perfect information on N, Y^N, and y_t. This implies that individuals are informed about the income distribution and the threshold income that separate income groups. Individuals use N, Y^N, and y_t to calculate the average income of the high-income group, $\bar{y}_H$, and the average income of the low-income group, $\bar{y}_L$. This provides a benchmark against which the results can be compared when the imperfect information case is introduced.

Also, there exists a set of possible tax policies $T = T^H \times T^L$, such that $T^H = [0, 1]$ is the set of all possible tax rates that can be chosen for high-income individuals and, similarly, $T^L = [0, 1]$ is the set of all tax rates that can be chosen for low-income individuals. I assume a model of redistribution by two different rates of linear taxation to allow for a progressive system to formulate the individual utility from taxes and transfers (Lü and Scheve 2016). The maximization problem of an individual i is given by:

$$\underset{\tau_L, \tau_H}{\text{maximize}} \ U_i(y_i, \tau_L, \tau_H) = T_i + F - C, \qquad (1)$$

where $T(i)$ is defined as the posttax income of the individual i, F is the amount of transfers, and C denotes the costs of taxation. In particular, I assume that the individual i who belongs to the low-income group—that is, has pretax income $y_i < y_t$—has a posttax income of $T_i = (1 - \tau_L)y_i$.

By the same token, an individual i who belongs to the high-income group has a posttax income of $T_i = (1 - \tau_L)y_t + (1 - \tau_H)(y_i - y_t)$. According to this formalization, high-income individuals only pay the tax rate of τ_H for the part of their income that exceeds the threshold that separates the two income groups. Additionally, F is defined as $F = \alpha_L \tau_L \bar{y}_L + (1 - \alpha_L)[\tau_L y_t + \tau_H(\bar{y}_H - y_t)]$, and C is defined as $C = \sum_{j=L,H} \gamma \tau_j^2$ where $\gamma > 0$.

Given this formulation, individual i's solution to the optimization problem has the following properties. First, low-income individuals always demand progressive taxation.

Additionally, high-income individuals, unless their income is very low compared to others in the high-income group, oppose progressive taxation. In sum, when individuals have perfect information about the income distribution, income groups, and average income levels of different factions, people at the different ends of the income distribution should have polarized views on progressive taxation.[1]

Subjective income-group identification

Now consider an informational variation on the above maximization problem in which the assumption of perfect information about the economic variables in the model is relaxed. An individual may or may not be fully informed about N, Y^N, y_l, $\bar{y}_L$, and $\bar{y}_H$. If the individual is informed, the decision-making process is similar to the case discussed above.

However, the individual might not know the true values of these parameters. After all, there is a great consensus among political scientists about citizens' ignorance in economic and political matters. In the absence of information, an individual uses cognitive devices, informational shortcuts, and personal experience to predict the values of the parameters that are needed to make a decision (Lupia and McCubbins 1998; Tversky and Kahneman 1974). As Lippman (1922, 18) suggests, "The world we have to deal with politically is out of reach, out of sight, out of mind. . . . Gradually he makes for himself a trustworthy picture inside his head of the world beyond his reach." For most people, this trustworthy picture involves a more familiar and simplified version of the real world. For example, when asked about preferences over inequality-reducing policies, an average person would try to think about a small group of individuals to generate the needed information instead of thinking about the national income distribution.

More formally, I posit that if individual i is not informed, she will think about a nonempty set of individuals, N^i, with incomes Y^{N^i} to estimate the income distribution, the threshold income (y_l), and the average income of the income groups ($\bar{y}_H$ and $\bar{y}_L$). One can conceptualize N^i, as the individual's reference group. Here, I do not impose any restrictions on either the composition of the reference group or the income levels associated with the individuals in the reference group. More specifically, the reference group need not be a proper subset of the population or be a group of people with whom the individual has personal ties.

Before specifying the model, it is worthwhile to explain further the lack of constraints on N^i. Most work in economic network effects rests on the assumption that the reference group is exogenous and the same for all individuals in a given

setting. A group of studies assumes that the residents of the local geographical area of the individual constitute the reference group (John, Song, and Gunatilika 2009). Another line of research posits that the reference groups consist of the people whom an individual personally knows and with whom she has daily interactions, such as friends, family members (McBride 2001), or coworkers (Brown et al. 2008). While this formulation can be analytically convenient, social scientists have yet to show why the reference group should consist of only one prespecified group defined by observable characteristics (such as age, race, education level), the frequency of interaction, or geographical proximity. In this paper I do not model, or specify, the psychological process by which reference groups evolve. Rather, the focus is on the individual's process of generating information and that information's impact on social policy preferences given different possible reference groups.

The question is then, of course, is it possible that individuals think about a reference group that is not a proper subset of the national population? Evidence from social psychology shows that the use of heuristics in the absence of perfect information could induce differences between the national population and reference groups. One such example is what Kahneman and Tversky (1972, 430) called the representativeness heuristic, defined as "the action of evaluating the probability of an uncertain event, or a sample, by the degree to which it is similar in essential properties to its parent population." When individuals are not correctly informed about the economy, they might be more inclined to think about a prototypical rich person, instead of judging the probability of the existence of such an individual objectively. This tendency is amplified with the increasing prevalence of social media outlets, where people are systematically subject to information about people they do not personally know.

Research shows that individuals often use information from social media or traditional media outlets to construct perceptions of social reality, including the perception of widespread presence of affluence and the affluent. This claim is backed with evidence from a growing body of research in psychology that concludes that what people see on social network sites or fictional shows affects their reference groups (Haferkamp and Krämer 2011; Hyll and Schneider 2013; Wang et al. 2017) Thus, with the use of heuristics and informational shortcuts, the reference group can include people with whom the individual has close ties or no ties, or even "prototypes" who do not exist at all. As Kahneman, Siovic, and Tversky (1982, 86) put it, "people often err by recognizing a prototypical stimulus that has never been shown."

Let me give a more intuitive example of what a subjective reference group, N^i, is, and how the inclusion of a prototypical

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1. A detailed account of this optimization problem can be found in the appendix.

rich person could affect perceptions of the economy. Imagine that there exists an individual i whose household's yearly income is $70,000 from a country with median income $20,000, with the top 10% earning $70,000 and the lowest 10% earning $5,000 a year. Moreover, assume that in this country the highest-earning CEO makes $500,000 a year. If individual i does not know these economic and political facts, when she is asked about income groups, she will try to recreate the reality in her mind. One possibility is that she will successfully think about a subgroup of the national population that is a representative sample: an individual x with a household income of $5,000, another individual with $10,000, another with $20,000, another with $50,000, and herself. In this case, she will, more or less, have a subjective perception of the economy that is very similar to the objective income distribution.

Let us consider an alternative case. Assume that individual i watches television shows that consistently portray the life of the rich or follow famous millionaires from other countries on social media. These examples are regularly available in her daily life, and these characters represent "what it means to be rich" to her. When prompted to think about inequality and inequality-reducing policies, the subsample of the population she considers to make a reasoned policy choice might disproportionately involve these stereotypes—even when these characters might not even live in her own country or exist at all. As Zaller (1992) argues, the more recently a consideration has been called to mind or thought about, the more likely it is to be retrieved from the memory for use whether or not this choice is rational or not. In this case, let us assume that i's reference group consists of a household that earns $20,000 a year, herself, a national television star who she thinks makes $100,000 a year, and finally, a prototypical CEO who is born out of her imagination. This prototypical figure, in her mind, drives a Ferrari, wears very fancy brands, lives in a big mansion, and earns over $100,000,000 a year. When she uses this reference group to make inferences about the income distribution, she will significantly overestimate the level of inequality. Also, in this case, individual i not only includes stereotypical characters in her reference group but also assigns them an income that might be an exaggeration, given people's inability to deal with large numbers (Guay et al. 2016).

How do people generate predictions on y_i, $\bar{y}_L$, and $\bar{y}_H$ using the subjective reference group? An important line of work in social sciences has established that humans are hardwired with the tendency to compare themselves with others to assess their positions (Festinger 1954; Tajfel and Turner 1986; Turner 1975). Building on this literature, I rely on the concept of perceived distance to characterize individuals' income categorization processes of themselves and other people into income groups (Shayo 2009).

The social comparison involves comparing the distance an individual feels from each income group. An individual will evaluate her distance from the lower- and higher-ranked people in her reference group to gauge her economic position. She will also, mentally, calculate the social distance of other individuals in her reference group to categorize them into different groups. Formally, perceived distances from the high-income and low-income groups are defined as follows.

Perceived distance from the high-income group. The perceived income distance function of individual i from the group of individuals with higher incomes, $S_H : [0, \infty)^N \to \mathbb{R}$, is specified by

$$S_H^i(y_i) = \sum_{j \in N^i} \beta_i \max(y_j - y_i, 0).$$

Perceived distance from the low-income group. The perceived income distance function of individual i from the group of individuals with lower incomes, $S_L^i : [0, \infty)^N \to \mathbb{R}$, is

$$S_L^i(y_i) = \sum_{j \in N^i} \beta_i \max(y_i - y_j, 0).$$

I further assume that each individual j has the same normalized weight in the social distance function, that is, $\beta_i = 1/(|N^i| + 1)$ for all $i \in N$.

Due to this specification, an individual's perceived distance from the high (low) income group depends not only on the cardinality of the set of individuals that she thinks earn more (less) than her but also on her degree of conviction. To substantively depict this mechanism, let us focus on the following example. Imagine the following scenarios in which an individual compares herself to her friends. Let us assume that in the first scenario, the individual cannot afford a quick getaway, whereas her friends have the resources to go to the nearest lake for the weekend. In the second scenario, the individual can afford to go to the lake, whereas her friends can take a cruise tour in the Caribbean. In both cases, the individual should feel poorer than her friends. In a model where only ordinal comparisons matter, the individual's assessment of her position in the income distribution is the same. However, if cardinal considerations matter, the individual should feel a lot poorer or a lot further away from the high-income group in the second scenario.

Let me now begin defining the subjective income-group identification mechanism:

High-income group identification. Individual i identifies with the high-income group if $S_H^i < S_L^i$.

Low-income group identification. Individual i identifies with the low-income group if her perceived distance from the individuals with the higher income is larger than her perceived distance from the individuals with lower incomes, that is, $S_H^i \geq S_L^i$.

Perceived threshold income. Let there be $||N^i||$ individuals in the reference group of the individual, N^i, indexed by $j \in \{1, 2, ... ||N^i||\}$. Individuals are distinguished by their pretax income level, y_j where $y_j \leq y_k$ for $j < k$. The term y_t^i is the income threshold such that for all $y_j > y_t^i$, $S_H^j \leq S_L^j$ and for all $y_j < y_t^i$, $S_L^j \leq S_H^j$.

Before proceeding to examine the theoretical implications, it is necessary to comment on an additional issue. A potential objection to this setup relates to the endogenous formation of tax brackets. In environments where individuals express preferences over a specific tax policy that will be applied to predetermined income brackets, there is no room for confusion and uncertainty about who belongs to which group. However, this model tries to identify who supports tax regimes in which the tax rate increases as the taxable income increases, rather than measuring support for a specific policy. Also, in most cases where tax policy is discussed or preferences of progressive taxes are questioned, whether by politicians, in the media, or by survey questions, the language usually only involves vague terms such as "taxing the rich" or "taxes the high-income group should pay." Thus, in many settings, people do not observe tax brackets directly to make decisions; instead, they form opinions about the tax obligations of not-well-defined income groups, such as "the rich."

The magnitude and the direction of misperceptions

How does the difference between the population and the individual's reference group generate subjective perceptions of the economy? I formulate the difference by introducing the following distance function between the population and the reference group based on an average of distances between the income of their elements. The distance function formalizes the intuition that the content of the reference group matters for the magnitude of distributional misperceptions.

Magnitude of misperceptions. Let $(\mathbb{R}, d)$ be a metric space, where $d(a, b)$ denotes the Euclidean distance between a and b. Let $\mathcal{P}(\mathbb{R})$ denote the collection of all nonempty finite subsets of $\mathbb{R}$. For each $Y^N \in \mathcal{P}(\mathbb{R})$ and $Y^{N^i} \in \mathcal{P}(\mathbb{R})$, define $M(Y^N, Y^{N^i})$ on $\mathcal{P}(\mathbb{R}) \times \mathcal{P}(\mathbb{R})$ to be the function

$$
\begin{aligned}
M(Y^N, Y^{N^i}) = & \frac{1}{|Y^N \cup Y^{N^i}|} \frac{1}{|Y^N|} \sum_{x \in Y^N} \sum_{y \in Y^{N^i} \setminus Y^N} d(x, y) \\
& + \frac{1}{|Y^N \cup Y^{N^i}|} \frac{1}{|Y^{N^i}|} \sum_{x \in Y^N \setminus Y^{N^i}} \sum_{y \in Y^{N^i}} d(x, y).
\end{aligned}
$$

(2)

Mathematically, the magnitude of the misperception function accounts for both ordinal and cardinal differences between the elements of Y^N and Y^{N^i}. An individual's misperceptions will not only depend on how different Y^{N^i} is from Y^N, that is, the dissimilarity of sets, but also on the distance between the different elements of both sets.

Given this formulation, the following proposition summarizes the main findings:

Proposition 1. The misperception function of an individual who lives in a country with the finite set of individuals N and has a reference group N^i, $M(Y^N, Y^{N^i})$, has the following properties:

1. If $N = N^i$ then $M(Y^N, Y^{N^i}) = 0$.
2. For a given $|Y^N \cup Y^{N^i}| = A \in N$, $M(Y^N, Y^{N^i})$ is increasing in $|Y^{N^i} \setminus Y^N|$.
3. $M(Y^N, Y^{N^i})$ increases as $\sup_{a \in Y^{N^i}} \inf_{b \in Y^N} d(a, b)$ increases. (The proof is in the appendix, available online.)

Part 1 of proposition 1 demonstrates that when the population and the reference group are the same, there are no misperceptions. It seems plausible that the cases in which the difference between N and N^i are minimal, the level of misperception is also minimal.

As the dissimilarity between N and N^i increases, the disparity between the state of the world and the perceptions intensifies. There are two types of possible deviations of the set of the incomes of the reference group from those of the population. First, as stated in part 2 of proposition 1, the number of elements that belong to $Y^{N^i} \setminus Y^N$ account for one kind of dissimilarity. As an individual has more individuals in her reference group with different incomes than the ones in the population, the magnitude of misperceptions increases substantially. On the other hand, as formulated in part 3 of proposition 1, the magnitude of misperception also depends on the distance between the different elements of Y^N and Y^{N^i}. As the greatest of all the distances from a point in Y^{N^i} to the closest point in Y^N increases, the divergence between the perceived state of the economy and the actual income distribution becomes more salient.

Proposition 1 shows that the lack of factual information and social comparison do not always lead to substantial misperceptions. This result seems to be consistent with earlier

research, which concluded that people use simpler substitutes for statistical information to arrive at the same conclusions as had they had full information (Lupia and McCubbins 1998). Gigerenzer (2007) calls this ability "the intelligence of the gut feelings," positing that "trusting your gut" can get you out of trouble. However, as parts 2 and 3 of proposition 1 illustrate, the sampling process can also lead to significant misperceptions. As Tversky and Kahneman (1974) argue, although sometimes useful, heuristics and shortcuts can also lead to systematic errors in perceptions and judgments.

Now that the conditions under which self-comparison to an endogenous reference group creates misperceptions are established, let me turn to practical implications of misperceiving. How do misperceptions affect self-placement into subjective income groups?

Proposition 2 For a given N^i and N, let $x \in N^i$ be the element that satisfies $\sup_{a \in Y^N} \inf_{b \in Y^N} d(a, b)$. Then, for all N and N^i, there exists $\omega \in \mathbb{R}$ such that if $x > \omega$, then $S_H^i > S_L^i$. (The proof is in the appendix.)

Proposition 2 establishes that even just one high-income outlier has the potential to render it impossible for an individual to identify with the high-income group. This is a result of the unboundedness of high incomes in the reference group. In comparison with members of the reference group, an individual's income acts as a limit for her distance from those with lower incomes—the most substantial difference could only be in the magnitude of the individual's income. However, comparisons with higher-income individuals do not have any constraints in the same nature.

An important issue to note is that the implausibility of identifying with the high-income group emerges even though the model assigns the same weights, $\beta_i = 1/(|N^i| + 1)$, for self-comparison with those with higher incomes and lower incomes. A considerable body of research has established that individuals suffer more from comparing themselves to those who have more resources (Fehr and Schmidt 1999; Loewenstein, Thompson, and Bazerman 1989). If the model is extended to capture dislike for disadvantageous inequality, an individual is even less likely to identify herself with the high-income group.

Preferences over progressive taxation

Now, let me turn to the policy implications of these misperceptions. Recall that the theory suggests that in the case of imperfect information, the individual relies on the subjective levels of the variables in equation (1) to calculate the optimal levels of τ_L and τ_H: the income threshold (y_t^i), average income

of the high-income group ($\bar{y}_H^i$), average income of the low-income group ($\bar{y}_L^i$). Also, individual i's expected posttax income also depends on her subjective group identification: if i identifies with the low-income group, she thinks her posttax income is $T(i) = (1 - \tau_L)y_i$. However, if i identifies with the high-income group, she assumes her posttax income is $T(i) = (1 - \tau_L)y_t^i + (1 - \tau_H)(y_i - y_t^i)$.

Solving the maximization problem based on the perceived income distribution, the following summarizes the main results:

Proposition 3

1. The optimal progressive tax for an individual who identifies with either income group is increasing in $\bar{y}_H^i$.
2. An individual who identifies with the low-income group demands progressive taxation independent of her income level.
3. An individual who identifies with the high-income group demands a positive, progressive tax if the perceived average income of the high-income group is sufficiently high. (The proof is in the appendix.)

This final proposition raises the issue of whether subjective income group identification, as well as nonfactual beliefs about the income levels of certain groups, maps to redistributive preferences. It might be the case that, although people compare themselves with the superrich, and that comparison affects their self-esteem or subjective well-being negatively, it does not impact fiscal policy demands. Experimental evidence available from multiple studies shows that, indeed, self-comparison and reference groups affect policy demands: when individuals are induced to feel a greater distance from the rich, they increase their support for redistributive policies. Sands and de Kadt (2019) show that randomized exposure to a BMW in South Africa increases an individual's likelihood of signing a petition to demand a wealth tax. Similarly, Condon and Wichowsky (2020) show that experimentally provoking self-comparisons with the wealthy generates concern about inequality and an increase in demand for social policies.

Taken together, propositions 1, 2, and 3 generate three empirical hypotheses:

H1. Individuals are less likely to identify with the high-income group as the perceived income of the high-income group increases.

H2. Subjective income-group rank is negatively correlated with demand for progressive taxation.

H3. The probability of supporting progressive tax policies is increasing in the perceived income of the high-income group.

EMPIRICAL EVIDENCE
Data and methods
The following analysis relies on the 2009 Social Inequality International Social Survey Programme (ISSP 2009), which asks a variety of questions about perceptions of economic inequality, self-placement, and preferences on redistributive policies. The analysis was restricted to countries where information on income allowed the generation of 10 deciles and where the respondents were asked to report gross household income before taxes and other deductions. The sample covers 22 countries and around 8,000 respondents.[2] It thus provides rich individual-level data on perceptions and preferences over welfare policies, as well as all the important control variables. First, I examine the determinants of subjective self-placement. Then I proceed to explore how subjective self-placement and assessments of high-income group's affluence levels affect preferences over progressive taxation.

Testing the impact of subjective-income identification and objective income on redistributive preferences calls for measuring these variables with precision. The measure of income is equivalized gross household income before taxes. I equivalize incomes by dividing household income by the square root of the number of household members. I also restrict the sample to those aged 22–60. Finally, I convert the income variable into 10 deciles to facilitate the comparison of different levels of income across countries.

While there are many ways to model subjective self-identification, I rely on the following "scalometer" question from the ISSP (2009) extensively used by scholars to measure subjective group identification in cross-national settings (Evans and Kelley 2004; Smith 1992): "In our society, there are groups which tend to be towards the top and groups which tend to be towards the bottom. Where would you put yourself now on this scale?" The respondents were asked to choose a rank between 1 and 10. I take the respondents' answers as a proxy for where they think they are located at the income distribution to operationalize a respondent's subjective group identification, self-placement.

To measure an individual's perceived income distance from the high-income group and low-income group, as well as to measure the perceived average income of the high- and low-income groups, I rely on the following two questions from the ISSP (2009). Respondents are asked to estimate how much a chairman of a large national company and an unskilled factory worker earn. These responses are recorded open-endedly. To generate internationally comparable distance measures, I use the following formulation to operationalize Income Distance to a CEO and Income Distance to a Worker variables.

$$\text{Income distance to a CEO} = \log\left(\frac{\text{Estimated CEO pay}}{\text{Respondent's household income}}\right),$$

$$\text{Income distance to a worker} = \log\left(\frac{\text{Estimated worker pay}}{\text{Respondent's household income}}\right).$$

I take the log transformation of the CEO pay to household income ratio and worker pay to household income ratio to reduce the influence of outliers and facilitate easier interpretation. This formulation allows me to use this variable for two of the parameters in the theoretical model: (i) an individual's perceived income distance from the high-income group and (ii) the perceived average income of the high-income group. Observe that an increase in the estimated CEO pay will increase both of these measures. In the text, I use these two interpretations of this variable interchangeably.

I capture demand for progressive taxation using the question, "Do you think people with high incomes should pay a larger share of their income in taxes than those with low incomes, the same share, or a smaller share?" Answers are recorded on a 5-point scale, with endpoints "much larger share" and "much smaller share." I create a binary variable, Progressive Tax, that equals one if a respondent agrees that those with high incomes should pay a much larger share or a larger share of their income in taxes.

To control for the variation in individual-level characteristics, I include respondents' Age, Gender (1 = female), Marital Status (1 = married), Conservative (1 = supports a right wing party), as well as whether the respondent is a college graduate, College (1 = has a college degree). Respondents' employment status is captured by the binary variables for currently being Unemployed (1 = unemployed), or Part-Time Employed (1 = part-time employed). I use a binary variable Union Member that takes the value one if the respondent indicates past or present membership to a union. Following Scheve and Stasavage (2006) and Stegmueller et al. (2011), I also control for Church Attendance (5-point measure, with endpoints 0 = never and 5 = daily). Finally, following Cusack, Iversen, and Rehm (2006) and Iversen and Soskice (2001), I control for skill specificity of respondents to account

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2. Countries included in this sample are Australia, Bulgaria, Cyprus, Denmark, China, Finland, Great Britain, Hungary, Iceland, Israel, Japan, South Korea, New Zealand, Norway, Philippines, Russia, Sweden, Turkey, Taiwan, United States, Venezuela, and South Africa.
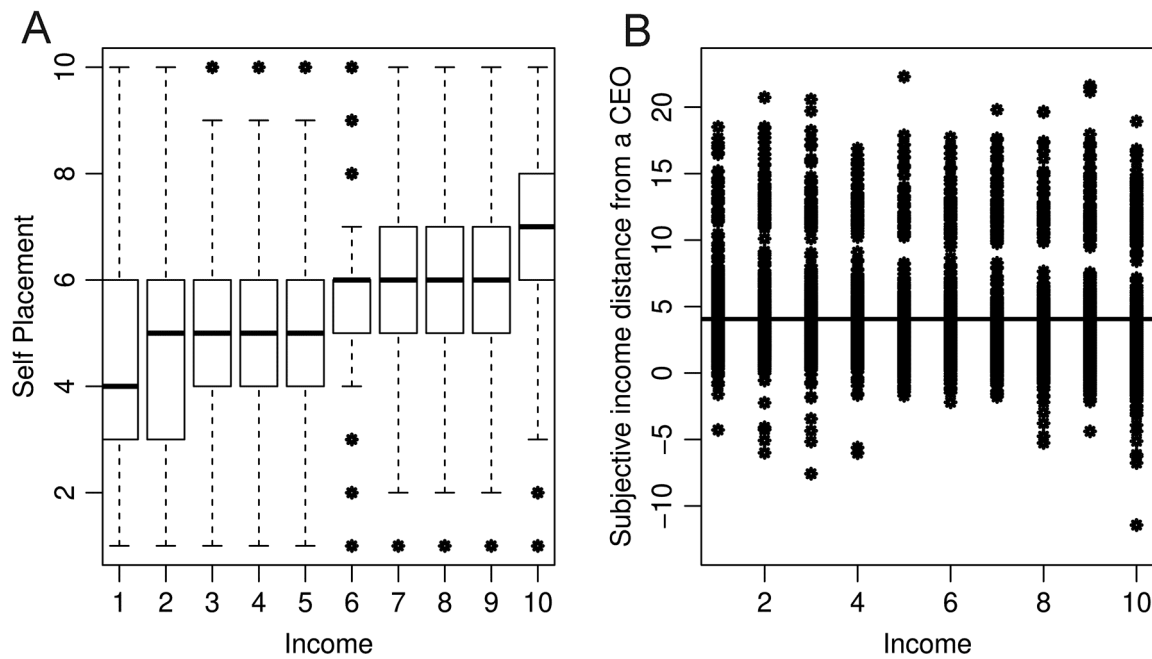
Figure 2. Self-Placement (*A*) and Income Distance to a CEO (*B*) by income decile. The black line shows the logarithmic transformation of highest average CEO-employee compensation ratio in the sample (the USA).

for differences in policy demands of those with different labor market risks.

To examine the empirical implications of the formal model presented in the theory section, I employ a series of semi-parametric generalized additive models (GAMs). GAMs possess important advantages over more traditional estimation methods. The most important advantage is that they allow the researchers to examine the effects of independent variables free of any functional assumptions. This is especially crucial where the theoretical claims warrant nonlinear effects that could not be easily captured by polynomials.[3] In such cases, it is more appropriate to refrain from imposing any linear functional form in the empirical analysis of that theoretical claim.[4]

Following Beck and Jackman (1998) and Keele (2008), I use a semi-parametric GAM:

$$\gamma_i = \alpha + \sum_{j=1}^{k} S_j(x_{i,j}) + \sum_{l=1}^{m} \beta_l(Z_{i,l}) + S_c(\text{country}_i) + \in_i,$$

where γ_i is the value of the dependent variable, α_i is the intercept, k stands for the number of nonparametrically modeled main independent variables, x, that are smoothed by the smoothing function S_j. I assume that control variables have

linear effects, as in the standard regression setup. Following this assumption, m number of control variables is estimated parametrically. The term $S_c(\text{country}_i)$ is the country random effect to account for differences in respondents' political and economic environments. The term ϵ_i is the error term, where $E(\in_i) = 0$ and $\text{var}(\in_i) = \sigma^2$. Following Keele (2008), the preferred parameter selection criterion is generalized cross-validation that automatically selects smoothing parameters.

One major difference between GAMs and more traditional estimation methods is the lack of numerical output. Since the coefficients are not fixed, there is no single point estimate to represent the relationships of interest. Instead, the nonparametric relationships are visualized using graphs.

Results

Before presenting the empirical results, it is interesting to look at Self-Placement and Income Distance to a CEO descriptively. The aim is to establish whether most high-income individuals place themselves in the middle, as well as to investigate the nature of perceptions pertaining to the income distance to a CEO. Figure 2 shows the distribution of Self-Placement and Income Distance to a CEO by objective income deciles of the respondents. Although the analytical scope of figure 2 is limited, it is immediately clear that when asked to place themselves on a 10-point scale, most respondents place themselves between the fourth and the sixth groups. Although self-placement increases with the objective income decile, the magnitude of this increase is not very substantial. The median

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3. For example, proposition 2 posits a nonlinear relationship between the income of the rich and self-identification.

4. All analysis in the paper is replicated in the appendix using OLS and logistic regressions. The choice of the estimation technique does not change the main results.

value of Self-Placement of the respondents below the median household earnings averages around 5, whereas it is 6 for those above the median.

Figure 2 also reveals valuable insights about the subjective perceptions of respondents on the income distance from a CEO. The range of perceived distance ranges from negative five to positive 20. The horizontal line shows the logarithmic transformation of the highest CEO to average worker pay ratio of a company in the United States, the country with the highest overall proportion in the sample. The logarithmic transformation of the highest CEO-employer compensation ratio in the United States is 4.06 (Melin, Zhao, and Perry 2019), whereas the logarithmic transformation of the average CEO-employer compensation ratio is only 2.42 (Duarte 2019). Looking at the distribution of the perceived distances and the actual numbers, it is clear that many people overestimate the distance by a considerable margin. This figure thus shows that some respondents' best guess about the yearly earnings of a CEO is significantly larger than the highest earner's salary in their country. These numbers reveal that some people think about prototypes that do not exist when they are prompted to think about the income levels of the rich.[5]

I begin the empirical analyses by examining the role of perceived income distance to the high-income group in shaping subjective group identification before turning to the role of these perceptions in shaping policy preferences. Recall that hypothesis 1 posits that individuals are less likely to identify with the higher income groups as their perceived income of the top earner's increases. Graph *A* in figure 3 plots the smoothed effect of Income Distance to a CEO on Self-Placement based on estimates from a linear GAM with country random effects. The model includes income, female, church attendance, college, union member, unemployed, part-time employed, married, conservative, skill specificity, and age as parametric controls. It also includes the Income Distance to a Worker variable nonparametrically as an additional control. The figure demonstrates the predicted self-placement of a respondent belonging to the top decile, holding other variables at their median values.

The first finding to note is the nonlinear nature of the curve, making the use of GAMs an appropriate choice for estimation. The curve slopes down steeply when the Income Distance to a CEO = 0, which is the point where a respondent thinks she earns as much as a CEO. After that steep decrease, the increases in the Income Distance to a CEO produce a little change in the self-placement. A respondent who belongs to the top income decile, holding other variables at their median values, places herself higher than the seventh group

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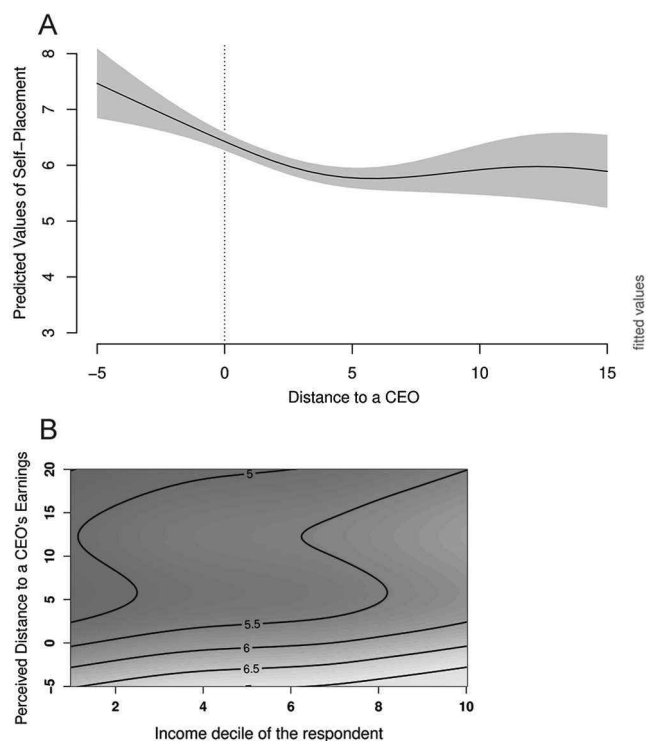5. The appendix contains more detailed information.

Figure 3. Determinants of self-placement based on estimates from a linear GAM with country random effects. The 95% confidence interval is shown as gray band in graph *A*. $N = 8,028$. Color version available as an online enhancement.

when she thinks she earns a lot more than a CEO. However, self-placement falls to lower than 6 when she feels that she is making much less. This empirical finding is consistent with hypothesis 1: an individual is less likely to identify with the high-income group if the perception of the earnings of the rich is very high.

Graph *B* in figure 3 displays the contour plot of the joint effect of objective Income and Income Distance to a CEO on Self-Placement based on the same model. The *x*-axis shows the objective income decile of a respondent, whereas the *y*-axis shows the Income Distance to a CEO, and the contour lines quantify the predicted values of Self-Placement. Dark areas denote the smallest predicted values, and light areas show the higher predicted values. In line with hypothesis 1, an individual's subjective self-placement is the highest when the perceived income of the high-income group is low. Looking at the right side of the figure, respondents who belong to the top decile place themselves in the higher groups, around 7, only when they think they earn more than a typical CEO in their country. As their impression of the income of an average CEO increases, they start underestimating their position significantly.

Moving onto the effects of these perceptions on policy preferences, I turn to logistic GAMs examining hypothesis 2 and hypothesis 3. Figure 4 illustrates smooth functions of
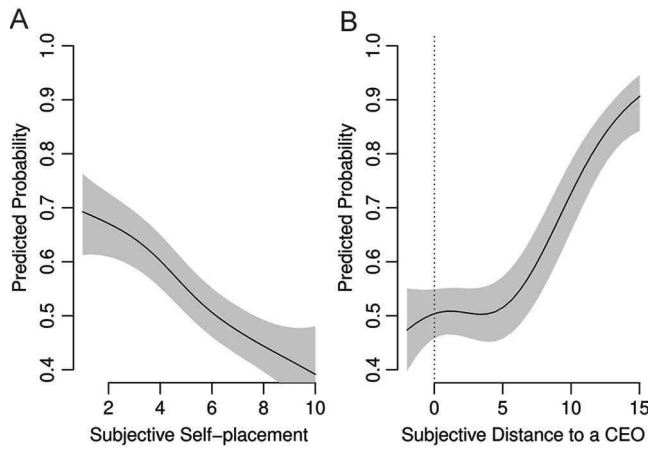
Figure 4. Relationship between subjective self-placement, subjective distance to a CEO, and the probability of supporting progressive taxation based on estimates from a logistic GAM with country random effects. The 95% confidence interval is shown as a gray band. $N = 8,028$.

Self-Placement's and Income Distance to a CEO's effect on the probability of supporting progressive taxation based on estimates from a logistic GAM with country random effects. The model includes income, female, church attendance, college, union member, unemployed, part-time employed, married, skill specificity, conservative, and age as parametric controls. The figure demonstrates that the probability of supporting progressive taxation decreases as Self-Placement increases and increases as Income Distance to a CEO increases.

Figure 5 shows further evidence supporting hypothesis 2 and hypothesis 3. The contour lines quantify the predicted values of probability of supporting progressive taxation. Darker areas denote the smaller predicted probabilities, while lighter areas denote higher predicted probabilities. The patterns are striking and consistent. Graph A in figure 5 plots the effects of income and self-placement on the probability of supporting progressive taxation. The contour plot reveals that Self-Placement is a stronger predictor of supporting progressive taxation than Income. The probability of supporting progressive taxation of a top-decile respondent and a first-decile respondent is very similar if they place themselves in the same subjective income rank. A respondent who is objectively in the tenth income group supports progressive taxation with probability 0.64 if she subjectively places herself in the tenth group on the scale of subjective perception. The probability of supporting progressivity increases to 0.8 if she subjectively places herself in the fifth group. Similarly, a first-decile respondent who places herself in the fifth group supports progressive taxes on those with high incomes with probability 0.82. However, first-decile respondents who place themselves in the first subjective group support progressivity with probability 0.9. Given that most respondents, high and low objective deciles alike, place them-

selves in the middle groups, this graph explains why the poor and the rich are not significantly polarized in their support of progressive policies.

Graph *B* in figure 5 quantifies a similar dynamic, this time using the perceived Income Distance to a CEO. Similarly, the perceived distance to the high-income group significantly impacts demand for progressive taxation. When individuals believe that a typical CEO earns significantly more than them, they fully support progressive taxation, independent of their own income levels. Recall that the average CEO-employee distance for the countries in the sample was 2.42, so the increase in the probability of support for progressive taxation mainly comes from respondents who unrealistically overestimate the earnings of a typical CEO.

Graph *C* in figure 5 summarizes these two results. As expected, the level of support for progressive taxation is the
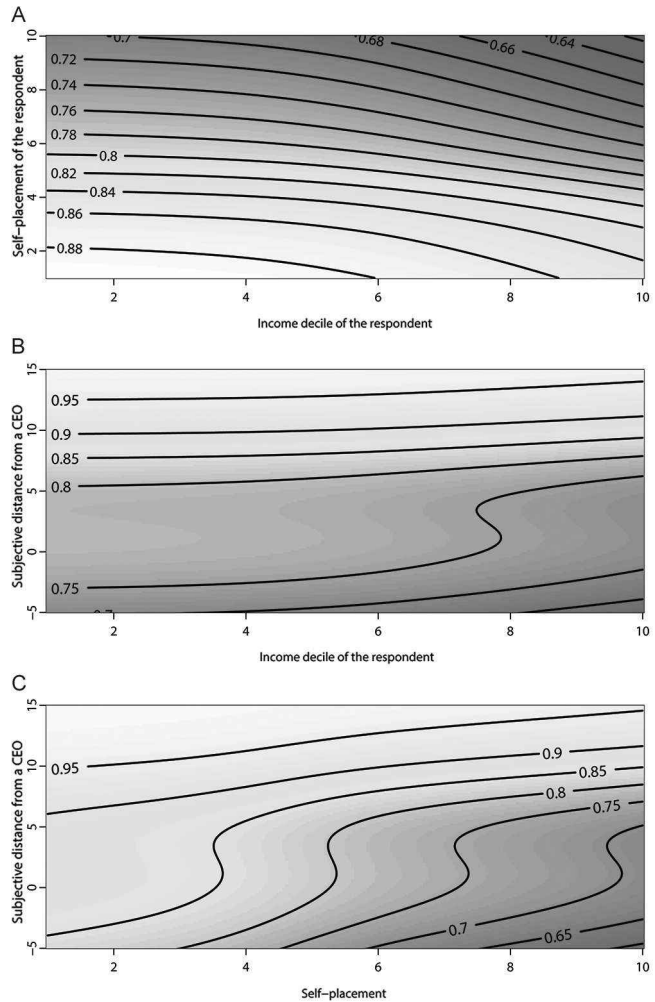

Figure 5. The effects of objective and subjective self-placement (*A*), objective self-placement and subjective distance to a CEO (*B*), and subjective self placement and distance to a CEO (*C*) on the predicted probability of supporting progressive taxation, based on estimates from a logistic GAM with country random effects. $N = 8,028$. Color version available as an online enhancement.

highest, 0.95, in the upper left corner where subjective income distance from a CEO is the highest, and the self-placement is the lowest. Respondents who identify with the lower groups and overestimate the earnings of a CEO demand progressive taxation. As we move to the lower right corner, that is, as the respondent's self-placement is high, but the perceived income distance to a CEO is small, the probability of agreeing to progressive tax is the lowest: around 0.6. When respondents place themselves in high-income groups and think that they are earning as much as a typical CEO, they are less likely to support progressivity. The most striking result perhaps relates to the individuals who place themselves in high groups but still believe they earn significantly less than a CEO. In line with the prediction of proposition 3.3 which posits that an individual who identifies with the higher-income group still prefers a progressive tax rate if she believes that the other members of the high-income group are substantially richer than her, this figure shows that the predicted probability of supporting progressive taxation of an individual who places herself in the top income group is substantially high, 0.95, when that individual unrealistically overestimates a typical CEO's earnings.

Overall, these results indicate strong support for hypothesis 1, hypothesis 2, and hypothesis 3. Individuals are less likely to identify with the high-income group as the perceived income of the high-income earners' increases. The analysis also shows that subjective income-group identification is negatively correlated with the demand for progressive taxation, and the demand for a progressive tax schedule is increasing in the perceived income of the high-income group. The results are mainly driven by those who significantly overestimate the affluence levels of the rich. Given that many individuals place themselves in the middle-income groups, these results explain why only a few people, low and high income alike, oppose progressive taxation.

CONCLUSION

I began this article by showing that the rich and the poor do not hold significantly different views on progressive taxation: a high proportion of individuals from each income class agree that the tax schedules should be progressive. To explain this similarity, I have argued that subjective income group identification and perceptions about the high-income class's earnings are key ingredients for understanding the microfoundations of preferences over progressivity, because they shape what people believe they will pay for and get from the welfare state.

This article challenged the core assumption of standard models of redistributive preferences by bridging two disconnected literatures: one on political behavior under conditions of imperfect information and another on preferences for redistribution. Inconsistent empirical accounts of the relationship between income and the demand for redistribution can be explained, I showed, by a cognitive framework in which individuals make subjective predictions about benefits and losses from redistributive policies. An individual's own income contributes to her level of demand for redistribution. However, her perceptions of how she ranks economically within the population also matter significantly for redistributive preferences. To understand how subjective rank is generated, I developed an argument about how people use heuristics and social comparison to estimate these in the absence of factual information. The use of social comparison with an endogenous reference group causes misperceptions that weaken the link between income and redistributive demands.

Perhaps one of the most interesting findings of this paper is that the well-known "middle-income bias" found in public opinion surveys can be systematically explained. When individuals compare themselves either to the superrich or the superpoor, they tend to infer that they are situated around the middle of the income ladder. This, of course, has severe effects on their political preferences.

Another important finding is that the design of widely used survey questions might induce measurement error. In the literature on redistribution, most of the questions used in constructing dependent variables contain concepts such as "high-income" individuals. If respondents have a different understanding of the high-income group's composition, such questions will fail to measure attitudes toward redistribution uniformly across individuals. Hence, incorporating informational assumptions into research on redistributive politics is not only relevant and important theoretically. It also has critical empirical implications that call for revising currently popular survey methodologies and measurement tools.

The theory developed in this article has important implications not only for the rich's preferences over the structure of taxation but also on its level. My findings suggest that a vast majority of individuals identify as "low-" or "middle-income" even if they are not. In addition, subjective identification matters in shaping tax preferences. Taken together, these analyses point to a discussion about how people assess tax rates that are imposed on their household's income. The results in this paper suggest that those who identify with the lower groups should find the tax burden on themselves extremely "high," given that they believe they are not "rich" at all. This implication is consistent with significant and unintuitive empirical findings in the political economy of redistribution literature. First, Roosma, Van Oorschot, and Gelissen (2016) show that high-income individuals think that the middle-income class is overburdened with taxation. Second, scholars have consistently found that individuals

prefer high progressivity—that is, want more redistribution—while opposing high tax rates—that is, oppose redistribution (Barnes 2015; Roosma et al. 2016). These accounts argue that the mismatch between the preferences over the size and the structure of tax policies might be shaped by distrust in governments' ability to use taxpayer dollars efficiently. This article's findings offer an alternative and informational explanation. Future research should take additional steps in investigating whether the provision of information corrects conflicting asymmetries in preferences over tax policies, as well as examining whether information changes the high-income group's assessment of the tax burden on middle-income citizens.

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