# Tax Decentralization, Preferences for Redistribution, and Regional Identities

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June 2024

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**Abstract**

This paper provides novel evidence on the impact of tax decentralization on citizens' preferences for redistribution. The study leverages results from a large-scale survey experiment implemented in Spain. The experimental design is based on an information treatment which explains the normative power of regional governments in personal income taxation, a feature mostly unknown at baseline. First-stage results show that the treatment increases the salience of this characteristic by 40 percentage points. The treatment increases respondents' aversion against inequality but decreases their support for higher taxes on the rich. Both results are explained by the identities of respondents. The effect on inequality is driven by individuals with a stronger regional than national identity, while the rejection of higher taxes on the rich is driven by participants which identify more with the nation than the region. Heterogeneous effects on trust in central or regional governments confirm this pattern. These results shed light on the role of identity in shaping preferences for redistribution and provide novel evidence that redistributive policies work as a local public good when local attachment of citizens is large.

**Keywords:** Preferences for redistribution; taxation; survey experiment; fiscal federalism; decentralization

**JEL Codes:** H22, H26, D83, D31, C9

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I gratefully acknowledge helpful comments received from Francesc Amat, Johannes Becker, Sebastian Blesse, Guillermo Cruces, Eckhard Janeba, Daniel Montolio, Andreas Peichl, Guillem Riambau, Melanie Revilla, Pilar Sorribas, Stefanie Stantcheva, Dominik Sachs, David Agrawal, Sandra Sequeira, and Ole-Andreas Elvik Naess. I also thank participants at the RIDGE Workshop on Public Economics, CesIfo Venice Summer Institute, World Bank Tax Conference, the PUC Rio Applied Micro Seminar, University of Lucerne, Universidad de Granada, Universidad Complutense de Madrid, Università della Svizzera Italiana, INSPER São Paulo, and ZEW Mannheim for comments and discussion. This research is funded by the Social Observatory of the "la Caixa" Foundation. I thank Aidan Parker for excellent research assistance. Universitat de Barcelona IRB approval IRB00003099 (14/11/2019).

# 1. Introduction

The redistribution of income through progressive tax and transfer systems is a crucial policy tool to combat the unequal distribution of market income. Economists conventionally argue that this function should be attributed to the central government, as decentralization of the redistribution function is associated with efficiency costs, mostly due to mobility of tax payers across jurisdictions (Musgrave, 1959). However, decentralization can allow local governments to tailor redistributive policies to better match the specific needs and preferences of their communities (Oates, 1972). When taxpayers perceive that policies are designed to address local inequalities, they may be more accepting. This could be particularly important in countries with stronger identities at sub-national levels, as shared culture is an important determinant of preferences for redistribution (Luttmer and Singhal, 2011; Fong and Luttmer, 2011). In recent decades, several countries have granted subnational jurisdictions some autonomy over personal income taxation. Although this approach may have some efficiency costs, it brings revenue collection closer to citizens and may affect their preferences for redistributional policies, as it occurs among more proximate citizens (Pauly, 1973). So far, there is no empirical evidence on the causal link between fiscal decentralization and the demand of citizens for income redistribution.

This paper aims to address this gap by incorporating fiscal decentralization into the growing body of literature on the determinants of preferences for redistribution. (see Mengel and Weidenholzer, 2022, for a survey). To identify the effect of decentralization on individuals' preferences is challenging, as decentralization reforms do not occur randomly and often affect all sub-national jurisdictions simultaneously.

This study is the first to provide experimental evidence on how citizens' views about inequality and tax progressivity depend on the allocation of the redistribution function between layers of government. To achieve this goal, the study leverages results from a large-scale survey experiment with a pre-post information treatment (see Haaland, Roth, and Wohlfart, 2022; Stantcheva, 2023, for the methodological approach and implementation). The identification strategy is based on the specific institutional feature of decentralized progressive income taxation in Spain: Half of the tax base is taxed by regional governments, and treated participants are informed about this feature. The institutional design provides an ideal setting for this experiment, as the regional impact on personal taxation is substantial, but generally not very salient to citizens at baseline (López-Laborda, Rodrigo, and Sanz-Arcega, 2020). Before the information treatment, only 10% of the participants were aware of the autonomy which regions in Spain enjoy in tax setting. The experimental setting then generates random variation of the information that respondents have about this feature. The information treatment shows strong first stage effects and increases the salience of this institutional feature by 40 percentage points. The paper

then estimates treatment effects on several outcomes. The results indicate that treatment increases the probability that respondents regard inequality as a serious or very serious problem by 4.3 percentage points. Heterogeneous effects show that this increase is driven by participants who identify strongly with their region of residence or feel similar about belonging to the nation and region, while treatment does not have an impact on those who identify more strongly with the nation. Results also convey that the treatment has an effect on how people think about tax progressivity. Treatment reduces the probability that individuals believe that taxes on the rich are too low by 5 percentage points. Heterogeneity here indicates that this result is driven by respondents with stronger national identities, likely due to efficiency concerns triggered by the treatment.

To analyze tax decentralization in a systematic way is novel, and relates directly to the classic trade-off discussed by (Musgrave, 1959; Oates, 1972): while decentralized taxation allows to account for heterogeneity in preferences across sub-nation jurisdictions, centralized taxation might be more efficient, in particular if tax bases are mobile.[1] The heterogeneity of the treatment effect is helpfully to understand the underlying mechanism. Pauly (1973) argues that redistribution can be considered a local public good if utility of a resident in one region depends on the utility of other individuals around. Under decentralized taxation, citizens which identify strongly with their region of residence might become more averse towards inequality if redistribution happens among more proximate peers, as long as citizens with similar identities cluster within sub-national units.

However, tax decentralization can have a negative impact on those who belong to the national identity group. For example, individuals might perceive that resources are directed to the regional level instead of providing more revenues for the central government, with which they identify stronger than their region of residence. Internal migration is a relevant factor here, as individuals might identify less with their region of residence if they originate from a different part of the country. Another explanation is that individuals perceive the potential efficiency costs to be greater than the gains from decentralization. The empirical analysis disentangles these effects through a careful analysis of heterogeneity. Investigating this phenomenon in Spain is particularly interesting due to the substantial degree of regional identities in the country.[2] Combining this feature with the other institutional elements mentioned above offers a unique environment to analyze the relationship between decentralized taxation and preferences for redistribution, and allows to establish simultaneously a link with regional identities, political trust, and

[1] Recent empirical findings show, however, that mobility responses across regions are moderate (see Agrawal and Foremny, 2019, for evidence from Spain), and estimates of the elasticity of taxable income across countries (Rubolino and Waldenström, 2019) do not systematically indicate larger responses in countries with decentralized tax systems.

[2] Figure A1 in the appendix illustrates this across European countries, with Spain belonging to the group of countries with strong sub-national identities.

internal migration patterns.

The paper hence contributes to the literature on the impact of identities and ethnic composition of the population on preferences. Luttmer and Singhal (2011) and Fong and Luttmer (2011) document the role of shared culture in shaping preferences for redistribution. Empirical evidence suggests that people tend to be more generous toward those who share their ethnic, linguistic, cultural, religious, and national backgrounds (Alesina and Stantcheva, 2020; Alesina and Giuliano, 2011; Stichnoth and Van der Straeten, 2013). However, most previous work has focused on diversity generated by immigration of foreigners. Bonomi, Gennaioli, and Tabellini (2021) provide a formal approach to link group identities with the demand for redistribution. Alesina, Miano, and Stantcheva (2022) conduct a large-scale survey experiment across various countries, and show that citizens have large misperceptions about migration, which in turn influence their support for redistribution. Other studies (e.g. Dahlberg, Edmark, and Lundqvist, 2012) use quasi-experimental variation to identify the effect of increasing diversity through immigration on natives preferences. To the best of my knowledge, no experimental evidence exists on the effect of group identities arising from sources other than immigration on preferences, and this study aims to contribute to the literature by examining identities within the existing population of a country across sub-national jurisdictions.

The study also contributes to the growing literature using information provision treatments (see Haaland, Roth, and Wohlfart, 2022, for an overview) to identify determinants of citizens' preferences for redistribution in survey experiments (see Stantcheva, 2023, on survey experiments and their design). Seminal work by Cruces, Perez-Truglia, and Tetaz (2013) documents the role of a biased perceptions of the own position in the income distribution. The authors provide this information as treatment to participants and document that those who have overestimated their relative position tend to demand more redistribution. This finding is confirmed by and Karadja, Mollerstrom, and Seim (2017), which shows that individuals who are richer than they initially thought demand less redistribution. In contrast, recent evidence by Hoy and Mager (2021) shows that individuals who are told to be ranked lower in the distribution than previously believed are less concerned about inequality and less supportive of redistribution. In addition to inequality, the literature has also focused on income mobility. Alesina, Stantcheva, and Teso (2018) show survey participants pessimistic information about social mobility, which increases support for redistribution relative to the control group. Stantcheva (2021) shows in a recent article that the way individuals reason economic policy has an important impact on the preferences of citizens for redistributive policies. By providing various information treatments on tax efficiency and equity, the study shows that equity related information increases support for more progressive income and estate taxes.

The paper is organized as follows. The next section introduces the survey and treatments. Section 3 documents regional identities in Spain, and explains how this will be

measured in the empirical analysis. Section 4 discusses the salience of tax decentralization, and the corresponding first stage effects of the treatment, before Section 5 presents results. The last section concludes.

# 2. The Survey and Experiment

## 2.1. Conceptual Framework

The approach of Pauly (1973) is adopted to formalize the interaction between preferences for redistribution, fiscal decentralization, and identities. Suppose that utility of an individual $i$ of type $T = R, N$ depends on their own income $y_i$, as well as the incomes of other individuals $j$ and $k$ of the same or different jurisdictions: $U_i^T = U(y_i; y_j, d_{ij}; y_k, d_{ik})$.

Here, the parameter $d$ measures the distance between individual $i$ and others in the economy. This distance may not necessarily have a spatial dimension, but rather may reflect cultural proximity. The only modification from the original definition of Pauly (1973) is that individuals belong to different jurisdictions, where $j$ is located in the same jurisdiction as $i$ and $k$ is located in a different jurisdiction.

To illustrate the impact of decentralization on preferences, consider two types of individuals: those with strong regional ties ($R$) and those with strong ties to the nation ($N$). Individuals of type $R$ are more concerned about proximate individuals, i.e., $d_{ij} > d_{ik}$, while type $N$ individuals can have positive parameters $d$, but not necessarily any systematic difference between $j$ and $k$.

Altruistic individuals with $d > 0$ derive positive utility from the income of others, and this effect is stronger the larger the value of $d$. Redistribution of income towards $j$ and $k$ increases their utility. Under decentralized redistribution, income can be distributed to a subset of all individuals. This means that it becomes more likely for type $R$ individuals to see larger income shares distributed to those with a large value of $d$, i.e., residents of their own jurisdiction. For type $N$ individuals, however, the probability decreases.

**Prediction:** *Fiscal decentralization will increase (decrease) support for redistribution for individuals with relatively strong (weak) links to other citizens within their sub-national unit.*

This stylized framework illustrates the main predictions of this paper. Tax decentralization will increase support for redistribution among individuals with strong regional ties, who are more closely connected to others within their sub-national unit, while decreasing support for redistribution among individuals with strong national ties, who are less closely connected to others within their sub-national unit. The following sections describe in detail the empirical implementation.

## 2.2. Data Collection and Sample

This paper is based on a large-scale survey conducted between December 2019 and January 2020.[3] 6000 individuals in all Autonomous Communities except Navarre and the Basque Country[4] between the ages of 25 and 70 have been surveyed. The age restrictions were selected to focus on the working age population, which likely pays income taxes. In this study, I use a sub-sample of 3000 respondents, which received either no information (control) or only the information on tax decentralization (treatment).[5] The sample has been designed by including gender, age, and region quotas crossed with treatment status, i.e., the sample is representative for Spain along those dimensions. The survey was internet-based and carried out by a professional survey company, which provided the questions to panel providers and collected the responses.

Data collection follows recent standards in the literature to ensure high quality responses. The survey was only submitted if the panelist spent at least 5 minutes on answering all questions. Observations which took more than an hour to complete the survey are eliminated from the baseline sample, but results are robust to including them. The average participant spent around 19 minutes to complete the questionnaire.[6] During the survey, two questions asked participants to select one specific word out of a list of four alternatives to drop careless answers from the sample. Furthermore, the method proposed by Meade and Craig (2012) is included in the survey design as previously in Alesina, Miano, and Stantcheva (2022). Before turning to the experimental part of the survey, participants are asked if they have paid careful attention and if they believe that their responses should be included in the study. They are informed that their answer will not have any consequence on their reward. The aim of this question is to raise respondents' awareness of the importance of their attention in the subsequent part of the survey. Although its purpose is fulfilled regardless of whether their answer was honest (Meade and Craig, 2012), 35 observations are discarded from the sample that state that previous responses were not truthful. Furthermore, another 31 observations which have missing values for one of the variables used in the study are deleted. The final sample includes 2812 observations (1,415 treated and 1,397 control).[7]

[3] Panel (a) of Figure A2 in the appendix shows the distribution of the dates when respondents took the survey. This period has been chosen because (1) the last liquidation of the 2018 tax took place right before and (2) in order to not interfere with national elections which were held in early November.

[4] these two regions have a special fiscal status which does not allow comparison with the other regions.

[5] The survey includes two different experiments, and for the purpose of this paper the estimations exclude all observations subject to the second experiment documented in a companion paper.

[6] Panel (b) of Figure A2 in the appendix shows the distribution of the duration.

[7] Table A2 in the appendix documents that results remain unchanged when using the full sample.

## 2.3. The Survey

At the beginning of the survey, participants were informed about the purpose of this study. To guarantee unbiased responses the identity of the people and institutions involved was not revealed, and participants were told that the study was being conducted by a leading public research institution in Europe. Following Alesina, Miano, and Stantcheva (2022), the survey landing page informs respondents that "*it is of great importance for the success of our research that you read the questions very carefully and respond as honestly as possible"* and that with their participation they "*will contribute to our knowledge as a society, independent of your political views. The purpose of this study is solely academic, and our results are intended to improve policy formulation and the welfare of society as a whole*". After the introduction, several questions collect basic information (demographics, residence, occupation and education). This block is used as screening questions to ensure representativeness of the sample.

All questions were phrased in a neutral way. Appendix B includes the full translated survey. The structure can be summarized as follows.

1. *Socio-economic background:* This block collects some basic information such as gender, age, marital status, children, education, occupation, fiscal residence of participants. The survey also collects information on income with questions relating to their 2018 gross income, as well as further details about their tax payments.

2. *Identity and politics:* This block asks participants how often they feel like they belong to their region of residence, being Spanish, and European. These questions are later used to classify individuals along the identity spectrum. Individuals are also asked about their political orientation, participation in recent elections (regional and central), trust in government, reasons for being rich or poor, and tax evasion. These questions help to benchmark results and analyze heterogeneous effects based on how important participants consider belonging to a specific region and ethnicity.

3. *Income and prior on tax policy:*
   To measure the baseline information respondents have about the level of government that taxes their income, the survey asks participants what percentage of their tax base was taxed with rates decided by the central government. The correct answer here is 50 percent. The survey made clear that exact answers are not needed and that individuals should provide their best guess about all numbers.[8]

4. *Treatment:*

[8]For the alternative experiment not used in this paper, participants are also asked about their prior on average and marginal tax rates. As the control group serves for both studies, this question is included for all participants.

Treated individuals in this study see at this stage the information treatment as described in Section 2.4

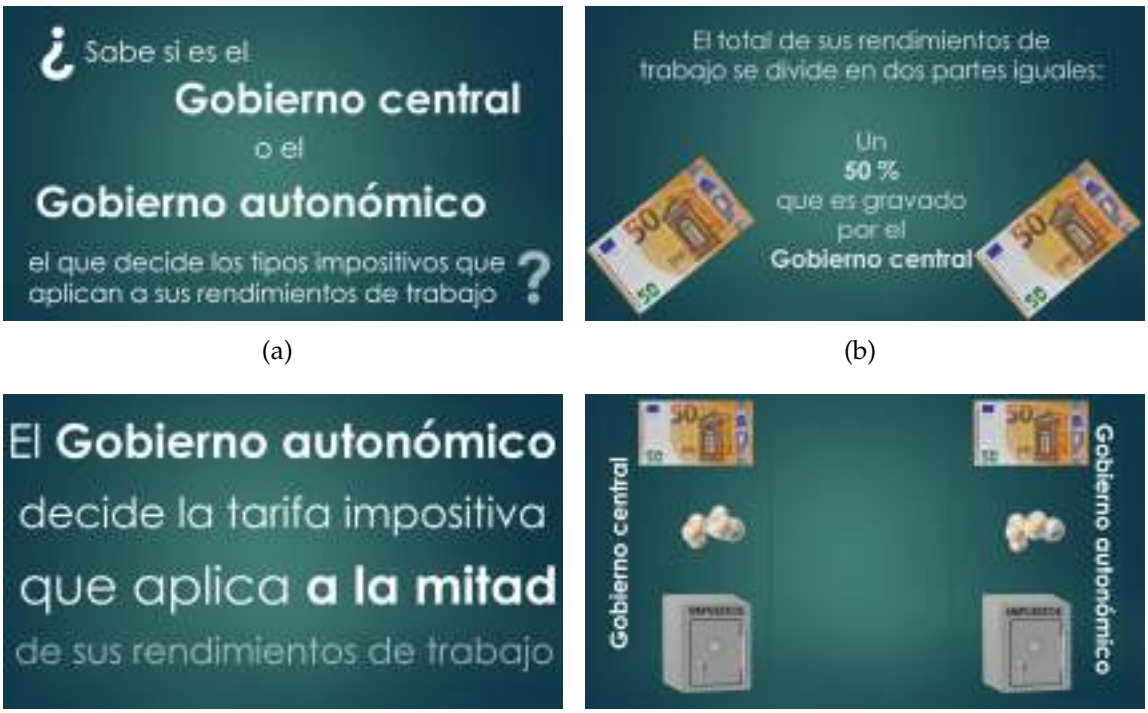
5. *First stage effects of the treatment:*
   To measure the effectiveness of the treatment, a slightly modified questions from the pre-treatment block is repeated. To avoid asking exactly the same question, the survey uses mechanically related questions. Instead of asking about the share taxed by the central government, after treatment the question is focused on the share taxed by the regional government.

6. *Outcomes:*
   Outcomes on preferred progressivity, panelists opinion about the level of taxes for the rich and the poor, as well as informality, tax evasion, and internal migration to save on taxes. See Section 2.5 for details.

7. *Migration:*
   At the end of the questionnaire participants are asked to indicate their and their parents region of birth. If they are not born in Spain, they can state the country of birth.

## 2.4. Information Treatment on the Impact of Regions

The randomly chosen respondents in the treatment group are exposed to a short animation that explains how the tax base is shared between the central and regional government, the autonomy regional governments have in setting tax rates, and how revenues can be used. Figure 1 shows the most important screens in this animation. The video starts by asking participants if "*they know if it is the central government or the regional government which decides the tax rates on your labor income?*" (see panel (a), in Spanish). The second screen, panel (b) of Figure 1 states that the total labor income tax base is divided into two equally sized parts. The animation shows the split of 100 Euros, one 50 Euro bill moves to the left, the other to the right. The video explains that 50% belongs to the central government, the other 50% to the regional government. The next screen in panel (c) repeats this information: "*The regional government decides the tax schedule which applies to half of your labor income*". The next screen shows an animation of how taxes (*impuestos*) out of their respective parts are received by regional and central treasury. The animation finishes by saying that this procedure allows the regions to decide what percentage rich and poor people should pay out of their income, to change tax rates to make taxes more progressive to achieve a more equitable income distribution, and to use the revenues to provide public goods such as education and health. The total duration of the video is 38 seconds.




(a) (b)

(c) (d)

Figure 1: *Screenshots of the Treatment Animation*

Notes: Screenshots of the video animation explaining the role and taxation power of regional governments. The total duration is 38 seconds. The full video can be seen at www.foremny.eu.

## 2.5. Outcomes

After treatment, various questions are used to elicit different dimensions of participants' preferences for redistribution.

First, to measure preferences over progressivity, respondents are asked to set marginal tax rates on income earned by four different individuals in the income distribution. The four individuals are identical other than the fact that they have very different levels of income. The poorest individual earns 10,000 Euros per year (833 Euros per month) while the richest earns 180,000 Euros per year (15,000 Euros per month). The sum of taxes collected must match the true overall amount of tax collection if the real tax system were applied, but the distribution is decided by the panelists. Using sliders, respondents have to indicate the marginal tax rate for each of the four cases, i.e. they are asked for the amount of tax on an extra 100 Euros of income. From this, a variable is calculated which groups the two individuals at the bottom and at the top to analyze the share of taxes collected from high incomes relative to the total amount. This block on progressivity also includes two direct questions about the participant's opinion about the tax system. On a five-level scale, participants have to evaluate if taxes for those with low (high) incomes in Spain are currently too low or too high.

In accordance with questions used in other surveys, such as the European Value Sur-

vey, inequality aversion is elicited by asking participants if they consider differences in income between the rich and poor to be problematic. Respondents can choose from five different answers, ranging from "*inequality is not a problem*" to "*inequality is a very serious problem*".

To measure preferences for the size of the public sector, the survey includes a question on the trade-off between public good provision and taxes. With a slider, all respondents have to indicate their position on a scale from 0 to 10 between supporting "better public services and social benefits with higher taxes" and "lower taxes and fewer public services and social benefits".

Furthermore, the survey includes a question related to tax evasion and tax avoidance. A statement is presented that "some people believe that it is important to be honest when it comes to declaring income and that tax evasion and avoidance are intolerable. Others believe that it is not wrong to evade or avoid some taxes because the government is probably corrupt and not likely to use the money for the right purpose" and participants are asked to position themselves between those two extremes on a scale from 0 to 10.

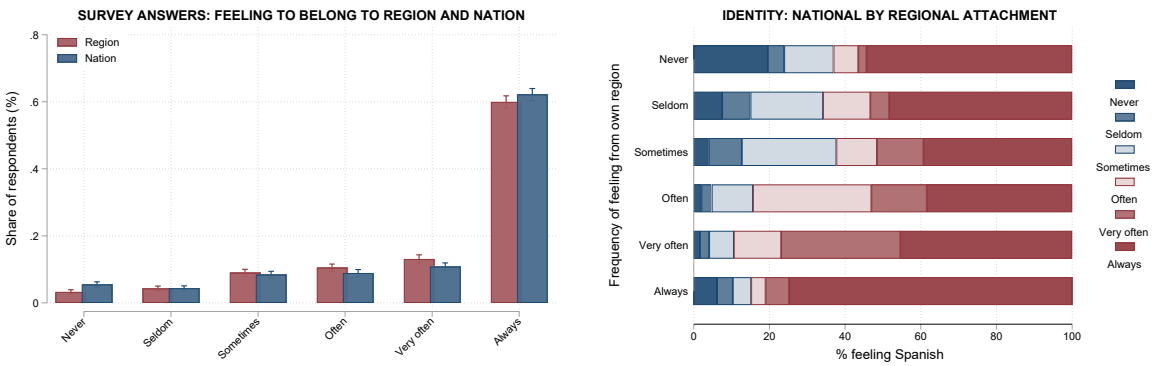
Regarding mobility, respondents are asked about their willingness to move across regions to avoid parts of the personal income tax. Participants are asked to think about another Autonomous Community, otherwise similar to the Autonomous Community in which they reside, which offers a tax cut on the overall tax bill if they take up residence there. Assuming that all other circumstances (work, housing, etc.) remain the same, respondents are asked to indicate if they would move, and if yes, whether this requires a 10%, 25%, 50%, 75%, 90%, or 100% tax cut.

## 3. Measuring Identities

An important aspect of this paper is the measurement of respondents' identities. This information is necessary in the empirical section to estimate heterogeneous treatment effects, as fiscal decentralization is expected to have opposite effects for those who identify more with their region and those who identify more with the nation. Therefore, it is crucial to develop an indicator along this dimension, and the survey includes questions capable of eliciting respondents' identity. Participants are asked to indicate the frequency with which they feel a sense of belonging to their region of residence or to the Spanish nation on a scale of 1 ("*never*") to 6 ("*always*") for both dimensions.

The distribution of responses to both questions is shown in Figure 2(a). On average, a large majority of respondents report always feeling a sense of regional identity (60%) and/or national identity (62.2%). However, regional identities are slightly more concentrated in the middle range of the scale than at the extremes.

The correlation between the two dimensions is relatively low (0.28), suggesting that

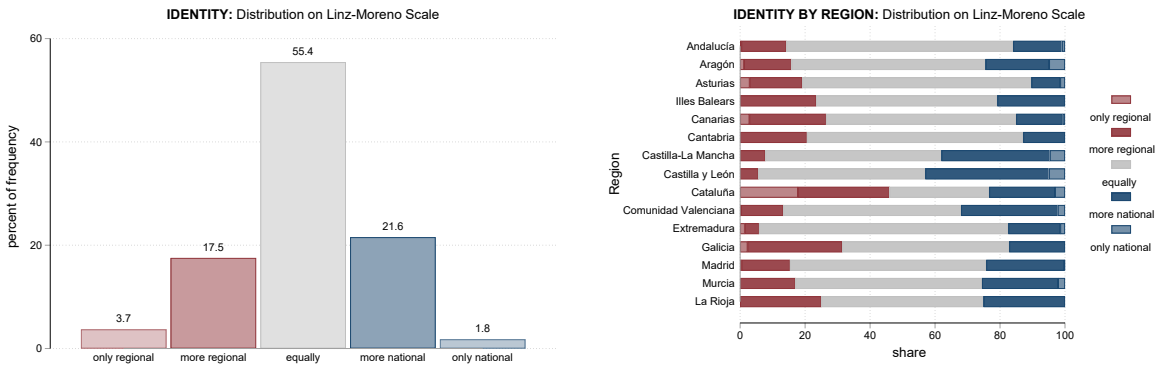



(a) Distribution of Answers (b) Cross Distribution between both Questions

Figure 2: *National and Regional Identity*

Notes: Panel (a) shows the distribution across the six potential answers to questions about feeling regional and national. Panel (b) shows the distribution of feeling national within the six levels of regional attachment.

respondents are likely to choose different responses for the two dimensions. Figure 2(b) illustrates this further. Each bar indicates the share of people across the national spectrum for each possible outcome of regional attachment. The largest overlap occurs between those who indicate "Always" for both questions, but the variation in the intermediate category confirms that a substantial share (44.5%) of all respondents allocate themselves into different categories across the two dimensions.[9]




(a) (b) Distribution across Regions

Figure 3: *Linz-Moreno Categories*

Notes: Panel (a) shows the answers to feeling from the region of residence and on the feeling Spanish across the five possible answers. Panel (b) shows bars for the levels of regional attachment, and illustrates the distribution of feeling Spanish within each category.

To summarize this information into a single indicator, the standard measure used in political science, known as the Linz-Moreno question (Linz et al., 1981; Moreno, 1995), is followed. Despite some criticism (Guinjoan and Rodon, 2015; Sinnott, 2006), this question

[9] Figure A3 in the appendix shows the flow between the two different categories and confirms variation across the regional-national dimension, which will be used to classify respondents' identity.

is utilized as the state-of-the-art measure of identities. The Linz-Moreno question asks individuals to position themselves along a five-category scale, ranging from feeling "only regional" to "only national."

A similar five-category scale is employed to classify individuals based on the information gathered from the questions above. Results are displayed in Figure 3(a). Respondents who report never feeling Spanish but always feeling a sense of regional identity are classified as "only regional" (3.7% of the sample), while those with a stronger attachment to their region than to the nation are classified as "more regional" (17.5%). The majority of respondents (55.4%) feel equally attached to both layers of government. On the other side of the spectrum, 21.6% are classified as those with stronger national identities, and 1.8% as those with a national identity only.

The distribution of identity categories shows significant regional variation. Figure 3(b) displays the distribution across regions. Notably, Catalonia has the highest proportion of individuals (17.8%) identifying solely with their region. The data indicates that across Autonomous Communities, individuals identifying more strongly with their region than with the nation varies between 5.6% (Castilla y Leon) and 46% (Catalonia). On average, residents of Catalonia, the Balearic and Canary Islands, Cantabria, Asturias, and Galicia place higher value on their regional identity than their national identity.

Identity at the individual level correlates with various idiosyncratic socio-economic and political characteristics. Figure 4 documents heterogeneity across various dimensions. Variables such as gender, age, education, and occupation yield no significant differences. Individuals below the age of 34 are slightly more likely to have regional identities than those aged between 45-64. Conversely, higher incomes (above 40 K) are more likely to be classified as national. Not surprisingly, political ideology strongly correlates with identity, with left-wing individuals exhibiting stronger regional identities, while right-wing individuals display stronger national identities. Interestingly, participants classified in the regional category are less likely to trust the central government and more likely to trust the regional government. This trend is mostly mirrored by changes in the neutral category; for the national category, trust does not create a difference. Beliefs in meritocracy somewhat reflect the pattern observed on the ideological spectrum.

Beyond socio-demographic variables, the individual migration background strongly influences identities. Residents in their birth region are more likely to exhibit similar levels of attachment to both the region and the nation, and less likely to value their national identity higher. This pattern is reversed for individuals born in a different region, who are disproportionately more likely to have stronger national identities. A similar pattern arises when individuals are classified by the birthplace of their parents, confirming that the individual background regarding internal migration matters for forming identities. Figure A4 replicates panel (a) of the two figures discussed above and excludes internal migrants. This exercise shows that, as expected, the distribution shifts slightly towards


Figure 4: *Heterogeneity*

Notes: Panel (a) shows the distribution of different categories on the Linz-Moreno scale across regions (Autonomous Communities). Panel (b) documents heterogeneity of this indicator. Light blue (red) indicates strict regional (national), blue (red) larger regional (national) than national (regional) identity, and gray equal values on both dimensions.

individuals with stronger regional ties. Besides including controls for these dimensions, the empirical analysis includes a robustness check which estimates results for the subset of individuals living at their birthplace (75% of observations) and those whose parents were also born in the region of residence (50% of observations).

# 4. Salience of Regional Taxation and First Stage Effects

This section documents the salience of the tax decentralization reform, i.e., the knowledge of the population about the institutional design of the tax system prior to treatment, and compares this to the ex-post knowledge of the treated individuals after having received the information.

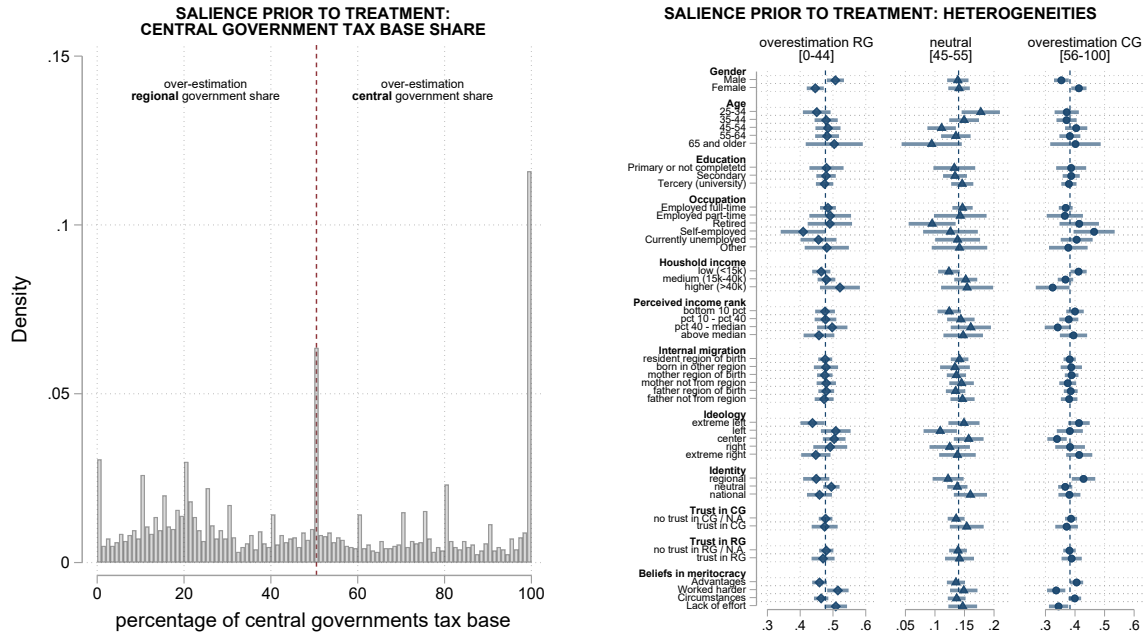
The tax base of the personal income tax in Spain is shared between the central government and regional governments (Autonomous Communities). Either level of government can impose a tax schedule of their choice on half of the total labor income tax base.[10] Revenues obtained from the sub-national base remain within the region:[11] As regional governments implement tax schedules on half of a taxpayer's labor income, they retain approximately 50% of revenues. However, apart from revenue considerations, regions also have a relatively large impact on the degree of progressivity. Most of these features were implemented by a major tax reform in 2010, after which substantial differences in statutory tax rates emerged between regions (Agrawal and Foremny, 2019).

Given this significant degree of autonomy, it is surprising that this feature is not well-known among taxpayers. Previous studies have documented the lack of salience of this institutional detail. (López-Laborda, Rodrigo, and Sanz-Arcega, 2020) show that this feature is not very prominent among taxpayers. The low baseline level of information about regional tax autonomy is important for the experimental design, as it creates a large scope for the intervention to increase the salience of this feature among treated individuals.

**Salience.** At the beginning of the experimental part, the survey elicits the salience of the tax sharing mechanism. Respondents have to select a value between 0 and 100% for the share of the tax base which they believe is assigned to the central government. Panel (a) of Figure 5 shows the distribution of answers. Positive deviations from 50 indicate that respondents underestimate (overestimate) the regional (central) impact, while negative deviations from 50 indicate an overestimation (underestimation) of regional (central) government's normative autonomy. Overall, the results indicate that the sharing mechanism is not very salient among taxpayers. More than 10.4% of respondents believe that

[10] Capital income is taxed at uniform rates, but half of the revenues also remain with the regions.

[11] While hypothetical revenues, which would have been collected by applying the uniform default schedule, are subject to some degree of horizontal redistribution between regions, revenues due to regional deviations from the default schedule remain directly with the region.




(a) Distribution

(b) Heterogeneity

Figure 5: Salience of Tax Base Split

Notes: Panel (a) shows the distribution of answers to the question *What share of your total personal labor income is taxed at tax rates decided by the central government?* The correct answer is 50, i.e. larger values underestimate and lower values overestimate the regional impact. Panel (b) shows heterogeneous effects across groups for the absolute deviation from 50.

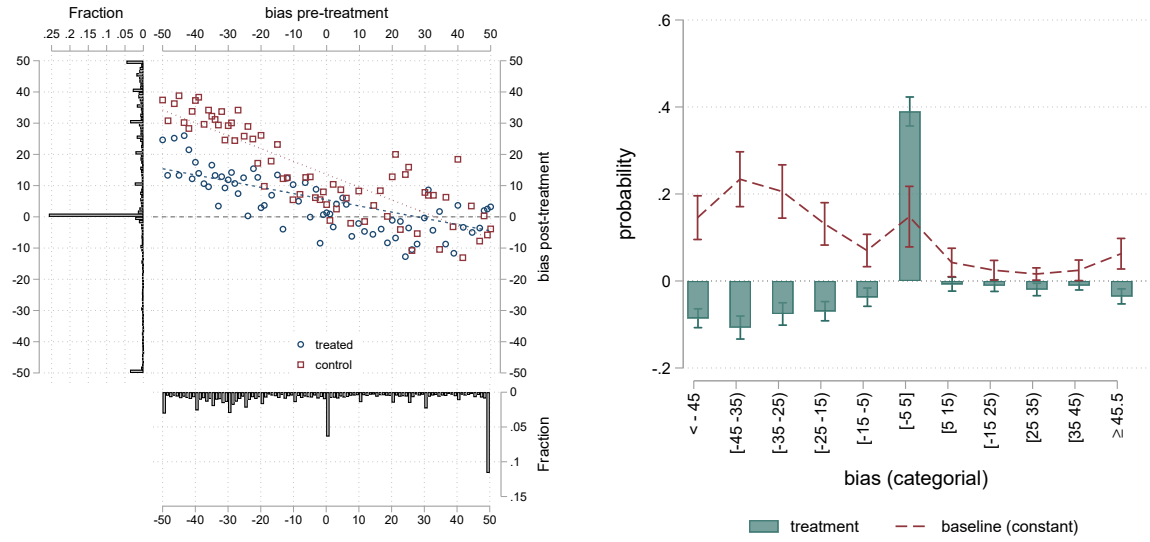
the entire tax base is owned by the central government, and 3.2% believe that none of the tax base belongs to the central government. Interestingly, around 6.3% respond with the correct share, a figure close to the number provided in López-Laborda, Rodrigo, and Sanz-Arcega (2020). The average reported share is 48.7% and close to the true value, which is driven by the fact that under- (52% report a too low share) and overestimation (42% of responses) cancel each other out. Note that respondents were required to state their best guess and were not allowed to skip this question. This explains intermediate answers, likely driven by participants picking random numbers when they do not have any knowledge of how the tax system functions.

Figure 5(b) illustrates characteristics of those who over-, under-, and correctly estimate the impact of the central government. Throughout the paper, the baseline definition of unbiased respondents uses a range of 5 percentage points above and below the threshold. The figure shows a small gradient along the age distribution, indicating that the tax sharing mechanisms is slightly more salient among the young. Besides this, no further systematic pattern arises. Among those who over- and underestimate the effect, some differences exist along the gender dimension, for the self-employed, income, and, to a smaller extent, individuals who identify with their region of residence.

**First Stage Effects.** To analyze the impact of the information treatment on respondents

understanding of the tax system, the survey includes a slightly modified question about the regional split after treatment. To measure the impact of the regional tax base treatment, participants are asked about the *regional* governments' share out of the total tax base. This question is mechanically linked to the earlier pre-treatment question about the *central* governments' part, as both need to add up to hundred percent. The unbiased answer is again 50 percent in this case.

Figure 6(a) shows the relationship between the pre- and post treatment bias in respondents beliefs about the share of the tax base corresponding to the central government. The graph shows a binned scatterplot for the treated and control units. The closer bins are to the dashed gray line around zero, the less biased are post-treatment responses. This figure indicates strong first stage effects in a descriptive manner. First, note that the distribution on the vertical axis shows a much larger share of unbiased responses around zero. Furthermore, the scatterplot reveals that treated units on average are closer to the zero-bias area than control units. While most respondents which previously had a positive bias (i.e. those which previously overestimated the central governments share) are around zero-post-treatment biases, some deviations still persists for those which have previously underestimated that share.




(a) Pre- and post Treatment Bias

(b) Probability

Figure 6: *First Stage Effects*

Notes: Panel (a) shows the bias about the central governments share of the tax base before (horizontal axis) and after (vertical) treatment. The after treatment share is imputed from the answers about the regional share. The histogram of raw data is shown on the axis. The central figure shows binned scatterplots for the treated (blue circles) and control (red squares) units. Red and blue lines show the best linear fit. The dashed gray line represents unbiased post-treatment values. Panel (b) shows the results from linear regressions with a binary outcome equal to one if the post-treatment bias falls into the indicated interval.

To test the effectiveness of the treatments more formally, the study follows Alesina and Stantcheva (2020) and runs regressions on a set of dummy variables which are equal

to one if the absolute bias of any measure falls into a certain interval. This exercise is repeated for intervals of 10 percentage points for the entire distribution of possible outcomes. To include unbiased answers in one category, the first category is centered around zero between $[-5, 5)$. Figure 6(b) shows the estimates resulting from those 11 regressions. Results indicate strong first stage effects. The central category of unbiased effects shows that the baseline probability is around 0.15 (std.dev. 0.04), but the treatment increases this value by 0.39 (std.dev. 0.017). The other categories confirm the descriptive results. The treatment significantly reduces the probability of a negative bias, i.e., the likelihood of underestimating the central government's share, while the impact on those overestimating the share is less pronounced. These results indicate that not all treated participants are compliers. Appendix Figure A5 documents the heterogeneity of the first stage in panel a) and compliers.[12] Few differences appear, most notably the effect of self-employed individuals, who are more likely to be successfully treated. Smaller differences appear between men and women, and those with meritocratic beliefs. Overall, the results demonstrate strong first-stage effects of the information treatment, significantly increasing the previously low salience of the region's impact on income tax policies.

# 5. Results

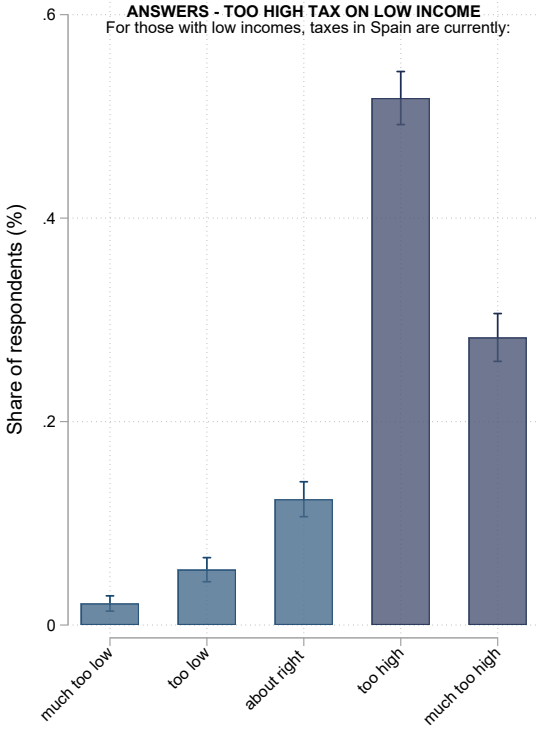
## 5.1. Baseline Results

This section presents the baseline results for all outcomes obtained from the control group. To simplify, all outcomes are represented as binary variables. Where feasible, categories indicating higher preferences for redistribution are grouped together. As a result, the analysis compares individuals in favor of more progressive policies with those against. Initially, I document the full distribution for all outcomes, and these figures also illustrate the binary codification - dark blue-colored bars are coded as one, while light blue bars are coded as zero in all regressions.

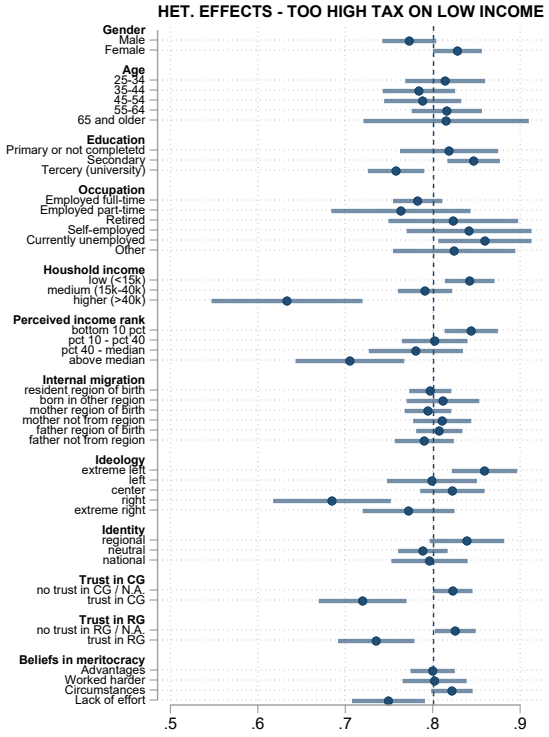
**Progressivity.** To measure respondents' preferences regarding progressivity, the survey includes two separate questions about taxing the rich and the poor. The first question refers to the level of taxes on low incomes, and answers are collected on a scale of five different values that range from *much too low* to *much too high*. The outcomes of the next question about taxes for those with high income follows the same scale.

Figure 7 displays the distribution of answers in panels a) and c). Approximately 80.1% of respondents state that taxes on low incomes are too high, while 72.5% regard taxes on the rich as at least too low. Both variables indicate a clear majority preferring a more

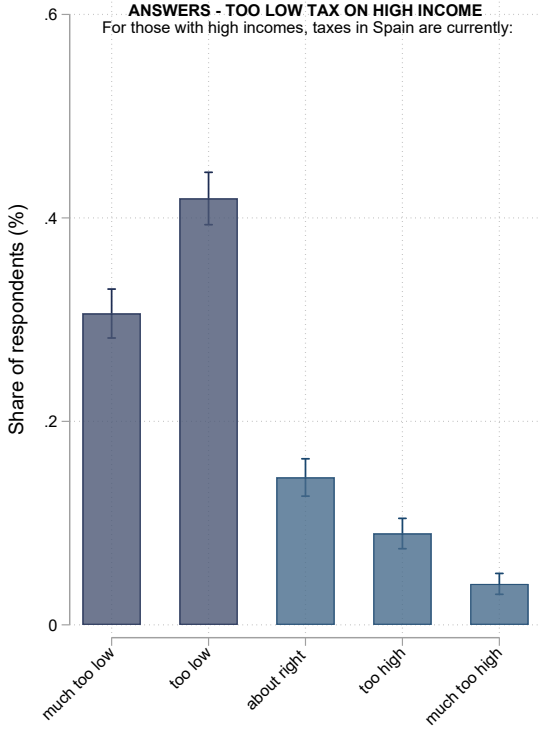
[12] defined as those out of the treatment group with a pre-treatment, comparing those with unbiased post-treatment outcomes in a +/- 5 points interval (compliers) relative to those which despite treatment have biased post-treatment outcomes (defiers).



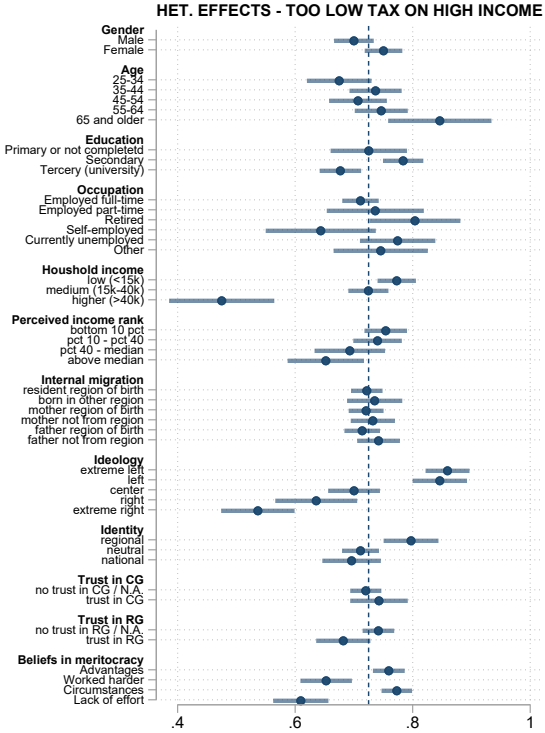

(a) Responses "*tax on low incomes*"




(b) Heterogeneity




(c) Responses "*tax on high incomes*"




(d) Heterogeneity

Figure 7: *Level of Tax on Low and High Incomes*

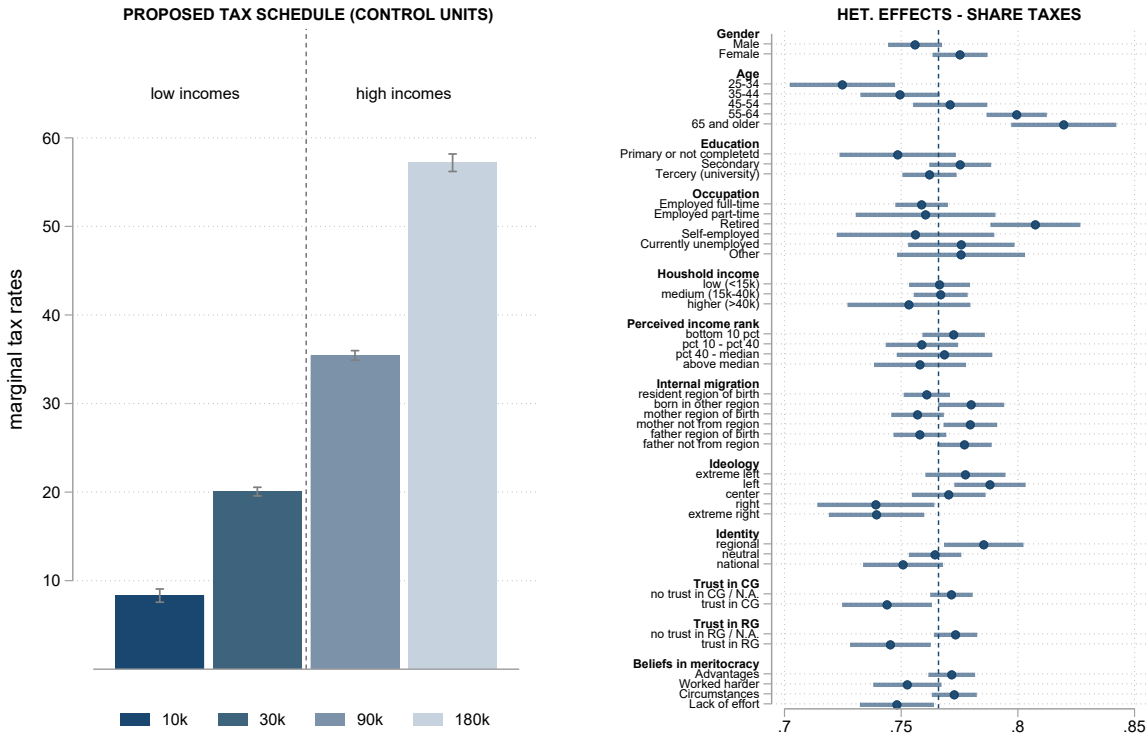
Notes: Panels (a/c) show the distribution of answers to the survey in the control group. Panels (b/d) group the answers in favor of higher redistribution, as indicated in dark shades in the left panels, and show heterogeneity of this group relative to the other categories. 95% confidence bands indicated around means.

progressive tax system at baseline. Panels (b) and (d) illustrate the difference in these values across groups for both questions. Differences are most pronounced along the income distribution, gender, and political ideology. At baseline, respondents with higher incomes are less likely to support lower taxes on low incomes or higher taxes on high incomes. Interestingly, this pattern also holds true for the perceived position in the income distribution. Results on the political spectrum indicate the expected pattern, as right-wing individuals support less taxation, particularly on the rich. Female respondents favor more progressivity on both dimensions compared to men. Furthermore, a gradient along the identity spectrum can be observed, with outcomes favoring more progressive tax systems for those with stronger regional identities. In general, results are more homogeneous for the question on low incomes, while opinions on taxes on high incomes differ more across subgroups of the population. An interesting observation is that this pattern is reverted for trust in government, where those which trust the regional or central government are less likely to consider taxes on low incomes to be too high.

These results are complemented by asking respondents about marginal tax rates they would implement on four individuals at different points of the income distribution. Participants are required to set tax rates such that the revenues collected match the amount of taxes that would have been collected if the true tax system were applied. Figure 8(a) illustrates the results. Overall, the resulting tax system is progressive. The top marginal tax rate and the rate on low incomes are higher than the actual rates implemented in any region, while medium incomes, on average, are taxed less than by the current tax system. This information is than combined in one indicator, which is calculated as the ratio of the share of taxes collected from the two high income indicates relative to total taxation, i.e. the larger this fraction, the more progressive the tax system. Figure 8(b) documents interesting differences between age groups, with the elderly showing more support for higher taxes on high incomes. Right-leaning respondents, those who trust in government, and those with meritocratic views, on average, set higher taxes on lower income groups than on higher ones.[13] This question reveals differences between those who migrated internally, and a gradient along the identity level can be observed. Respondents with regional ties are more likely to favor taxing the rich. It's noteworthy that, in contrast to the previous questions, the level of income does not create differences with respect to the level of taxation. Comparing this to the larger differences observed in the previous two questions indicates that individuals might have biased perceptions of income levels. If so, participants may find it difficult to rationalize tax rates on incomes that they cannot clearly allocate along the income distribution, while questions about high and low

[13]Note that the sum was kept constant in this question. In an alternative question where the total sum of taxes was not constrained, the total sum of taxes collected is lower for those without trust, high incomes, and with meritocratic views, and male; and higher for low educated respondents. Appendix Figure A8 shows results.

incomes are more salient and easier to evaluate relative to each other.



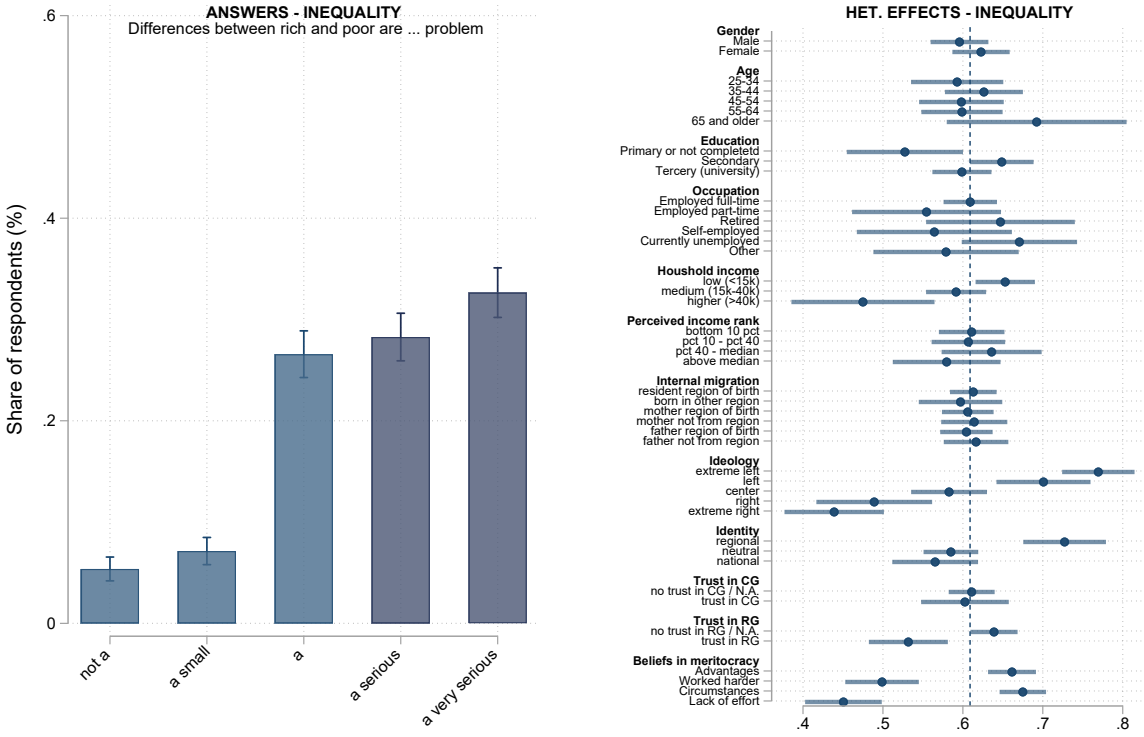

(a) Marginal Tax Rates (b) Heterogeneity

Figure 8: *Tax Schedule*

Notes: Panel (a) shows the proposed marginal tax rats across the income distribution. Panel (b) shows heterogeneity across the same groups of income (from left to right). 95% confidence bands indicated around means.

**Inequality.** To elicit respondents' degree of inequality aversion, participants are asked if they consider differences in income between the rich and the poor problematic. This question follows the wording in the European Value Survey. Figure 9(a) shows that 12.5% consider inequality not or only a small problem, 26.6% consider differences between the rich and the poor as problematic, and 60.9% as a serious or very serious issue. Figure 9(b) illustrates the heterogeneity of this outcome for the share of respondents evaluating inequality as a serious or very serious problem. Small differences emerge across education levels, but most heterogeneity is explained by income, ideology, and regional identities. Lower income groups are more likely to consider inequality a serious issue, and a strong gradient emerges from the left to the right on the political spectrum. Similarly, respondents with a stronger regional identity are more likely to regard income differences as problematic. Meritocratic views add another dimension of heterogeneity to this outcome.

**Public goods.** A question commonly used to elicit individuals' preferences for public spending is related to the trade-off between public good provision and taxation. When asked to position themselves between the two extremes of lower (higher) taxes and fewer (more) public goods, Figure 10(a) shows that 60% place themselves above the intermedi-



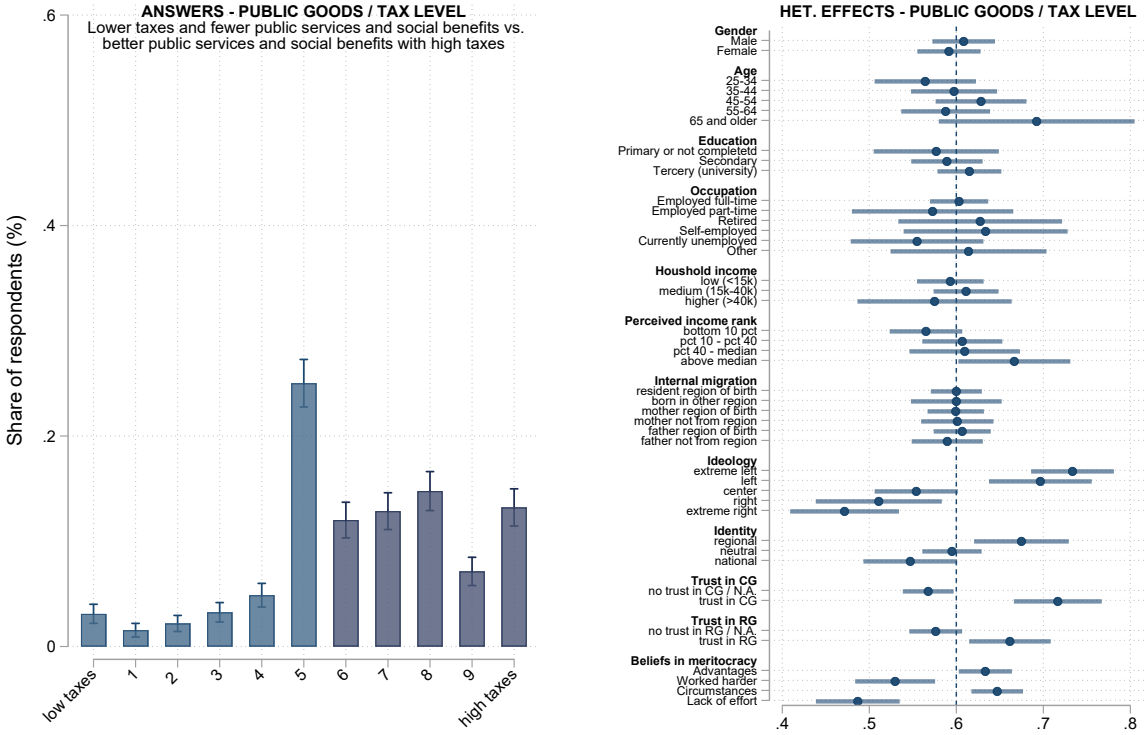

(a) Responses "*inequality*"

(b) Heterogeneity

Figure 9: *Inequality*

Notes: Panel (a) shows the distribution of answers to the question *Do you think the differences in income between rich and poor are: (not a / a small / a / a serious / a very serious) problem*. Panel (b) groups the two categories most adverse to inequality and shows heterogeneity across groups as indicated in the graph. 95% confidence bands indicated around means. The dashed line indicates the mean value of this classification of answers.

ate category, 25% are undecided, and 15% prefer low taxes over more public goods. Heterogeneity in this outcome is similar to the previous questions, with differences most pronounced across the left-right spectrum and meritocracy. Also, respondents with strong regional identities show larger preferences for public goods (see 10(b) for heterogeneity across various dimensions). Interestingly, as this question directly relates to public goods and services provided by the government, respondents who trust in government are more likely to confirm this affirmation.



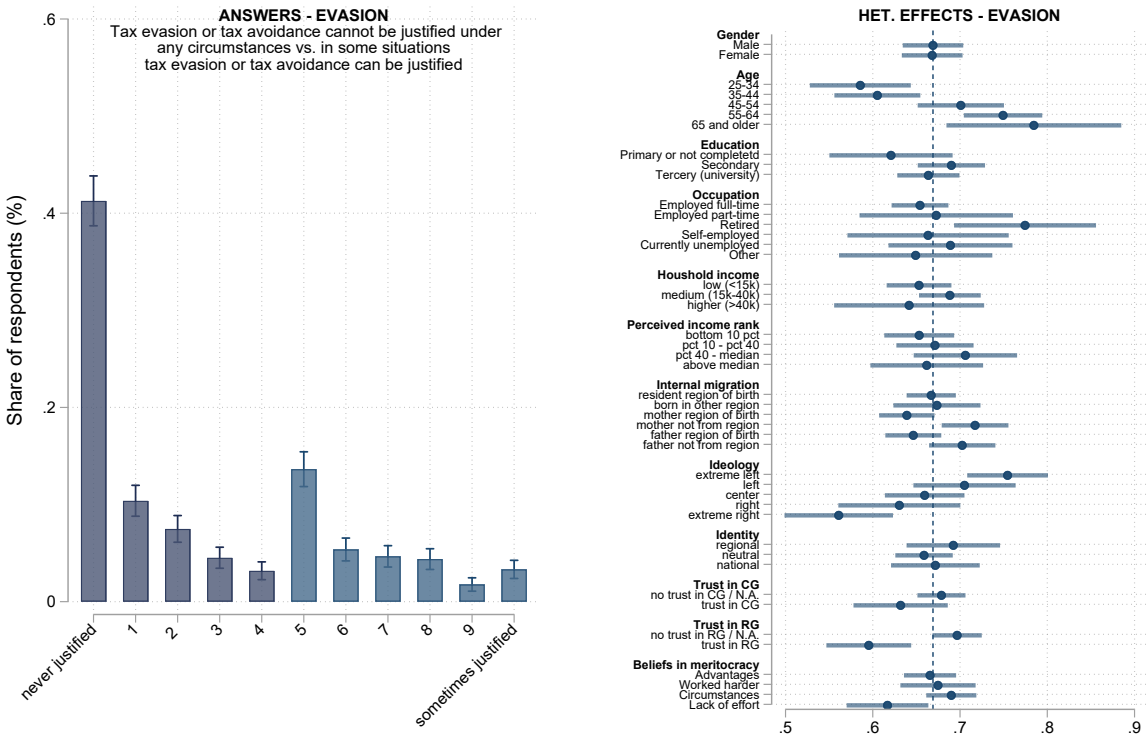

(a) Responses "*taxation and public goods*"

(b) Heterogeneity

Figure 10: *Public Goods and Taxation*

Notes: Panel (a) shows the distribution of answers to the question *Lower taxes and fewer public services and social benefits vs. better public services and social benefits with high taxes*. Answers were possible between 0 (low taxes) and 10 (better public goods). Panel (b) groups the upper categories most in favor of better public goods with higher taxes and shows heterogeneity across groups as indicated in the graph. 95% confidence bands indicated around means. The dashed line indicates the mean value of this classification of answers.

**Tax evasion.** Tax evasion is less controversial than any of the other dimensions, as most people consider it to be important to be honest with taxation. Figure 10(a) shows that a majority of 67% considers tax evasion to be unjustified (against 13.6% in the intermediate category and 19.5% who at least consider tax evasion to be justified in some circumstances). Figure 11(b) demonstrates a clear age gradient indicating larger aversion towards tax evasion the older respondents are. Considerable heterogeneity emerges on the political spectrum, as the share of individuals rejecting tax evasion drops to 55% for the right-most category on the political spectrum, while being honest with taxes is more important for left-leaning respondents.



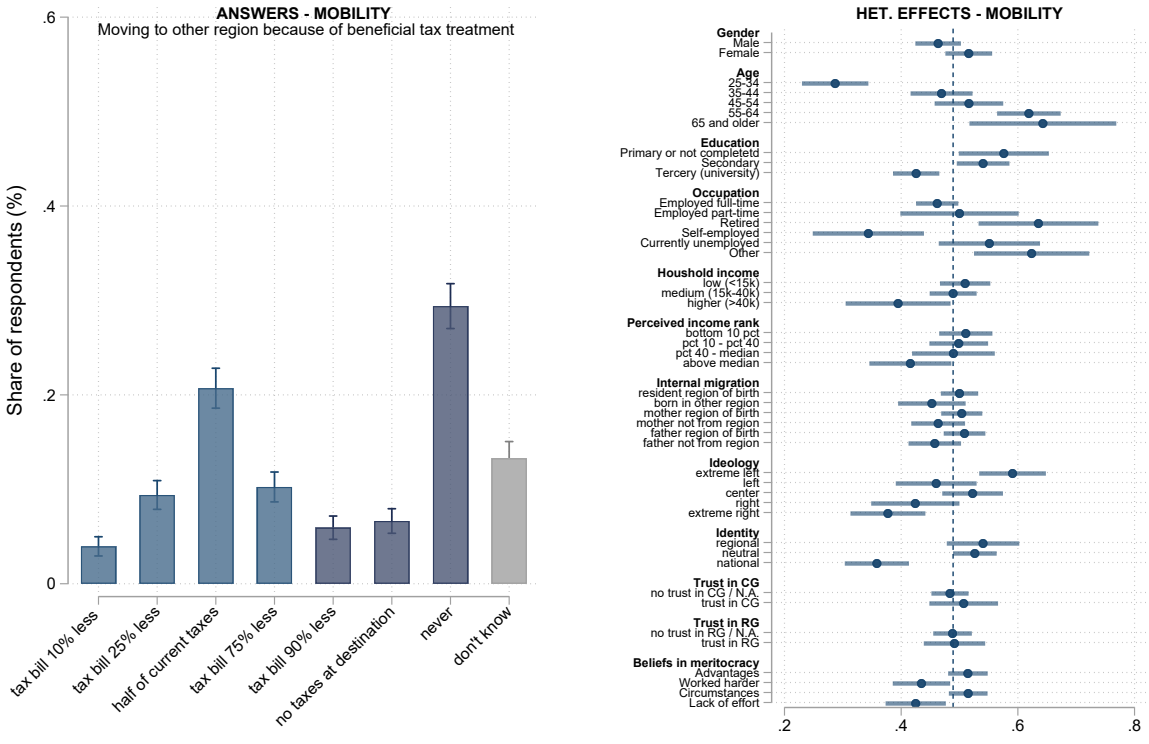

(a) Responses "*evasion*"

(b) Heterogeneity

Figure 11: *Tax Evasion*

Notes: Panel (a) shows the distribution of answers to the question *Tax evasion or tax avoidance cannot be justified under any circumstances vs." "in some situations tax evasion or tax avoidance can be justified*. Answers were possible between 0 (never justified) and 10 (can sometimes be justified). Panel (b) groups the upper categories most in favor of better public goods with higher taxes and shows heterogeneity across groups as indicated in the graph. 95% confidence bands indicated around means. The dashed line indicates the mean value of this classification of answers.

**Mobility.** A last outcome to be analyzed is the individual propensity to migrate to save on taxation. As the main result, most respondents do not consider moving as a response to taxation. Figure 12(a) shows that 29.4% state that they would never move, and another 12.6% in the case of substantial tax savings of at least 90%. The heterogeneous effects in Figure 12(b) are estimated for this group, i.e., individuals who do not consider moving or only for substantial tax benefits, and reveal interesting insights about tax-related mobility. High-income and highly educated young individuals are more likely to move. Along the age distribution, the propensity to change their region of residence gradually reduces until the middle-aged, and individuals above 55 would never or only for substantial tax cuts consider moving. Differences across occupations confirm studies on tax-induced mobility using administrative data. Agrawal and Foremny (2019) show that mobility is mainly driven by the self-employed, a pattern that also emerges in the survey responses. Not unexpectedly, identity creates further heterogeneity, as those with national identities are more likely to consider moving out of their region for tax reasons. These baseline findings confirm patterns that have been previously documented in the literature on taxation and mobility (see Kleven et al., 2020, for a summary).




(a) Responses "*mobility*"

(b) Heterogeneity

Figure 12: *Mobility*

Notes: Panel (a) shows the distribution of answers to the question *Moving to other region because of beneficial tax treatment*. Possible answers were: Answers were tax bill 10% less; tax bill 25% less"; half of current taxes; tax bill 75% less; tax bill 90% less; no taxes at destination; never; don't know. Panel (b) groups the categories never and no taxes at destination and shows heterogeneity across groups as indicated in the graph. 95% confidence bands indicated around means. The dashed line indicates the mean value of this classification of answers.

## 5.2. Treatment Effects

To document the effects of the information treatment, the study conducts simple reduced form regressions on a treatment indicator, using the same outcomes as documented before. Each of these regressions is complemented with an IV estimate for the behavioral elasticity, i.e., $Y_i = \beta \cdot \widehat{bias_i} + \gamma \cdot X_i + \varepsilon_i$, where the endogenous bias is instrumented by the treatment dummy. In this specification, either the direct bias or the binary classification in intervals around the unbiased outcome is employed. All results include a full set of controls, which, in addition to fixed effects for the dimensions used in the heterogeneity analysis before, are augmented with fixed effects to control for the region of residence and birth, and the day the survey was taken. Furthermore, all regressions include dummies for the baseline identity level (i.e., a set of dummies for each of the six potential categories on the question of feeling Spanish and feeling regional).[14]

| | Tax Poor | | Tax Rich | | Share Rate Top | | Inequality | | Public Goods | | Tax Evasion | | Mobility | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) | (4a) | (4b) | (5a) | (5b) | (6a) | (6b) | (7a) | (7b) |
| | Panel A: *reduced form* | | | | | | | | | | | | | |
| regional split treatment | -0.009 | -0.010 | -0.043** | -0.050*** | -0.000 | -0.003 | 0.047*** | 0.043** | 0.025 | 0.021 | 0.004 | -0.002 | 0.019 | 0.020 |
| | (0.015) | (0.016) | (0.017) | (0.017) | (0.006) | (0.006) | (0.018) | (0.018) | (0.018) | (0.018) | (0.018) | (0.018) | (0.020) | (0.020) |
| # obs. | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2435 | 2435 |
| | Panel B: *binary IV: bias* $\lvert 5 \rvert < pp.$ | | | | | | | | | | | | | |
| bias $\lvert 5 \rvert <$ pp. | 0.020 | 0.022 | 0.095** | 0.110*** | 0.000 | 0.006 | -0.105*** | -0.096** | -0.055 | -0.047 | -0.010 | 0.005 | -0.042 | -0.044 |
| | (0.034) | (0.034) | (0.038) | (0.037) | (0.013) | (0.013) | (0.040) | (0.039) | (0.041) | (0.040) | (0.039) | (0.039) | (0.044) | (0.042) |
| # obs. | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2435 | 2435 |
| K-P F-statistic | 1149.97 | 1080.87 | 1149.97 | 1080.87 | 1149.97 | 1080.87 | 1149.97 | 1080.87 | 1149.97 | 1080.87 | 1149.97 | 1080.87 | 1046.57 | 980.62 |
| | Panel C: *IV: behavioral elasticity* | | | | | | | | | | | | | |
| post-treatment bias | 0.001 | 0.001 | 0.005** | 0.006*** | 0.000 | 0.000 | -0.006** | -0.005** | -0.003 | -0.002 | -0.001 | 0.000 | -0.002 | -0.002 |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.001) | (0.001) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| # obs. | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2812 | 2435 | 2435 |
| K-P F-statistic | 80.68 | 82.05 | 80.68 | 82.05 | 80.68 | 82.05 | 80.68 | 82.05 | 80.68 | 82.05 | 80.68 | 82.05 | 69.15 | 69.21 |

Table 1: *Treatment Effects (Reduced Form and IV)*

Notes: The table shows results from linear models for all outcomes. Columns (a) are estimated without controls, columns (b) include a full set of fixed effects as described in the text. Outcomes are (1a/b) "taxes on low income too high or much too high", (2a/b) "taxes on high income too low or much too low", (3a/b) the ratio of top tax revenues to total revenues, (4a/b) "inequality a serious or very serious problem", (5a/b) "better public goods with higher taxes", (6a/b) "tax evasion cannot be justified", and (7a/b) "never move to other region because of beneficial tax treatment". Estimations (7a/b) exclude individuals answering "don't know" (option not given in the other questions). IV estimations use the treatment dummy as instrument. Robust standard errors in parenthesis * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Table A2 in the appendix shows that results are robust to the sample selection.

Table 1 presents the estimated treatment effects and behavioral elasticities. Panel A displays reduced-form estimates, Panel B shows results from IV regressions on a binary indicator of having non-biased post-treatment beliefs about the regional tax share, and Panel C uses the post-treatment bias as an endogenous variable. Columns (b) include controls. However, as the treatment was randomly assigned, qualitative or quantitative

[14] Including these dummies is important for the estimation of the impact of identity, as the indicator focuses on the relative difference between the two dimensions. Including the baseline dummies therefore accounts for any differences that might emerge because of the absolute position on that scale. For example, the indicator would classify an individual as 'more regional than national' when located on the highest category of the regional scale and a lower category on the national scale. It would also classify an individual in the second-lowest category on the regional scale relative to the lowest on the national scale. Therefore, these dummies account for any differences in the absolute position on the scale.

differences between the specifications with and without controls are minor.

The results for the four outcomes related to progressivity are shown in columns (1)-(3). Estimates in columns (2a/b) indicate that the treatment reduces the probability of considering taxes on the rich as too high or much too high by 4.3 - 5 percentage points. IV estimates indicate that removing the bias yields a 10 percentage points decrease. The treatment has no effect on other progressivity-related outcomes. The absence of significant effects on the choice of tax rates confirms previous studies showing that individuals have difficulty reasoning about the actual level of tax by assessing average and marginal tax rates (de Bartolome, 1995; Gideon, 2017). Overall, the results suggest that individuals are more concerned about the level of taxation on high incomes than low incomes when it comes to fiscal decentralization, which together with the negative sign, is consistent with equity and efficiency motivations. Respondents may be worried about potential revenue losses due to mobility or other behavioral responses of high-income earners or disagree about the partition of potential revenues from taxes on the rich across regions.

The second half of Table 1 shows the results for the other outcomes. Regarding equity, models (5a/b) show that respondents changed their aversion to inequality as a reaction to the treatment. On average, the treatment increased the probability of considering inequality as a serious or very serious issue by 4.3 (with controls) to 4.7 (without controls) percentage points. This translates to a 10 percentage point increase in the binary IV. Given the baseline level of inequality aversion discussed above, the effect size is approximately 1/6 for this outcome and confirms the hypothesis that tax decentralization can increase preferences for redistributive policies. Interestingly, the treatment does not change views about the spending-to-taxation ratio, tax evasion, and mobility. The absence of treatment effects for those questions confirms that respondents were mostly concerned about equity related issues as a response to the treatment. The next section will shed further light on the mechanism behind both results by analyzing heterogeneous treatment effects.

A word of caution is necessary on the effects on the tax share of high incomes. Table A1 in the appendix indicates that part of this effect is driven by defiers, which despite receiving the treatment, continue to have biased perceptions.[15] For the inequality result, however, effects are as expected solely driven by compliers with previous biased views on the share.

[15] Psychologists explain this as the "backfire effect" (see Swire-Thompson, DeGutis, and Lazer, 2020, for a summary). This effect leads an individual to increase her belief in the misconception that the information treatment intended to correct. The similarity of the treatment effect for both groups (e.g. columns 2a and b of Table A1 indicates that defiers receive the treatment in a similar way as compliers but refuse to rectify their beliefs in the post-treatment question on the bias.

## 5.3. Mechanism: Heterogeneous Treatment Effects

This section documents the heterogeneity of the treatment effect, which is crucial for uncovering the underlying mechanism. First, results from a categorical approach for many dimensions of heterogeneity are presented. Then, the following sub-sections provide additional evidence using machine learning and other techniques to explore further the dimensions identified as important.

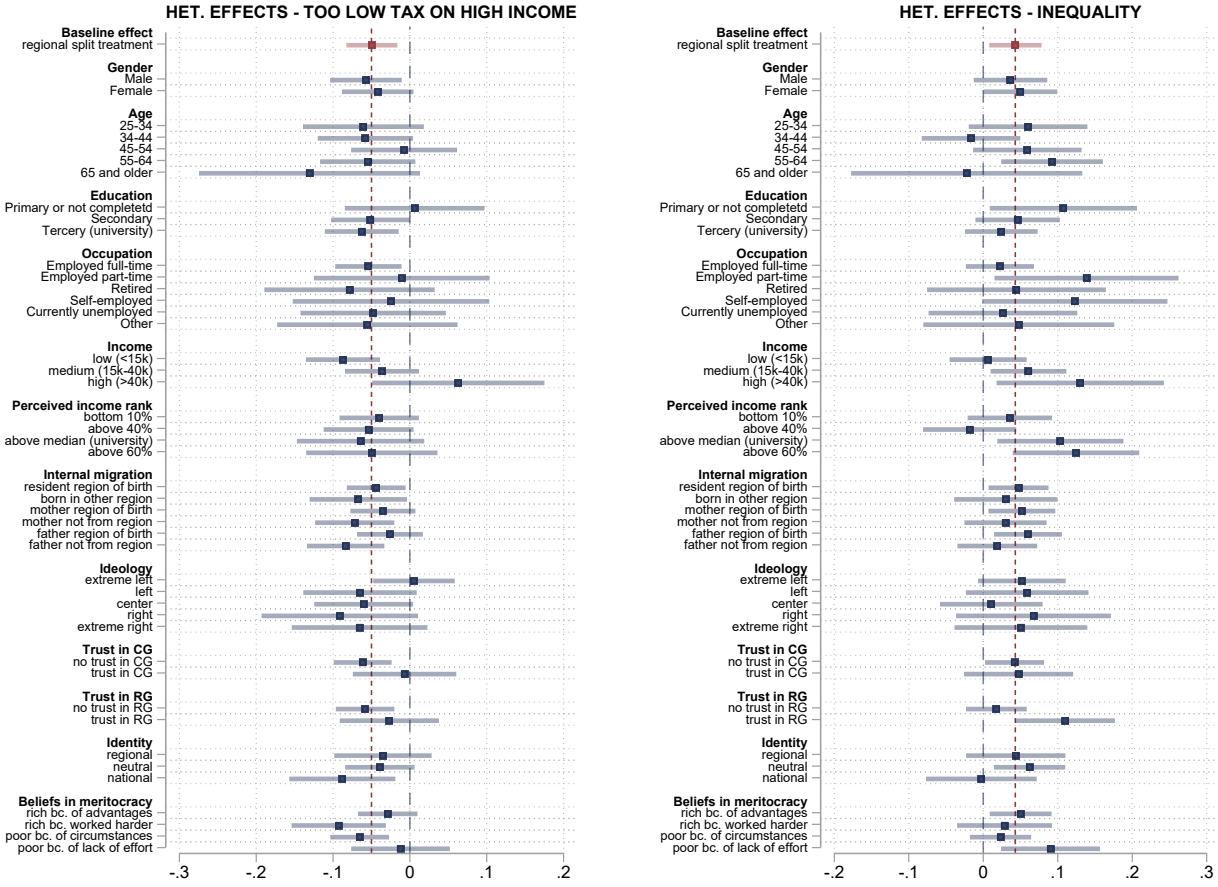
### 5.3.1. Categorical Approach

Results in this section are based on linear models which interact the treatment indicator with categorical variables of different dimensions of heterogeneity. Figure 13 shows the marginal effects obtained from a separate regression for each dimension of heterogeneity for the two outcomes with significant aggregate treatment effects (i.e., taxes on the rich and inequality).

Figure 13(a) illustrates that the decrease in support for higher taxes on high incomes is driven by individuals with stronger national identities, and not significant for those with stronger regional identities and those with equal levels of identities at both levels of government. This corroborates the earlier discussion of efficiency motivations for those respondents. The figure also shows that respondents with no trust in government drive the result. The importance of trust in government has previously been documented by Kuziemko et al. (2015), who explain the absence of large changes in preferences over tax policies after information treatments on inequality with the lack of trust in the underlying institutions. Results here point in a similar direction. Those learning about the actual role of governments in tax policy become less likely to support taxes on the rich.[16]

Next, Figure 13(b) documents the treatment effects for the inequality aversion outcome. The positive treatment effect disappears for those individuals with national instead of neutral or regional identities. Furthermore, the effect almost doubles for those who trust the regional government. These findings document that tax decentralization changes preferences for redistribution - but conditional on the underlying relationship which individuals have with different layers of government. This supports the argument that decentralized redistribution can be viewed as a local public good since only those individuals who are more attached to the region see decentralized taxation as a means to combat inequality. These results are consistent with previous empirical studies on preferences for redistribution in the context of migration (i.e., Stantcheva, 2021), as aversion to inequality becomes more important once respondents learn that redistribution through

[16]The data shows a strong correlation between defiers and trust in government. This negative result explains the effect of the defiers discussed above, since those without trust in government are those who strongly oppose higher taxes and at the same time do not believe the information provided during treatment.




(a) Tax on high income too low

(b) Inequality

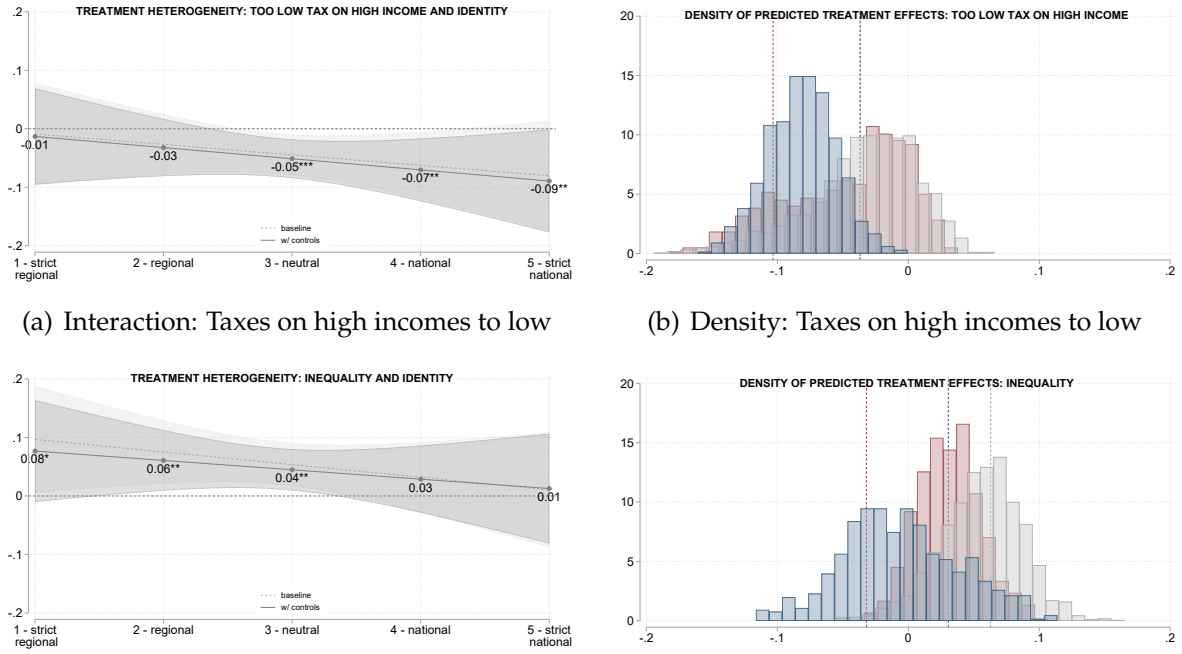
Figure 13: *Treatment Heterogeneity*

Notes: Results document heterogeneous treatment effects estimated from a model that interacts all categories within the different dimensions of heterogeneity with the treatment indicator. Results at the top of each panel replicate the baseline effect of Table 1. All models include a full set of controls and fixed effects. Panel a) shows estimates for the outcome "Taxes on the rich" and panel b) on Inequality". Estimates for other outcomes are documented in Figure A6 in the appendix. 95% confidence intervals around point estimates.

decentralized taxation is an effective tool to reduce inequalities among close peers.

### 5.3.2. Continuous Models and Machine Learning

Two alternative methods are used to document the effect of regional identities. First, a simple linear model which interacts treatment with a continuous variable for the relevant dimensions of heterogeneity is estimated. The left panels of Figure 14 show all linear combinations of interest with the identity indicator. Second, to highlight further the differences between identity groups, right panels plot the distribution of Conditional Average Treatment Effects (CATE) by training a causal forest (Wager and Athey, 2018) separately for the three primary groups, those with stronger regional, national, or equally strong attachments.[17]




(a) Interaction: Taxes on high incomes to low

(b) Density: Taxes on high incomes to low

(c) Interaction: Inequality

(d) Density: Inequality

Figure 14: *Alternative identification approaches: Identity*

Notes: Panels on the left show the linear combination of the treatment effect interacted with the identity indicator. Standard errors and point estimates are indicated for the model including control variables. Shaded areas represent 95% confidence intervals. Right panels show the distribution of CATE obtained from training three separate random forests for the groups of individuals with stronger regional (blue), national (red), or neutral (gray) identities (Wager and Athey, 2018).

The results confirm previous findings. Figure 14(a) documents the outcome of taxing the rich and shows that the negative average treatment effect is driven by respondents who identify stronger with the nation than their region. Although the effect is insignificant for those with strict or at least larger regional identities, the estimates turn negative and significant for the other categories. Panel 14(b) shows the distribution of CATE obtained from training three separate random forests for the groups of individuals with

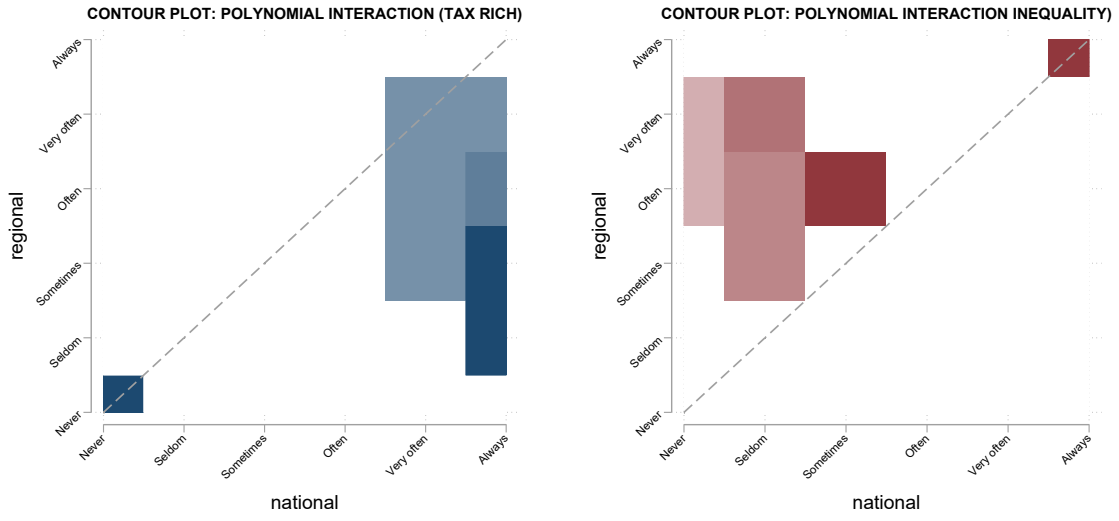
[17] All estimates were obtained using the R package, "grf: Generalized Random Forests"

stronger regional (red), national (blue), or neutral (gray) identities. The figure confirms that individuals with stronger preferences for centralization (blue) are less likely to consider larger taxes on high income as positive after having learned about the impact of regions on taxation.

The estimates for the inequality outcome are presented in the bottom panels of Figure 14. Unlike the tax on the rich, this result is driven by respondents with a stronger regional identity or an equally strong regional and national identity. The linear combination of the interaction models shows positive coefficients for these groups, and the distribution of the CATE is skewed towards the positive area. Therefore, only individuals who favor decentralization become more concerned about inequality after treatment.

### 5.3.3. Robustness

**Identity Indicator.** To corroborate the effectiveness of the identity indicator in capturing the documented heterogeneity, an alternative approach is employed. Instead of condensing both dimensions into a single indicator, the model incorporates polynomial interaction terms between both dimensions (the continuous regional and national indicators) and treatment. This methodology enables the prediction of all potential linear combinations on a 6x6 matrix without imposing any predefined structure on the variable.




(a) Taxes on Rich

(b) Inequality

Figure 15: *Robustness: Identity Indicator*

Notes: The heatmap shows 6x6 entries for all combinations between the regional and national dimensions with treatment. All entries show marginal effects obtained from a model including a continuous polynomial interaction term between treatment and the continuous identity indicators. Non-significant combinations (at the 10% level) are omitted. Blue represent negative effects, red positive effects. Panel (a) shows results for the question on taxes on the rich as, while panel (b) shows results for inequality aversion as outcome.

Figure 15 shows the results. All significant interactions of this matrix are plotted as a heatmap with darker blue tones indicating lower (negative) values and darker red tones

higher (positive) values. Panel a) shows results for taxes on high incomes. Confirming the results discussed before, all significant combinations are negative. Furthermore, the figure confirms the previous classifications, as on the matrix only elements below the 45-degree line are significant. This implies that these are combinations for which national attachment on the horizontal axis is larger than regional attachment on the vertical. The most negative estimates are also found for those which strongly identify with the nation at the last column of the matrix, but little with the region. A notable exception is the negative result for those which equally reject booth dimensions on the lower left, indicating that individuals which do not feel any attachment to any layer of government also oppose strongly higher taxes on the rich.

The results are reverted for inequality aversion, with positive and significant coefficients above the 45-degree line, i.e. for those which value the region higher than the nation. This confirms the previous results, again with one notable exception. Those which identify equally at the highest level with both dimensions have the largest treatment effects in the upper-right of the matrix.

**Alternative Mechanisms.** Given that regional identity is not random, a potential concern arises regarding variables correlated with the identity indicator that could influence the results. Figure 4 highlights three dimensions that serve as important determinants of regional identities: individuals with a migration history from a different region of origin, those with higher incomes, and politically conservative respondents, who are more likely to be assigned to the national identity group. This information is crucial to consider when interpreting the results, as it suggests that factors beyond regional identity may be influencing the observed effects. By controlling for fixed effects in those dimensions, as done previously, the effect is partially isolated from competing alternative mechanisms. To further investigate, Figure A9 displays results that simultaneously include the respective interaction terms. For both of the main outcomes, the quantitative and qualitative results are almost identical, confirming that regional identities play an important role, although other mechanisms might be present simultaneously.

**Internal Migration.** Respondents which are not residing in their region of birth have different identity patterns (see Figure 4). To corroborate the results, Figure A10 presents results for two samples: i) respondents living in their region of birth (approximately 75% of all observations), and ii) respondents who not only live in their region of birth but also have parents born in that region (approximately 50% of observations). While results are similar to the previous ones, point estimates indicate a steeper gradient of the identity dimension. In particular, for the most selected sample ii), the regional group has larger point estimates, while the others decrease. However, none of the estimates is statistically different from the baseline (in red).

**Sample.** Table A2 replicates the main analysis without excluding flagged observations. First, it includes observations such as those which took more than an hour to answer the

survey. In the second panel, the former sample is used, but it excludes those who did not answer all questions needed for the heterogeneity analysis. Results are similar to the ones presented in Table 1.

# 6. Conclusion

This study provides novel evidence on the relationship between fiscal decentralization and individuals' perceptions and preferences regarding taxation and redistribution policies. As a main result, the paper demonstrates that regional identity plays a pivotal role in shaping attitudes towards taxation, with individuals exhibiting varying degrees of attachment to their region or nation showing distinct preferences for progressive tax policies - when decentralized.

In essence, the paper contributes to our understanding of the complex interrelations between regional identity, taxation attitudes, and fiscal decentralization, offering implications for policymakers seeking to decentralize tax instruments but ensure efficient and equitable fiscal policies. This is an important policy concern, as many countries went through decentralization reforms on the expenditure side, but face now vertical fiscal imbalances as revenues have not been decentralized simultaneously.

When assigning revenue collection to layers of government, theoretical work favors more centralized taxation, while empirical results indicate that negative efficiency effects of decentralized taxation might be smaller than expected. For example, Agrawal and Foremny (2019) show that high-income earners in Spain react to tax differentials between regions, but the mobility elasticity is moderate and does not threaten the redistribution function of government.

This paper provides an explanation for those effects. When citizens connect sufficiently with their local environment, they demonstrate higher preferences for redistribution in a decentralized setting. This paper shows that individuals with larger regional identities become more concerned about inequality when they became aware of the fact that regional governments can redistribute among individuals within the same region. I also show that individuals with a stronger national than regional identity become less in favor of higher taxes on the rich once they learn that those taxes might increase revenues in their region.

Overall, empirical results suggest that fiscal decentralization can have differential effects on preferences for redistribution depending on an individual's attachment to the region or the nation. These findings have important implications for policy makers who seek to design effective redistribution policies in decentralized systems, and the specific context of regional identities should be taken into account when designing tax systems across layers of government.

# References


Agrawal, David R. and Dirk Foremny. 2019. "Relocation of the Rich: Migration in Response to Top Tax Rate Changes from Spanish Reforms." *The Review of Economics and Statistics* 101 (2):214–232.

Alesina, Alberto and Paola Giuliano. 2011. "Preferences for Redistribution." In *Handbook of Social Economics*, vol. 1, edited by Matthew Jackson Jess Benhabib, Alberto Bisin. Amsterdam, London: North Holland, 92–131.

Alesina, Alberto, Armando Miano, and Stefanie Stantcheva. 2022. "Immigration and Redistribution." *The Review of Economic Studies* 90 (1):1–39.

Alesina, Alberto and Stefanie Stantcheva. 2020. "Diversity, Immigration, and Redistribution." *AEA Papers and Proceedings* 110:329–34.

Alesina, Alberto, Stefanie Stantcheva, and Edoardo Teso. 2018. "Intergenerational Mobility and Preferences for Redistribution." *American Economic Review* 108 (2):521–554.

Bonomi, Giampaolo, Nicola Gennaioli, and Guido Tabellini. 2021. "Identity, Beliefs, and Political Conflict*." *The Quarterly Journal of Economics* 136 (4):2371–2411.

Cruces, Guillermo, Ricardo Perez-Truglia, and Martin Tetaz. 2013. "Biased perceptions of income distribution and preferences for redistribution: Evidence from a survey experiment." *Journal of Public Economics* 98:100 – 112.

Dahlberg, Matz, Karin Edmark, and Heléne Lundqvist. 2012. "Ethnic Diversity and Preferences for Redistribution." *Journal of Political Economy* 120 (1):41–76.

de Bartolome, Charles A.M. 1995. "Which tax rate do people use: Average or marginal?" *Journal of Public Economics* 56 (1):79–96.

Fong, Christina M. and Erzo F.P. Luttmer. 2011. "Do fairness and race matter in generosity? Evidence from a nationally representative charity experiment." *Journal of Public Economics* 95 (5):372–394. Charitable Giving and Fundraising Special Issue.

Gideon, Michael. 2017. "Do Individuals Perceive Income Tax Rates Correctly?" *Public Finance Review* 45 (1):97–117.

Guinjoan, Marc and Toni Rodon. 2015. "A Scrutiny of the Linz-Moreno Question." *Publius: The Journal of Federalism* 46 (1):128–142.

Haaland, Ingar, Christopher Roth, and Johannes Wohlfart. 2022. "Designing Information Provision Experiments." *Journal of Economic Literature* forthcoming.

Hoy, Christopher and Franziska Mager. 2021. "Why are relatively poor people not more supportive of redistribution? Evidence from a randomized survey experiment across ten countries." *American Economic Journal: Economic Policy* 13 (4):299–328.

Karadja, Mounir, Johanna Mollerstrom, and David Seim. 2017. "Richer (and Holier) Than Thou? The Effect of Relative Income Improvements on Demand for Redistribution." *The Review of Economics and Statistics* 99 (2):201–212.

Kleven, Henrik, Camille Landais, Mathilde Mu noz, and Stefanie Stantcheva. 2020. "Taxation and Migration: Evidence and Policy Implications." *The Journal of Economic Perspectives* 34 (2):119–142.

Kuziemko, Ilyana, Michael I. Norton, Emmanuel Saez, and Stefanie Stantcheva. 2015. "How Elastic Are Preferences for Redistribution? Evidence from Randomized Survey Experiments." *American Economic Review* 105 (4):1478–1508.

Linz, Juan, Manuel Gomez-Reino, Francisco AndrÃ©s, and Dario Vila. 1981. "Informe Sociologico sobre el Cambio Politico en Espana 1975-1981: IV Informe FOESSA."

López-Laborda, Julio, Fernando Rodrigo, and Eduardo Sanz-Arcega. 2020. "Who knows whom we pay taxes to? Tax visibility in a decentralized country: The case of Spain." Studies on the Spanish Economy 2020-15, FEDEA.

Luttmer, Erzo F. P. and Monica Singhal. 2011. "Culture, Context, and the Taste for Redistribution." *American Economic Journal: Economic Policy* 3 (1):157–79.

Meade, Adam W. and S. Bartholomew Craig. 2012. "Identifying careless responses in survey data." *Psychological Methods* 17 (3):437–455.

Mengel, F and E Weidenholzer. 2022. "Preferences for redistribution." *Journal of Economic Surveys* :1–18.

Moreno, Luis. 1995. "Multiple ethnoterritorial concurrence in Spain." *Nationalism and Ethnic Politics* 1 (1):11–32.

Musgrave, Richard Abel. 1959. *The theory of public finance*. New York: McGraw-Hill.

Oates, Wallace E. 1972. *Fiscal federalism*. New York: Harcourt Brace Jovanovich.

Pauly, Mark V. 1973. "Income redistribution as a local public good." *Journal of Public Economics* 2 (1):35–58.

Rubolino, Enrico and Daniel Waldenström. 2019. "Trends and gradients in top tax elasticities: cross-country evidence, 1900-2014." *International Tax and Public Finance* 26 (3):457–485.

Sinnott, Richard. 2006. "An evaluation of the measurement of national, subnational and supranational identity in crossnational surveys." *International Journal of Public Opinion Research* 18 (2):211–223.

Stantcheva, Stefanie. 2021. "Understanding Tax Policy: How do people Reason?" *Quarterly Journal of Economics* 136 (4):2309–2369.

———. 2023. "How to Run Surveys: A guide to creating your identifying variation and revealing the invisible." *Annual Review of Economics* 15:205–234.

Stichnoth, Holger and Karine Van der Straeten. 2013. "Ethnic Diversity, Public Spending, and Individual Supportfor the Welfare State: A Review of the Empirical Literature." *Journal of Economic Surveys* 27 (2):364–389.

Swire-Thompson, Briony, Joseph DeGutis, and David Lazer. 2020. "Searching for the Backfire Effect: Measurement and Design Considerations." *Journal of Applied Research in Memory and Cognition* 9 (3):286–299.

Wager, Stefan and Susan Athey. 2018. "Estimation and Inference of Heterogeneous Treatment Effects using Random Forests." *Journal of the American Statistical Association* 113 (523):1228–1242.

# Appendix (online only)

# A. Additional Graphs and Tables

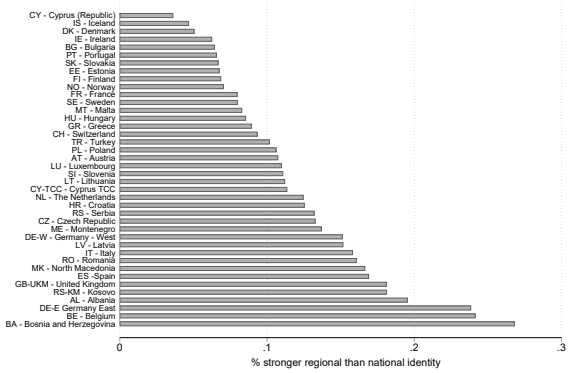
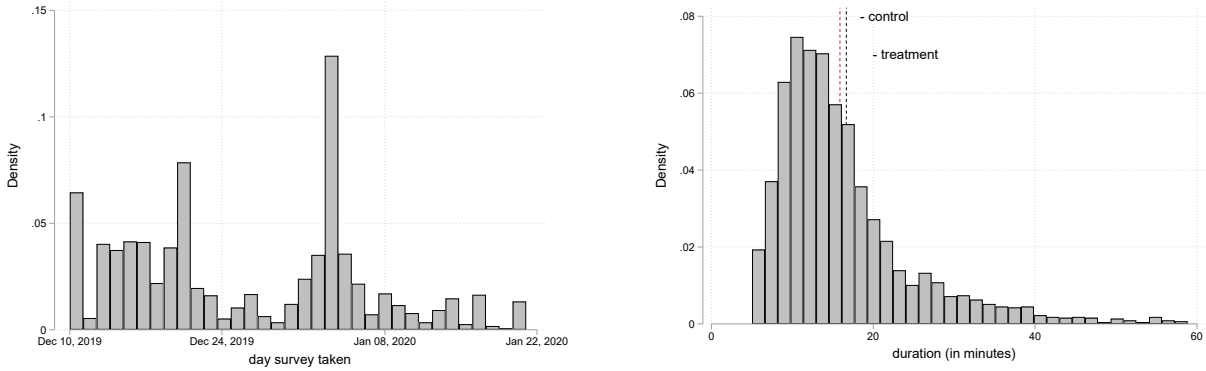



Figure A1: *Regional Identities across Europe*

Notes: Data taken from European Commission, Brussels (2021). Eurobarometer 94.3 (2021). GESIS Data Archive, Cologne. ZA7780 Data file Version 1.0.0, https://doi.org/10.4232/1.13793. Share of respondents with stronger regional (qc1a_1) than national attachment (qc1a_2).




(a) Timing (b) Duration

Figure A2: *Timing and Duration of the Survey*

Notes: Figure A2(a) shows the day of submission of the survey. Figure A2(b) shows the the distribution of the duration in minutes. 78 observations truncated at 60 minutes. Lines indicate the the average duration by treatment status.

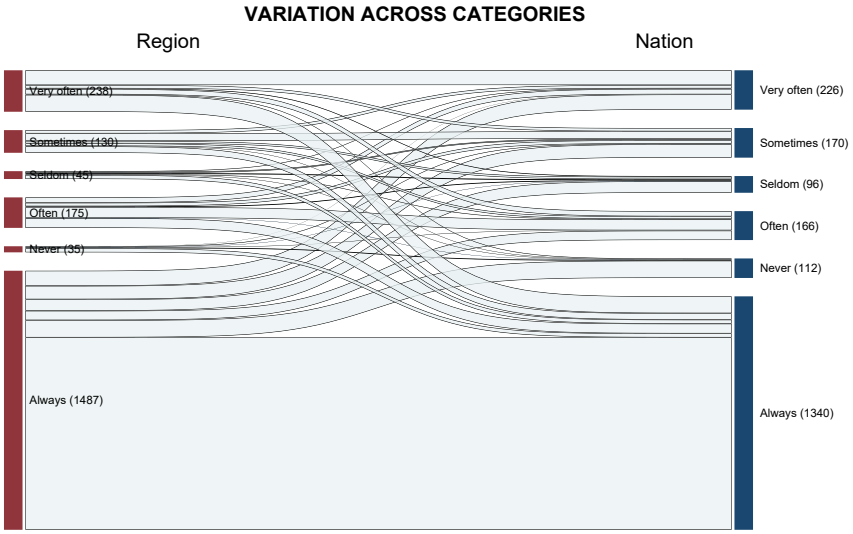
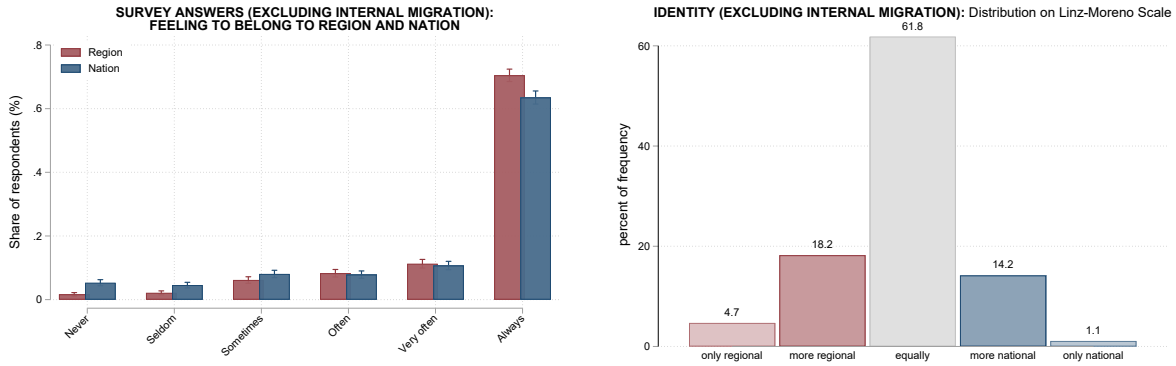



Figure A3: *Sankey Chart of Regional and National Identities*

Notes: The figure presents a Sankey chart for the changes across categories of the nation/regional identity question. The figure shows flows between all categroies for both dimensions.

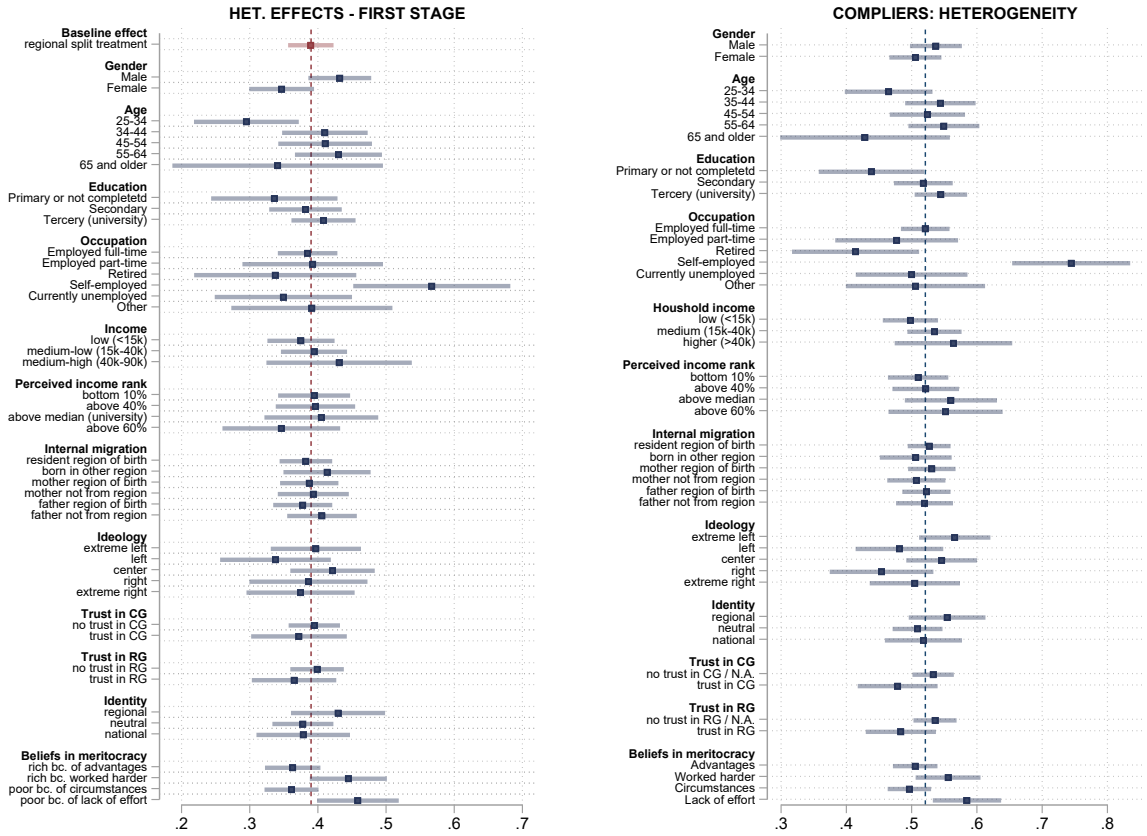



(a) National and Regional Identity

(b) Linz-Moreno Categories

Figure A4: *Identities w/o Internal Migration*

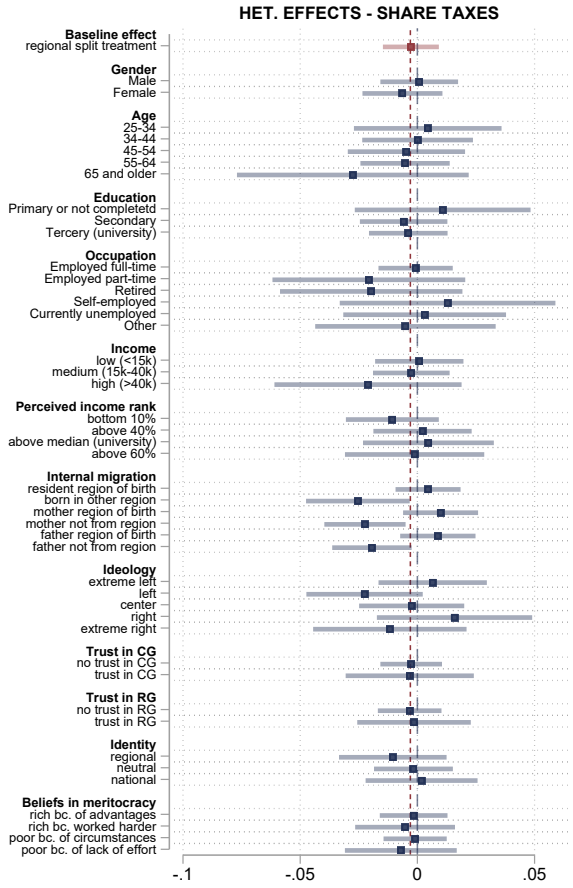
Notes: This figure replicates 2(a) and 3(a), but excludes individuals which do not reside in their region of birth.



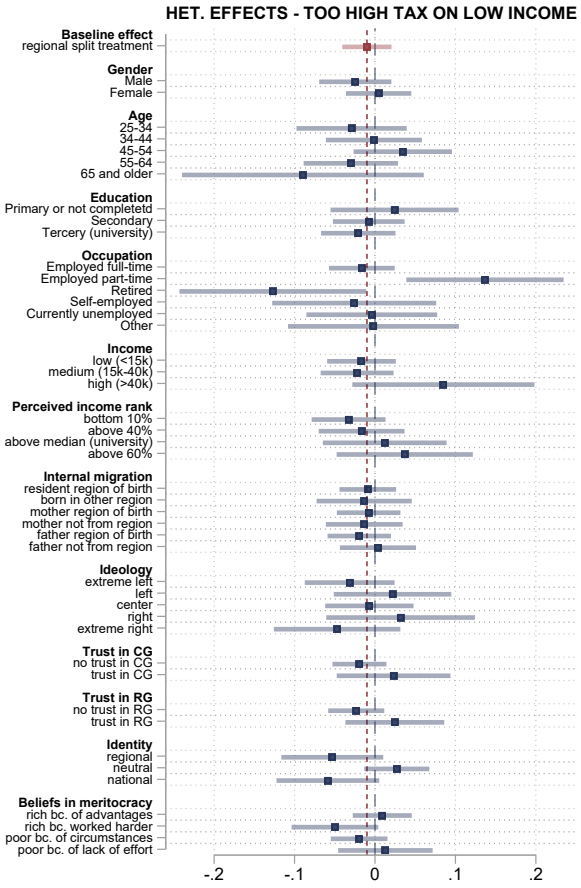

(a) Heterogeneity (b) Compliers

Figure A5: *First Stage Effects and Compliers*

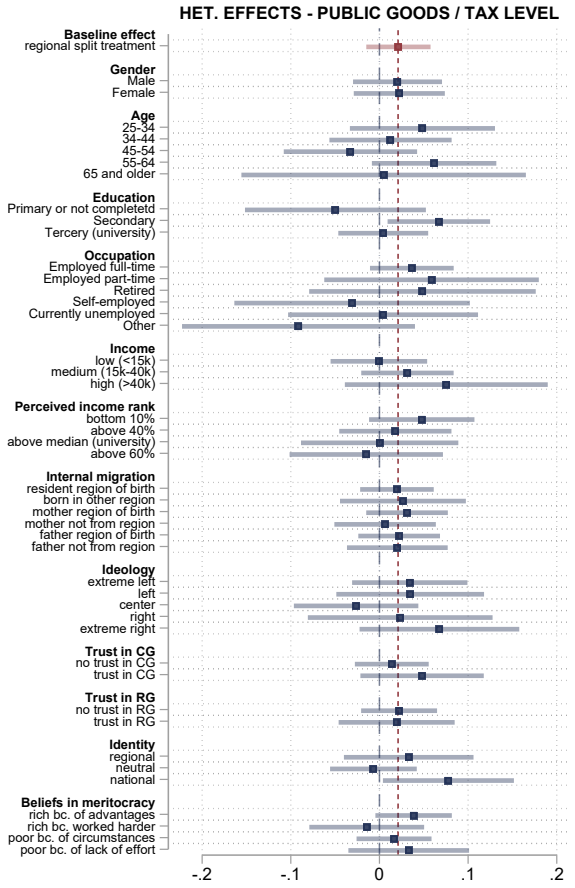
Notes: Panel (a) documents the heterogeneity of the first stage results. The outcome variable is a binary indicator for having reported a share of the tax base around +/- 5 points of the true value. Panel b) defines complier as treated units which had a bias larger than 5 points before treatment but fall into the +/- 5 points interval afterwards. The table compares those units relative to other treated which had a pre-bias which did not get corrected by the treatment (defiers). 95% confidence intervals indicated around point estimates.



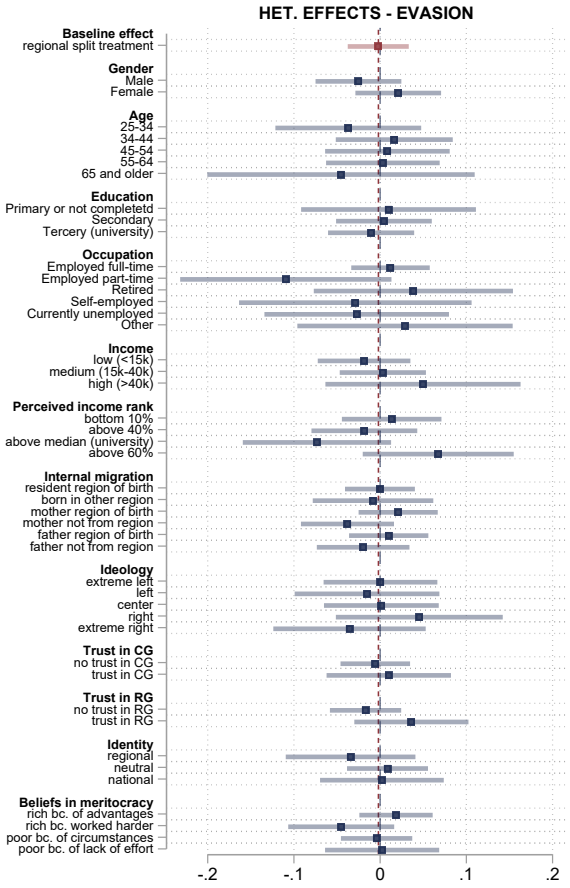

(a) Share taxes high income



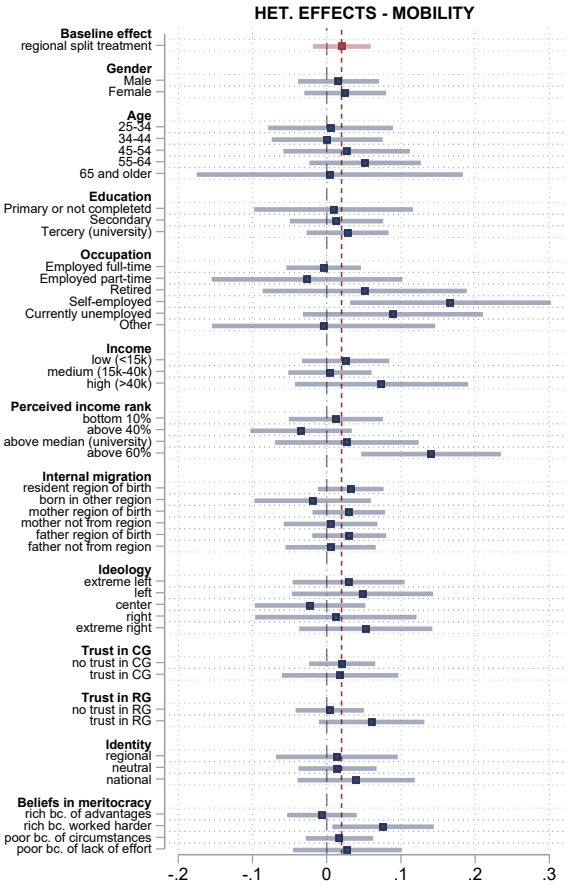

(b) Tax on low incomes




(c) Public goods



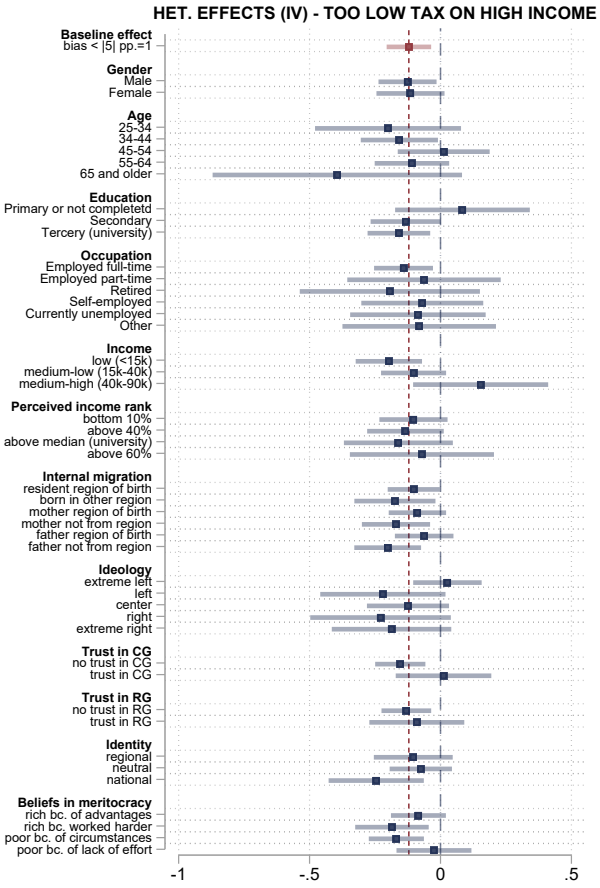

(d) Evasion



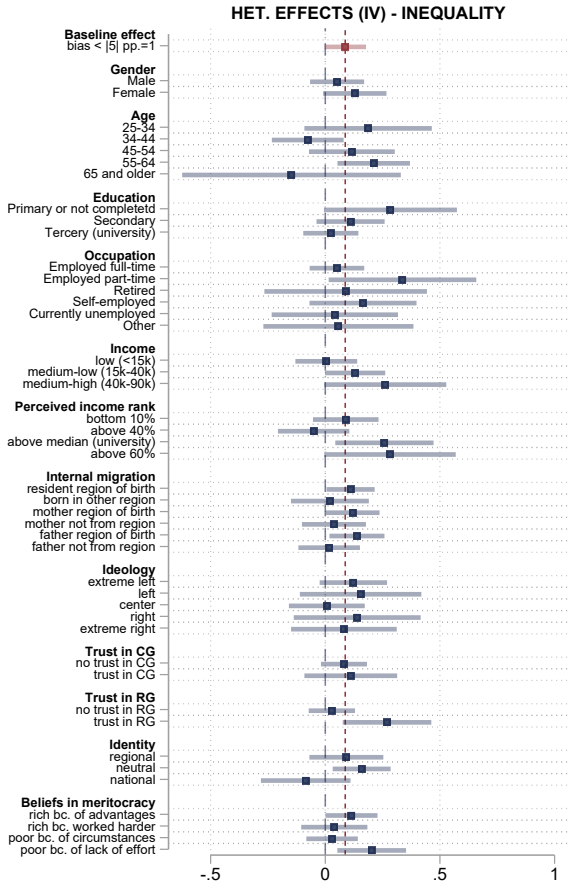

(e) Mobility

Figure A6: *Heterogenoues Effects of other Outcomes*

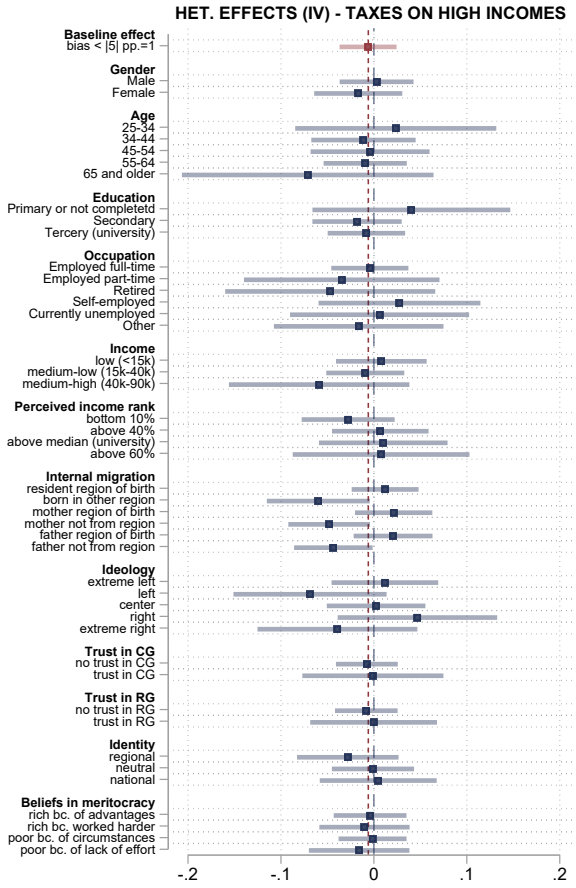
Notes: Results document heterogeneous treatment effects estimated from a model that interacts all categories within the different dimensions of heterogeneity with the treatment indicator. Results at the top of each panel replicate the baseline effect of Table 1. All models include a full set of controls and fixed effects. This figure is the equivalent to Figure 13 for the main outcomes in the text. 95% confidence intervals around point estimates.



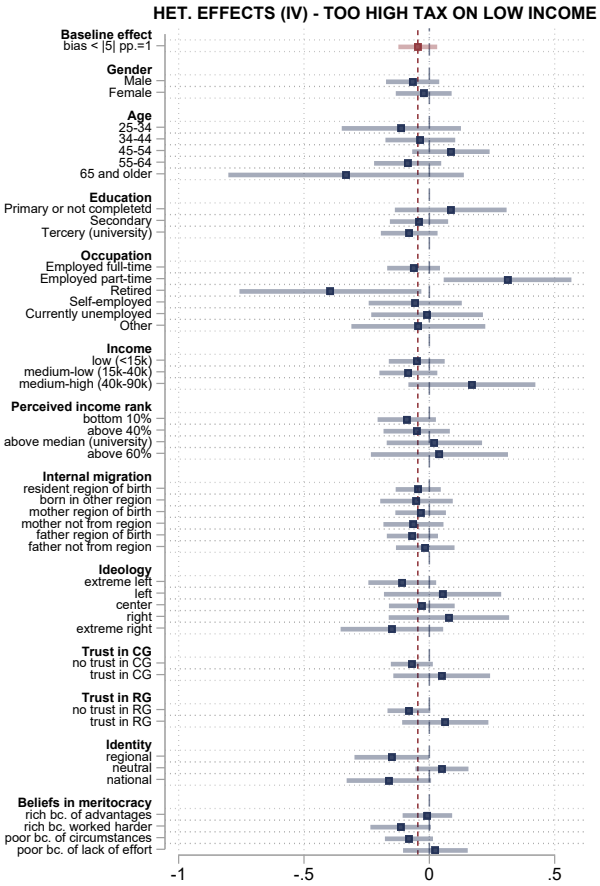

(a) Interaction: Taxes on low incomes to high



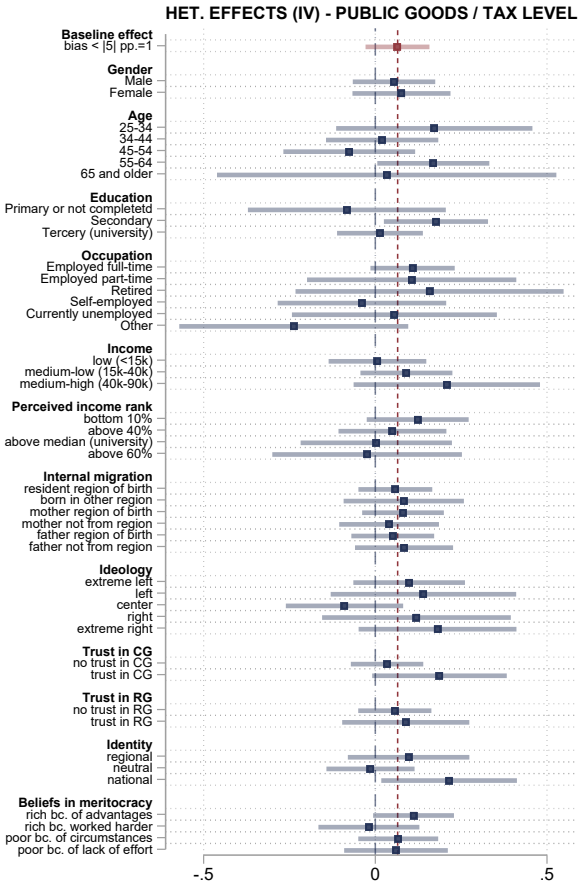

(b) Interaction: Tax rate on low incomes



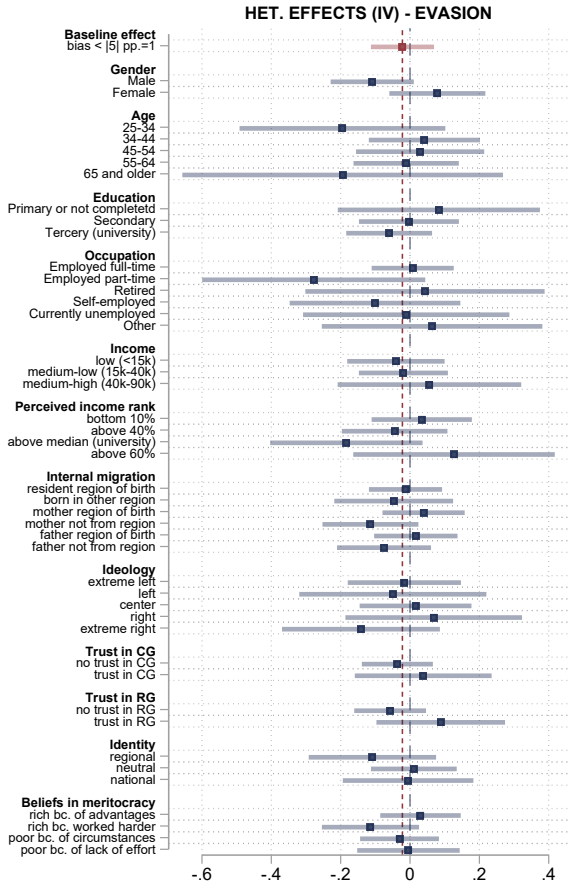

(c) Interaction: Taxes on low incomes to high



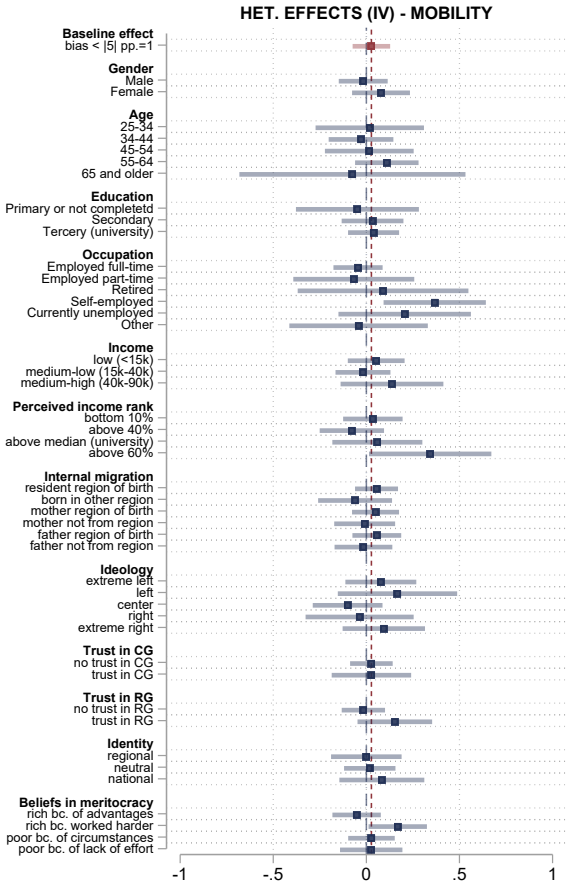

(d) Interaction: Tax rate on low incomes




(e) Density: Tax rate on low incomes



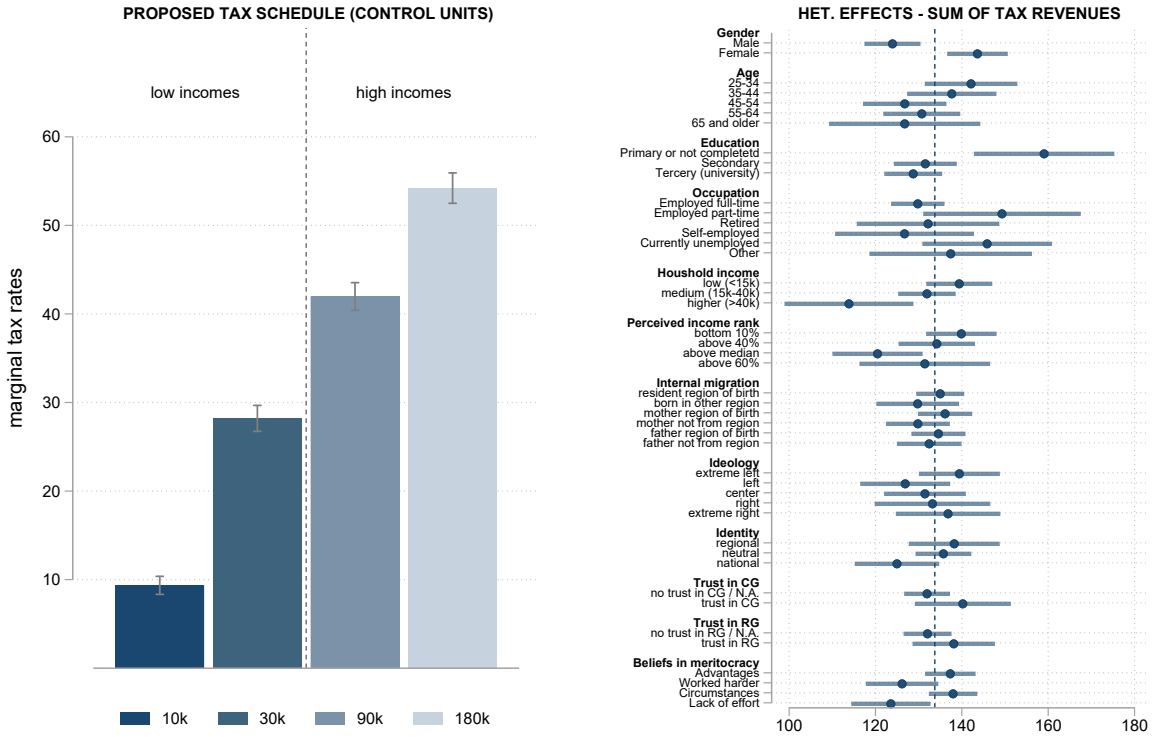

(f) Density: Taxes on high incomes to low




(g) Interaction: Tax rate on high incomes

Figure A7: *Heterogeneity in the IV Model*

Notes: Results document heterogeneous treatment effects estimated with an IV model that interacts all categories within the different dimensions of heterogeneity with the treatment indicator. Results at the top of each panel replicate the baseline effect of Table 1. All models include a full set of controls and fixed effects. 95% confidence intervals around point estimates.




(a) Marginal Tax Rates

(b) Heterogeneity

Figure A8: *Tax Schedule*

Notes: Panel (a) shows the proposed marginal tax rats across the income distribution without imposing restrictions on the sum of taxes. Panel (b) shows heterogeneity for the total amount of taxes collected (i.e. the sum across brackets).

## TREATMENT EFFECTS - Pre-bias and Complier

| pre-bias | yes (>\|5\|) | no (< +/- 5) | all | | yes (>\|5\|) | | no (< +/- 5) | |
|---|---|---|---|---|---|---|---|---|
| post-bias treated | all | all | complier | defier | complier | defier | complier | defier |
| | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) | (4a) | (4b) |
| **Panel I** | | | | Tax Poor | | | | |
| regional split treatment | -0.003 | -0.020 | 0.003 | -0.016 | 0.015 | -0.017 | -0.026 | 0.018 |
| | (0.017) | (0.052) | (0.018) | (0.020) | (0.020) | (0.022) | (0.058) | (0.095) |
| **Panel II** | | | | Tax Rich | | | | |
| regional split treatment | -0.047*** | -0.092 | -0.043** | -0.058*** | -0.041* | -0.057** | -0.077 | -0.101 |
| | (0.018) | (0.056) | (0.020) | (0.022) | (0.022) | (0.023) | (0.060) | (0.105) |
| **Panel III** | | | | High-low-Income Tax Ratio | | | | |
| regional split treatment | -0.003 | 0.008 | 0.009 | -0.013 | 0.008 | -0.015* | 0.019 | -0.046 |
| | (0.007) | (0.025) | (0.007) | (0.009) | (0.007) | (0.009) | (0.030) | (0.057) |
| **Panel IV** | | | | Inequality | | | | |
| regional split treatment | 0.035* | 0.029 | 0.059*** | 0.024 | 0.051** | 0.018 | 0.048 | -0.027 |
| | (0.019) | (0.059) | (0.021) | (0.023) | (0.023) | (0.025) | (0.066) | (0.114) |
| **Panel V** | | | | Public Goods | | | | |
| regional split treatment | 0.012 | 0.018 | 0.027 | 0.016 | 0.028 | -0.004 | 0.009 | 0.118 |
| | (0.020) | (0.060) | (0.022) | (0.024) | (0.024) | (0.025) | (0.066) | (0.113) |
| **Panel VI** | | | | Evasion | | | | |
| regional split treatment | -0.001 | -0.040 | 0.037* | -0.044* | 0.031 | -0.033 | 0.032 | -0.282*** |
| | (0.019) | (0.058) | (0.021) | (0.024) | (0.023) | (0.025) | (0.066) | (0.103) |
| **Panel VII** | | | | Mobility | | | | |
| regional split treatment | 0.010 | 0.089 | 0.060** | -0.022 | 0.041 | -0.022 | 0.149** | -0.064 |
| | (0.021) | (0.066) | (0.024) | (0.025) | (0.026) | (0.027) | (0.075) | (0.121) |
| # obs. | 2104 | 331 | 1874 | 1788 | 1591 | 1566 | 283 | 222 |
| Controls | Yes | yes | Yes | yes | Yes | Yes | Yes | Yes |

Table A1: *Treatment Effects: Pre-bias and Complier*

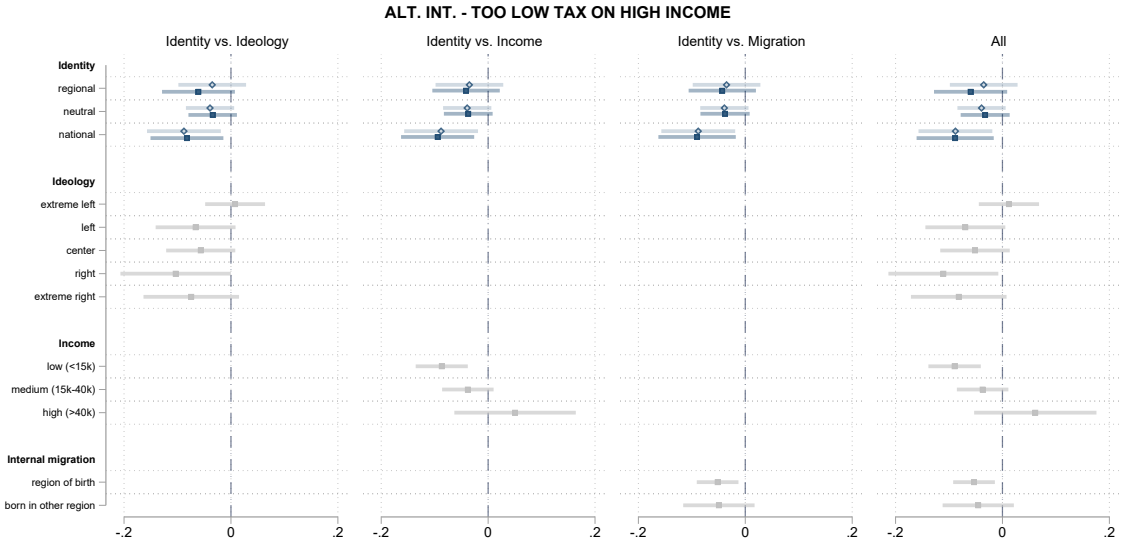
Notes: The table shows the treatment effects for sub-samples organized by the level of the pre-treatment and post-treatment bias. Columns labeled (1) split the sample between those with a pre-treatment bias which in absolute values exceeds 5 (a) and those with unbiased pre-treatment outcomes (b). Models (2) include observations with all levels of pre-treatment bias, (3) the biased observations as (1a), and 4 the unbiased observations as in (1b). Versions (a) and (b) of models (2)-(4) differ by the post-treatment bias of the treated. but observations which had a bias pre-treatment larger than 5 percentage points around the true value, models (b) include observations which got the split about right. Robust standard errors in parenthesis * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

## TREATMENT EFFECTS - ROBUSTNESS SAMPLE

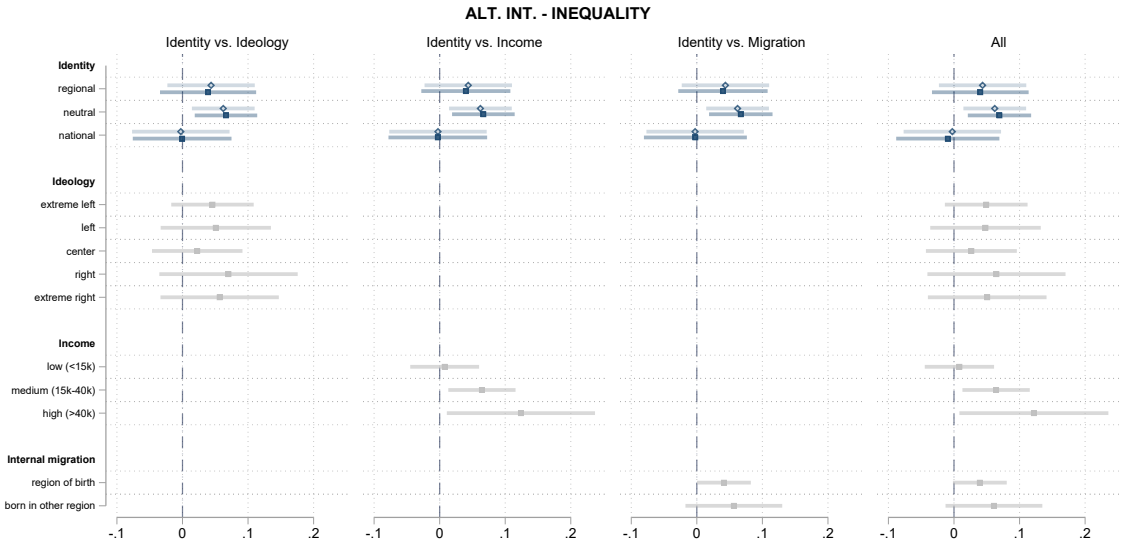
| | Tax Poor | | Tax Rich | | High-low Ratio | | Inequality | | Public Goods | | Tax Evasion | | Mobility | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1a) | (1b) | (2a) | (2b) | (3a) | (3b) | (4a) | (4b) | (5a) | (5b) | (6a) | (6b) | (7a) | (7b) |
| **Panel I** | Full sample including flagged and observations missing controls | | | | | | | | | | | | | |
| regional split treatment | -0.009 | -0.009 | -0.050*** | -0.057*** | -0.002 | -0.002 | 0.051*** | 0.042** | 0.033* | 0.019 | -0.002 | -0.012 | 0.016 | 0.018 |
| | (0.015) | (0.015) | (0.017) | (0.016) | (0.006) | (0.006) | (0.018) | (0.018) | (0.018) | (0.018) | (0.018) | (0.018) | (0.020) | (0.019) |
| # obs. | 3002 | 2978 | 3002 | 2978 | 3002 | 2978 | 3002 | 2978 | 3002 | 2978 | 3002 | 2978 | 2597 | 2574 |
| **Panel II** | Full sample excluding observations with missing controls but including flagged observations | | | | | | | | | | | | | |
| regional split treatment | -0.010 | -0.009 | -0.050*** | -0.056*** | -0.001 | -0.002 | 0.053*** | 0.041** | 0.030 | 0.019 | -0.006 | -0.014 | 0.021 | 0.018 |
| | (0.015) | (0.015) | (0.017) | (0.016) | (0.006) | (0.006) | (0.018) | (0.018) | (0.019) | (0.018) | (0.018) | (0.018) | (0.020) | (0.019) |
| # obs. | 2968 | 2968 | 2968 | 2968 | 2968 | 2968 | 2968 | 2968 | 2968 | 2968 | 2968 | 2968 | 2567 | 2567 |
| Controls | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |

Table A2: *Treatment Effects: Robustness Sample*

Notes: The table shows results from linear models for all outcomes with and without controls. Panel I includes flagged observations (long duration, etc.), and panel II excludes observatiuons with missing covariates from the former. Robust standard errors in parenthesis * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$



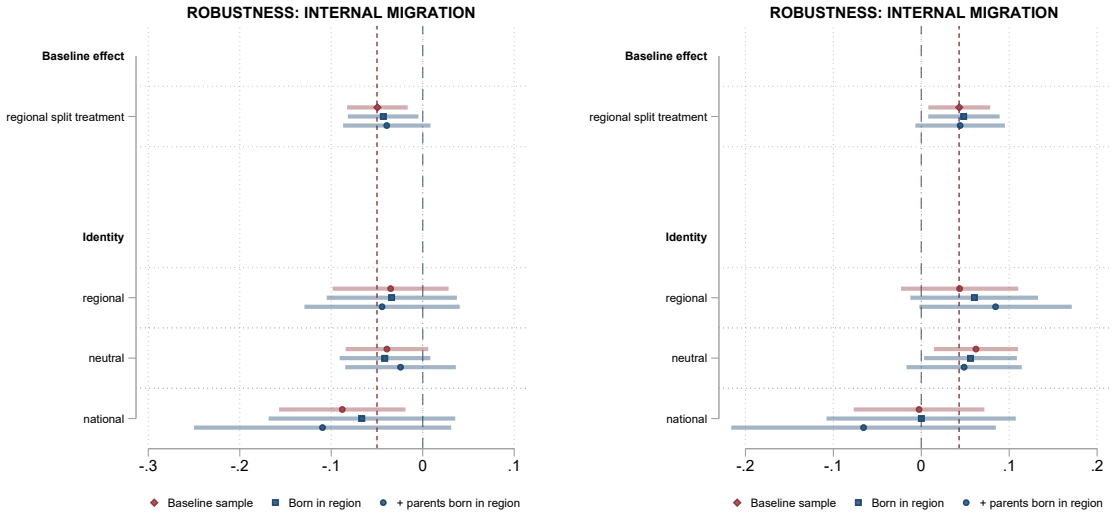

(a) Taxes on Rich




(b) Inequality

Figure A9: *Robustness: Other Mechanisms*

Notes: Both panels show marginal effects obtained from a model including an interaction term between treatment and identity, and adding a further interaction between treatment and ideology, income, and migration, respectively. The last specification includes all interactions simultaneously. Panel (a) repeats results for the question on taxes on the rich as in 14(b), while panel (b) shows results with inequality aversion as outcome as in 14(d). 95% confidence bands indicated around means.




(a) Taxes on Rich

(b) Inequality

Figure A10: *Robustness: Internal Migration*

Notes: Results are based on two modified samples which consist i) of respondents living in their region of birth (blue squares, approx.75% of all observations) and ii) respondents who live in their region of birth and their parents are also born in that region (blue circles, approx. 50% of observations). Baseline estimates are indicated in red diamonds. 95% confidence bands indicated around means.

# B. Survey

## B.1. Introduction

**English:** We are a group of academic researchers working at a public university in Europe and we undertake this study independently of any government or governmental institution. We have no specific agenda to promote whatsoever, nor do we have any economic or financial interests that relate to the outcomes of this research.

We are interested in how people assess the tax system and in determining how much support there is for different tax policies. By participating in this survey you will contribute to our knowledge as a society, independent of your political views. The purpose of this study is solely academic, and our results are intended to improve policy formulation and the welfare of society as a whole.

It is of great importance for the success of our research that you read the questions very carefully and respond as honestly as possible. If you don't know the exact response to a factual question, please provide your best guess estimate. However, we ask you to assign sufficient time to reading and understanding the questions. Please answer all questions. The survey is expected to take around 15 minutes to complete.

Your participation in this study is completely confidential and your name will not be recorded or included in any discussion of the results. Our results will be presented in aggregate form and no individual respondent will be identified.

If you have any questions about our project or you are interested in receiving a copy of the final study, please contact us by email at investigacion@mail.com.

**Original Spanish:** Somos un grupo de investigadores que trabajamos en una universidad pública europea. Este estudio se lleva a cabo desde la imparcialidad y la independencia de cualquier gobierno u organismo público. No tenemos mandato alguno para promover nada en concreto ni tenemos intereses económicos o financieros relacionados con los resultados de este estudio.

Nos interesa conocer lo que opina la población sobre el sistema fiscal y saber si estÃ¡n de acuerdo con ciertas polÃticas fiscales. Al participar, estará contribuyendo a que conozcamos mejor nuestra sociedad, independientemente de cuáles sean sus tendencias políticas. Este estudio se lleva a cabo con objetivos meramente académicos, y sus resultados se utilizarán para mejorar la formulación de las polÃticas públicas y el bienestar de toda la sociedad.

Para que el estudio sea fiable, es muy importante que responda con total sinceridad y que lea las preguntas atentamente antes de responder. Si no sabe una respuesta a una pregunta factual, ponga una estimación. Sin embargo, le rogamos que dedique el tiempo necesario a leer bien y a entender las preguntas. Le agradeceremos que responda a todas

las preguntas. En principio, solo le llevará unos 15 minutos.

Le garantizamos que su participación en el estudio es completamente confidencial. Bajo ningún concepto quedará grabado su nombre cuando se analicen los resultados. Los resultados serán datos agregados, ninguno de los encuestados será identificado.

Si tiene alguna duda sobre nuestro proyecto o le interesa recibir un ejemplar del informe final una vez se dé por finalizado, puede ponerse en contacto con nosotros por correo electrónico investigacion@mail.com.

## B.2. Survey Questions

I. Background Questions

1) **What is your gender?** Male (1); Female (2); Transgender (3); Other (4).

2) **How old are you?**

   (numerical response)

   **Please indicate your marital status:** Single (never married) (1); Married (2); Domestic partnership (3); Divorced (4); Widowed (5); Other (6).

   **How many children do you have?** 0 (0); 1 (1); 2 (2); 3 (3); 4 (4); 5 or more (5).

   **What is the highest level of education you have successfully completed?** Less than 5 years of schooling (1); More than 5 years without completing *ESO*, *EGB*, or *Bachiller Elemental* (2); *ESO*, *EGB*, *Bachiller Elemental*, or Certificate of Schooling or Primary Studies (3); *Bachiller (LOE, LOGSE)*, *BUP*, *Bachiller Superior*, *COU*, *PREU* (4); FP intermediate, FP I (5); FP superior, FP II, Professional Mastery, or equivalent (6); University degree, *Diplomatura* (two-year degree), or equivalent (7); Licenciate, Architecture, Engineering, or equivalent (8); Official Master's degree, MBA, medical specialization, or analogous (9); Doctorate (10).

   **What is your current principal employment status?** Employed full-time (1); Employed part-time (2); Student (3); Self-employed (4); Currently unemployed (5); Retired (6); Unable to work (7); Other (8).

3) **What is your postal code**

   (5-digit numerical response)

4) **What was your fiscal residence at the time of your last income tax declaration, i.e., for 2018? If you did not make a declaration, please select the Autonomous Community in which you resided for the greatest part of 2018.** Andaluc'ia (1); Arag'on (2); Asturias (Principado de) (3); Balears (Illes) (4); Canarias (5); Cantabria (6); Castilla-La Mancha (7); Castilla-Le'on (8); Catalu na

(9); Comunidad Valenciana (10); Extremadura (11); Galicia (12); Madrid (Comunidad de) (13); Murcia (Region de) (14); Navarra (Comunidad Foral de) (15); Pa'is Vasco (16); Rioja (La) (17); Ceuta (Ciudad Aut'onoma de) (18); Melilla (Ciudad Aut'onoma de) (19).

II. Identity, Politics, etc.

People sometimes consider themselves as forming part of a certain group of people. We would like to know how strongly you feel yourself to be [Autonomous Community of residence], Spanish, and European.

9) **How often do you feel [Autonomous Community of residence]?** Never (1); Seldom (2); Sometimes (3); Often (4); Very often (5); Always (6).

10) **How often do you feel Spanish?** Never (1); Seldom (2); Sometimes (3); Often (4); Very often (5); Always (6).

11) **How often do you feel European?** Never (1); Seldom (2); Sometimes (3); Often (4); Very often (5); Always (6).

12) **What do you think best explains why a person is poor?**

*Scale of (1-10)* 1 indicates "Lack of effort in his or her own part" and 10 indicates "Circumstances beyond his or her control"

13) **What do you think best explains why a person is rich?**

*Scale of (1-10)* 1 indicates "Because he or she has worked harder than others" and 10 indicates "Because he or she had more advantages than others"

14) **Where would you place yourself on the political spectrum?**

*Slider of (-5 5)* -5 indicates "Far left" and 5 indicates "Far right"

15) **The next question is about the general elections held last November. In talking to people about elections, we often find that many were not able to vote because they were not registered, because they were sick, or simply because they could not find the time. Did you vote in the elections held in November 2019?** Yes (0); No (1); Don't remember (98).

16) **Did you vote in the last elections for the government of your Autonomous Community?** Yes (0); No (1); Don't remember (98).

17) **How much of the time do you think you can trust the politicians of the central government to do what is right?** Almost always (1); A lot of the time (2); Not very often (3); Almost never (4); Don't know (98).

18) **How much of the time do you think you can trust the politicians of your Autonomous government to do what is right?** Almost always (1); A lot of the time (2); Not very often (3); Almost never (4); Don't know (98).

19) **In Spain there are approximately 25 million people in the active population. In your opinion, what percentage of people in Spain have an income lower than yours?** The income of 0 to 10% of the people in Spain is lower than mine (0); The income of 10% of the people in Spain is lower than mine (1); The income of 20% of the people in Spain is lower than mine (2); The income of 30% of the people in Spain is lower than mine (3); The income of 40% of the people in Spain is lower than mine (4); The income of 50% of the people in Spain is lower than mine (5); The income of 60% of the people in Spain is lower than mine (6); The income of 70% of the people in Spain is lower than mine (7); The income of 80% of the people in Spain is lower than mine (8); The income of 90% of the people in Spain is lower than mine (9).

20) **In your opinion, how much tax evasion is there in Spain?** There is a lot of tax evasion (1); There is a fair bit of tax evasion (2); There is little tax evasion (3); There is very little tax evasion (4); There is no tax evasion (5); Don't know (98).

21) **And in your Autonomous Community (AC)? How would you evaluate the situation there with regard to tax evasion relative to that in other Autonomous Communities?** There is no tax evasion in my AC (1); Much less tax evasion than in other ACs (2); A little bit less tax evasion than in other ACs (3); The same amount of tax evasion (4); A bit more tax evasion than in other ACs (5); Much more tax evasion than in other ACs (6); Don't know (98).

22) **Which of these taxes did you have to pay in the fiscal year 2018? Please indicate all the taxes you paid, regardless of how much you had to pay.** Personal income tax (1); Value-added tax (VAT) (2); Corporate tax (3); Wealth tax (4); Inheritance and gift tax (5); Retired (6); Property transaction tax (7).

III. Fiscal questions

The following questions concern the *income you earned in 2018 and the personal income tax (IRPF) you paid in the last campaign (ie the income you declared in your last declaration in spring 2019).*

It is important that the answers you give here are as accurate as possible.

23) **Please indicate how much labor income (that is, income from your work, self-employed activities, pension, etc.) you declared in your income tax declaration for the 2018 tax year. If you had no income, please answer 0 euros.**

Individual annual labor income declared in 2018: *(numerical response)* €

24) **Please indicate how much capital income (interest, dividends, rents, etc.) you declared in your income tax declaration for the year 2018. If you had no capital income, please answer 0 euros.**

Individual annual capital income declared in 2018: *(numerical response)* €

IV. Prior

The following questions concern the amount of personal income tax that you pay. Here, we are interested in what your opinion is or what you believe. *If you do not know the exact amount, please just record a best guess estimate*.

25) **Please indicate the amount of taxes you paid on average in your 2018 personal income tax declaration; that is, the overall percentage of your income you paid to the government tax office.**

*(0-100) Scale*

26) **Suppose you earned an extra 100 euros labor income in 2018. How much tax would you have to pay for those extra 100 euros? Please indicate your tax liabilities using the slider below:**

*(0-100) €*

27) **What share of your total personal labor income is taxed at *tax rates decided by the central government?*** *(0-100)* 0 indicates "The central government decided none of the tax rates on my personal labor income" and 100 indicates "The central government decided the tax rates which apply to my entire personal labor income"

V. Quality Control (Meade and Craig, 2012)

Before proceeding to the next set of questions, we want to ask you to provide feedback on the responses you have provided so far. It is vital to our study that we only include responses from respondents who have devoted their full attention to this study. Your response to this question will not affect in any way the payment you receive for taking this survey.

28) **In your honest opinion, should we use your responses, or should we discard your responses since you did not devote your full attention to the questions so far?** Yes, I have devoted my full attention to the questions, and I think you should use my responses for your study (1); No, I have not devoted my full attention to the questions, and I do not think you should use my responses for your study (2).

VI. Treatment: Regional importance of the tax

*Video animation*

VII. First stage

29) **What percentage of your personal labor income was taxed by *tax rates decided by the Autonomous Community* of [AC of fiscal residence] according to the current legislation?**

*(0-100) Scale* 0 indicates "The government of the AC decided none of the tax rates which apply to my personal labor income" and 100 indicates "The government of the AC decided the tax rates which apply to my entire personal labor income"

30) **Suppose once again that you earned an additional 100 euros labor income in 2018. Please indicate how much of this extra 100 euros you could have kept for yourself after paying personal income taxes:**

*(0-10)* €

VIII. The following set of questions is designed to find out what *you personally believe to be fair*.
We would like you to indicate what you consider to be a fair distribution of the tax burden between four individuals. The four individuals are identical other than for the fact that they have very different levels of income. The poorest individual earns 10,000 euros per year (833 euros per month) while the richest earns 180,000 euros per year (15,000 euros per month).

31) **Imagine all four individuals earn an additional 100 euros of labor income in 2018. Please indicate the amount of tax (between 0 and 100 euros) each of the four should pay for this extra 100 euros of income. For example, if you indicate 20 euros, then the individual would receive 80 euros and the government 20.**

Individual 1 (who has already earned 10,000 euros per annum or 833 euros per month) should pay:
*(1-100)* €

Individual 2 (who has already earned 30,000 euros per annum or 2500 euros per month) should pay:
*(1-100)* €

Individual 3 (who has already earned 90,000 euros per annum or 7,500 euros per month) should pay:
*(1-100)* €

Individual 4 (who has already earned 180,000 euros per annum or 15,000 euros per month) should pay:

*(1-100)* €

32) **We applied the tax code for 2018 of your AC to the four individuals and found that the sum of their true tax payments would amount to:** *[AC specific value]* €

**Please reconsider the tax payments you believed the four individuals should pay and fix their payments so that they add up to the overall sum of tax payments which would be collected by applying the tax rates of your AC.**

You need to collect a total of *[AC specific value]* €Individual 1 (who has already earned 10,000 euros per annum or 833 euros per month) should pay:
*(1-100)* €

Individual 2 (who has already earned 30,000 euros per annum or 2500 euros per month) should pay:
*(1-100)* €

Individual 3 (who has already earned 90,000 euros per annum or 7,500 euros per month) should pay:
*(1-100)* €

Individual 4 (who has already earned 180,000 euros per annum or 15,000 euros per month) should pay:
*(1-100)* €

Currently you collect *[sum of 4 tax payments]* €

**Do you think the differences in income between rich and poor are:** No problem at all (0); A small problem (1); A problem (2); A serious problem (3); A very serious problem (4).

**For those with low incomes, taxes in Spain are currently...** Much too low (0); Too low (1); About right (2); Too high (3); Much too high (4).

**For those with high incomes, taxes in Spain are currently...** Much too low (0); Too low (1); About right (2); Too high (3); Much too high (4).

33) **Some people believe that public services and social benefits should be improved, even though higher taxes would be needed to meet this additional expenditure. Others believe that it is more important to pay less tax, even though this would result in a reduction in public services and social benefits. Where do you stand on this question?**

*(0-10) Scale* 0 indicates "Lower taxes and fewer public services and social benefits" and 10 indicates "Better public services and social benefits with high wages"

34) **Some people believe that it is important to be honest when it comes to declaring your income and that tax evasion and avoidance is intolerable. Others believe that it is not wrong to evade or avoid some taxes, because the government is probably corrupt and not likely to use the money for the right purpose. Use the slider to indicate where you stand in this debate.**

*(0-10) Scale* 0 indicates "Tax evasion or tax avoidance cannot be justified under any circumstances" and 10 indicates "In some situations tax evasion or tax avoidance can be justified"

35) **Imagine that another Autonomous Community, which is otherwise similar to the Autonomous Community in which you reside, offered you a tax cut on your overall tax bill if you took up residence there. Assuming that all your other circumstances (work, housing, etc.) remained the same, which of the following matches the minimum conditions you would accept in order to move?**

I would not move under any circumstances (1); Paying 10% less than where I currently live (2); Paying 25% less than where I currently live (3); Only paying half of what I pay where I currently live (4); Paying 75% less than where I currently live (5); Paying 90% less than where I currently live (6); I would only move if I no longer had to pay any taxes (7); Don't know (98).

36) **In which Autonomous Community were you born? If you were born outside Spain, please indicate your country of birth.**

(List of countries and Autonomous Communities)

37) **In which Autonomous Community was your mother born? If she was born outside Spain, please indicate her country of birth.**

(List of countries and Autonomous Communities)

38) **In which Autonomous Community was your father born? If he was born outside Spain, please indicate his country of birth.**

(List of countries and Autonomous Communities)