The inequality trap: how high stakes fuel overestimation and equity aversion

Experimental evidence on preferences for redistribution

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Abstract

Bringing existing inequality in South Africa (high) and Switzerland (low) to the lab, we study how people's preferences for redistribution change with the level of income inequality, income mobility, uncertainty of initial income positions, and source of income (random or real-effort based). We find that uncertainty and overconfidence about one's income position undermine demand for redistribution. The effect magnifies with larger income disparity. It further induces a *reverse* POUM effect: since wealth ambitions of rich aspirants are better preserved under low than under high mobility, demand for redistribution grows with the degree of mobility. These results combined propose an *inequality trap*: greater inequality today favors personal income overestimation. Demand for redistribution reduces, in particular with low mobility, which propels advanced inequality tomorrow.

Keywords: overconfidence, income inequality, social mobility, uncertainty

JEL Classification: D31, D63, D84

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1 Introduction

Democracy enables the people to choose policies via the ballot. It is therefore remarkable that, although income inequality has grown worldwide since the 1980s, demand for redistribution has declined continuously throughout the same period (Stiglitz, 2016).[1]

Motivated by the public relevance of socio-economic problems through spreading inequality, there is resurgent research interest in the familiar paradox that "the poor do not expropriate the rich" (Roemer, 1998). Why do poor individuals show little support for redistributive policies and even vote for regressive tax schemes?

Growing wealth and income gaps corrode societies, yet like themselves, consequences are multilayered.[2] Thus, we contribute to the literature by exploiting the controlled lab environment, granting isolated analysis of economic drivers that favor inequality. By testing fresh leads from empirical data experimentally, we follow several studies that accrued more recently to the field.

Durante et al. (2014) adopt a real-world framing, described in more detail below, which highlights different features of the macroeconomy. In our view, their study sets a first benchmark to measure preferences for redistribution in the lab. They find that a mix of classical motives concurs in determining support for redistributive policies. This includes maximization of expected earnings, demand for self-insurance against future income shocks, and social concern for inequality and efficiency.

The present study focuses on related issues beyond the scope covered by Durante et al. (2014), i.e., the influence of pre-tax inequality on people's demand for redistribution and its interaction with social mobility. Pre-tax inequality can impact redistributive demand under various aspects, e.g., distortionary costs of taxation, fairness of income differences, legitimacy of the redistribution process, or its leverage on people's expectations about their prospects in life. Much work has documented a human tendency to hold overoptimistic beliefs (e.g., Moore and Healy, 2008). This overconfidence differs

[1] Over the period 1980-2016, the top 1% captured twice as much of the world's income growth as the bottom 50% (Alvaredo et al., 2018). Despite these large inequality shifts, top marginal income tax rates reduced drastically (on average from 70% to 42 % in the major world economies), with redistribution achieved by the tax-benefit systems also falling (Atkinson, 2015; Piketty, 2014).

[2] Economic inequality causes problems for well-being, social cohesion, health, access to education, public order, mortality, etc. (Wilkinson and Pickett, 2017). At the time of writing this paper, the explosion of healthcare needs and the fear of an upcoming recession have made the inequitable response to the COVID-19 pandemic evident (Ahmed et al., 2020). Moreover, the large media attention around the social unrest across major US cities in the aftermath of the death of George Floyd has raised awareness for the negative implications of social inequality and sparked a public debate.

from the rational prospect of upward mobility (POUM hypothesis) that people with an income below average (the poor) can have to move up the income ladder when actual mobility is sufficiently high (Benabou and Ok, 2001). Though different from rational expectations, overconfidence can interact with true mobility.

By inducing distinct degrees of inequality, our experiment replicates real-world conditions in South Africa, home of the highest national pre-tax inequality, and conditions in Switzerland, the worldwide lowest pre-tax inequality. Whereas in Phase 1 of the experiment subjects know the income distribution but not their individual position, in Phase 2 subjects learn about their income position, which is either randomly assigned or based on an effort task (cf. Durante et al., 2014). By varying income determination and adding a dynamical framework (income mobility) to the treatment set we employ a 2x2x2x2 design altogether, i.e., two within-subject variables (uncertainty vs. certainty of income class, low vs. high income mobility) and two between-subject variables (low vs. high pre-tax inequality, random vs. effort-based income assignment).

In line with Durante et al. (2014), we find that uncertainty about one's income position arouses overconfidence. What is new, overconfidence intensifies with the level of pre-tax inequality. This induces a reverse POUM effect. Since income uncertainty preserves wealth ambitions of rich aspirants better under low than under high mobility, demand for redistribution grows with mobility. Lifting uncertainty of initial incomes is a game-changer. While demand for redistribution increases, the distributional conflict between rich and poor emerges more polarized, particularly so in the high inequality treatment. Combined results suggest that reducing pre-tax inequality and raising awareness of the own economic position can represent two measures to invert what could be called an inequality trap: inequity promotes income overestimation, which depresses demand for redistribution, with the consequence of increasing inequality.

The remainder of the paper is structured as follows. The next section reviews related literature on preferences for redistribution. In Section 3, we describe the data set, the experimental procedure, and the design. Section 4 contains a descriptive and econometric analysis of the results. The last section concludes by discussing the findings, policy implications, and directions for future research.

2 Literature review

A large literature has investigated people's preferences for redistribution. Below we review the main insights relevant for our experiment.

2.1 Rational preferences: redistribution and income uncertainty

The workhorse to analyze redistributive policies, the median voter theorem (Downs, 1957; Meltzer and Richard, 1981), assumes that people know their income position with certainty. Thus, the classic *homo oeconomicus* hypothesis predicts that the below-mean income majority (poor) support redistribution, whereas the above-mean minority (rich) oppose it. The actual amount of redistribution resulting from voting decisions depends on various conditions. Nevertheless, it is widely agreed that the theorem predicts more redistribution than generally observed (Alesina and Giuliano, 2011).

Among the frequently debated ideas for why tax rates deviate from the median voter theorem, we focus on the role of income uncertainty in the following.[3] Today's voting decision affects one's earnings tomorrow given persistent tax schemes. In this case, expectations about the future income position come to the fore. The rational expectation hypothesis considers two effects.

2.1.1 Risk aversion

Risk mitigation implies that also the rich welcome redistribution as a form of self-insurance against future income shocks. Its demand ought to grow in uncertainty (Sinn, 1996). Examining the effect of insurance motives in real-world data can be difficult due to several confounding factors, e.g., multiple equilibria when other insurance opportunities from the private sector are available (Benabou, 2000). Yet, various experiments have confirmed a significant impact of income uncertainty on redistribution preferences (e.g., Cowell and Schokkaert, 2001; Höchtl et al., 2012; Schildberg-Hörisch, 2010).

2.1.2 Prospects of mobility

Preferences for redistribution can also depend on self-expectations to ascend or descend the income ladder. Benabou and Ok (2001) introduced the prospect-of-upward-

[3] Several critics note that the median voter model is too naive for reality as democratic institutions work imperfect (Harms and Zink, 2003), e.g., due to lobbyism by rich individuals (Bartels, 2018).

mobility (POUM) hypothesis. Assuming a concave transition function, limited risk aversion, and some duration of the implemented tax scheme, the theorem proves that a rational median income holder votes for limited redistribution today as she expects an above-mean income tomorrow. Various scholars have studied the impact of mobility prospects with survey data (e.g., Alesina and La Ferrara, 2005; Bernasconi, 2006; Cojocaru, 2014; Laméris et al., 2020). While studies usually find that preferences for redistribution decrease with greater mobility, the relationship between perceived and actual mobility is often weak (e.g., Alesina et al., 2018; Cheng and Wen, 2019). That means studies are generally inconclusive for the POUM hypothesis.

Few experiments have tested the POUM in the lab. Checchi and Filippin (2004) find decreasing average tax rates as income mobility and the length of the implemented tax scheme rise. Agranov and Palfrey (2020) develop a dynamic model of redistributive taxation, which casts the POUM in a Meltzer-Richard set-up. They find in a corresponding experiment that preferred tax rates fall with increasing mobility. Instead, the level of mobility affects inequality not significantly. Both studies, though not fully comparable, bear theory-driven experiments validating the intuition of the POUM hypothesis in view of a dynamic trade-off between actual levels of inequality and mobility. Yet, neither experiment considers a possible impact of personal beliefs and perceptions, generated by income uncertainty in a dynamic framework (mobility).

2.2 Social preferences, merit, luck

Besides self-interest, economists used to consider social preferences mainly from a normative perspective, reflecting an impartial position (Harsanyi, 1955; Rawls, 1971). From a more practical view, self interest and social concern likely co-determine attitudes towards economic divisions, e.g., income distributions (Bolton and Ockenfels, 2000; Charness and Rabin, 2002; Fehr and Schmidt, 1999).

Many models of social preferences underlie the close connection between the notions of risk aversion and inequality aversion (Atkinson, 1970). It implies that the greater inequality is, the higher the demand for redistribution ceteris paribus. Moreover, when redistribution is free of costs, the level of pre-tax inequality ought not to affect preferences for post-tax inequality. The caveat 'ceteris paribus' is important from a positive perspective. Much work has affirmed how people's culture, history, or traits can affect beliefs about justice and fairness, thus redistributive policy decisions (Alesina and Angeletos, 2005; Benabou and Tirole, 2006; Piketty, 1995).[4]

Survey evidence suggests that people are willing to accept more inequality when income is obtained by merit instead of pure luck (Cojocaru, 2014; Fong, 2001; Luttmer and Singhal, 2011). There is mixed experimental support for this conjecture. Gee et al. (2017) conduct an experiment in which absolute thresholds rather than tournaments between subjects determine payoffs. Here, the degree of inequality affects redistribution preferences less than when incomes are generated by luck (control treatment). Balafoutas et al. (2013); Kesternich et al. (2018); Ku and Salmon (2013); Lefgren et al. (2016) find mixed evidence, too. Durante et al. (2014) report greater demand for redistribution when luck rather than effort decides over income positions. The difference occurs before subjects learn their income position but disappears after. Durante et al. (2014) attribute the effect to people's overconfidence about their ability in the effort task.

Luck can also be viewed as a form of fairness under certain conditions, e.g., when goods are indivisible (Broome, 1984; Diamond et al., 1967; Sen, 1970). It can be further regarded as necessary to prevent society from drifting towards too rigid structures that bear negative socio-economic externalities (Arrow et al., 2000; Young, 1958).

2.3 Behavioural approaches

Explaining limited redistribution by misperceiving wealth differences has caught growing attention in the debate on inequality. Misperception can affect how people evaluate their current situation and the way they look into the future.

2.3.1 Misperception of social inequality and mobility

Studies focusing on current income, respectively wealth, find large discrepancies between underestimated and existing inequality (Ashok et al., 2015; Cruces et al., 2013; Hauser and Norton, 2017; Karadja et al., 2017; Norton and Ariely, 2011). They observe a general preference for even less inequality than the already underestimated levels.

Few studies have analyzed the relationship between people's expectations of future income positions based on perceived versus actual mobility (Davidai and Gilovich,

[4] Roemer (1998) has shown that sociological traits (e.g., religion, ethnicity) can affect demand for redistribution also when they represent politically relevant, secondary divides used by low-tax parties to distract a fraction of the poor from voting for high redistribution (see Corneo and Neher, 2015). While experiments can control for secondary channels, e.g., by using homogeneous samples, results of experiments can still be influenced by cultural and sociological factors when they affect moral values globally.

2015; Kraus and Tan, 2015). The evidence is mixed. In line with the "American Dream", Alesina et al. (2018) find that Americans' beliefs about mobility are more optimistic than Europeans' and that while the former are also over-optimistic regarding the level of actual mobility, the latter tend to be over-pessimistic. Other studies find contrasting evidence and argue that Americans' beliefs of social mobility are pessimistic (Cheng and Wen, 2019; Swan et al., 2017).[5]

2.3.2 Overconfidence

A different form of misperception that can affect expectations is overconfidence. Various explanations can underlie overconfidence, including cognitive errors, self-motivated beliefs, self-esteem, or social context (Köszegi, 2006; Logg et al., 2018; Schwardmann and Van der Weele, 2019). Forms of overconfidence specifically relevant in economics occur not only when people overestimate their absolute abilities but also when they believe their abilities are better than others', referred to as overplacement or 'better-than-average' bias[6] (DellaVigna, 2009).

Overconfidence can also be related to other forms of optimistic beliefs, such as people's tendency to overestimate preferred outcomes (Brunnermeier and Parker, 2005; Heger and Papageorge, 2018). It can respond to social stereotyping and exhibit gender effects with men displaying generally higher overconfidence, being particularly prominent in competitive tasks (Bordalo et al., 2019; Buser et al., 2020; Charness et al., 2018).

We are interested in two possible implications of overconfidence in the context of redistributive preferences. First, we argue that greater pre-tax inequality can boost overplacement of the income position; in a world where incomes are close to each other little reason for overestimation exists. The larger a society's median-mean income gap, the greater is the motivation for being overconfident.

[5]Most existing studies focus on inter- rather than intra-generational mobility. Cheng and Wen (2019) also remind that a difficulty to reconcile different results can arise from the multi-faceted nature of income mobility, with transition probability matrices that cannot be easily consigned to a unique measure (Fields and Ok, 1999; Jäntti and Jenkins, 2015).

[6]According to Logg et al. (2018), the better-than-average bias ought to apply to cases where the majority of people claim they are better than the median, while overplacement refers to situations in which a person thinks to obtain a higher ranking on a task test than she does. Note that parallel to the diversity of definitions, the literature maintains a variety of approaches to estimate overconfidence. E.g., Benoît and Dubra (2011) demonstrate that in some cases, beliefs and behaviors consistent with overconfidence can result from a population of rational Bayesians with incomplete information regarding their abilities. Yet, recent evidence by Benoît et al. (2015) shows that true overconfidence is also robust to such Bayesian critique (see also Cheung and Johnstone, 2017).

Second, we suggest that overconfidence can weaken or even reverse the ramifications of the POUM hypothesis. The argument rests on the mean marking the theoretical tipping point in any income distribution between beneficiaries (below-mean or "poor") and benefactors (above-mean or "rich") of direct redistribution. While the poor ought to demand less redistribution with growing mobility, the rich hold rational preferences for more redistribution, considering the enhanced probability to move below average in tomorrow's income distribution. Which of the two opposing forces dominates depends on the shape of the distribution.

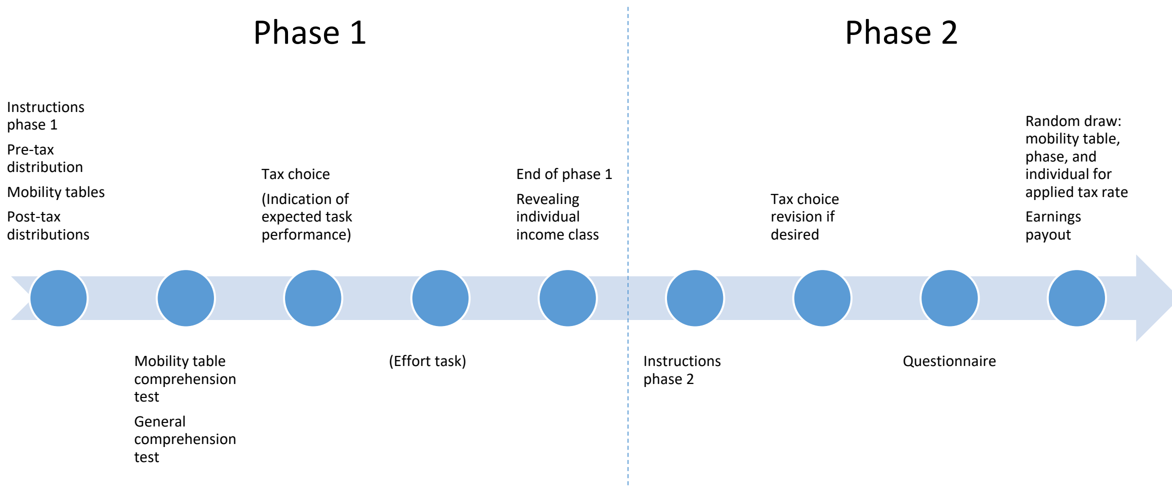
Assuming limited risk aversion, concavity of the transition function, and a minimum length of the redistributive rule, Checchi and Filippin (2004) experimentally confirm a negative relationship between mobility and stated tax rates for the standard case of right-skewed distributions as predicted by the POUM hypothesis. The distribution of expected incomes, and thus aggregated losses of the rich and gains of the poor are invariant of the distribution's skewness but solely determined by the concavity of the transition function. Yet, the gains of the poor concentrate on fewer people with decreasing skewness. Given growing mobility, a lower share of beneficiaries today means less demand for redistribution tomorrow.

In contrast to the standard POUM framework assuming certainty about current income positions, we invite the reader to think of a state in which there is uncertainty about people's current income positions. Under the premise of overconfidence, uncertainty should inflate the fraction of (perceived) benefactors reversing the negative relationship between income mobility and demand for redistribution.

Given people believe to be more able than others and deserve being rewarded for this, they will prefer economic positions invariably awarded on merit. Put differently, they will prefer a rather rigid society in determining social ranking as too much mobility could harm their economic ambitions. One could conjecture that overconfident individuals dislike redistribution under low mobility, while they may be more supportive of it under high mobility. We refer to this hypothesis as the reverse POUM effect.

3 Experiment

We run an experiment to study people's preferences for redistribution conducted at the CERME lab of the Ca' Foscari University in April 2018 using z-Tree (Fischbacher, 2007).



Steps in brackets are only relevant for the effort condition.

Figure 1: Experimental flow.

A total of 160 college students (mainly from the economics faculty) were recruited and assigned randomly via ORSEE (Greiner, 2015) to one of eight sessions with 20 participants each. The sample averages 21 years and is fairly gender-balanced (55% males).

3.1 Procedure

The procedure of our experiment is similar to Durante et al. (2014), in which subjects are asked to state their redistribution preferences under different conditions, both within- and between-subject. Figure 1 illustrates the flow of a typical session which lasted 75 minutes and was divided into Phase 1 and Phase 2. Each of the two phases asked participants to choose two tax rates for redistributive transfers (hence, four tax rates in total) that could affect their own payoff and the payoffs of the other participants.[7]

Phase 1

At the beginning of each session, the experimenters hand out instructions for Phase 1 and read them aloud to subjects. The instructions mention a division into two phases and that only one of the phases, randomly chosen, counts for payment. However, the content of Phase 2 is not further specified until its very start.[8]

[7]Subjects received an additional show-up fee of 5 €.

[8]The instructions for the two phases are in Online Appendix A.

Table 1: Pre-tax income distributions

Income quintile	Switzerland (Low inequality)	South Africa (High inequality)
1	4.80 €	1.25 €
2	7.15 €	2.35 €
3	8.90 €	4.00 €
4	11.25 €	7.95 €
5	17.95 €	34.45 €
Income average ($\overline{X}$)	10.00 €	10.00 €

Pre-tax income distribution

The instructions of Phase 1 tell participants that they and the other 19 participants form a society with a pre-tax income distribution of five income classes X_i, i = 1,2,...,5 and four subjects per class. They further learn that the income distribution represents one of the world's top 40 national economies scaled down to an average income $\overline{X} = 10$ €. The actual country's income distribution varies among two between-subject treatments (Table 1). Note, whereas the instructions inform subjects of the pre-tax income distributions, their own income assignment remains unknown to them until the end of Phase 1. They only know the assignment mechanism of income positions, which could either be random or based on an ability task in two further between-subject treatments.

Mobility process

The instructions explain to participants that the pre-tax income distribution lasts for two periods t=1 and t=2. The payoffs received by each subject at the end of the experiment will be determined by a tax rate randomly chosen among all tax rates indicated by participants and applied to the final period (t=2) pre-tax income distribution. Subjects learn that income levels remain constant between periods, but subjects' initial income assignments can change between periods according to a specific mobility process, which translates incomes $X_{i,1}$ in the initial period t=1 into incomes $X_{i,2}$ in t=2 (see Section 3.2.4). A mobility table or transition matrix M specifies the probability $p_{i,j}$ to move from a certain income class i in t=1 to an income class j in the final period t=2.

$$M = \begin{bmatrix} p_{11} & \cdots & p_{15} \\ \vdots & \ddots & \vdots \\ p_{51} & \cdots & p_{55} \end{bmatrix} = (p_{i,j}) \in \mathbb{R}_+^{5\times 5} \qquad \sum_{i=1}^{5} p_{i,j} = 1 \quad \forall\ j = 1,2,...,5$$

Income distributions in t=1 and t=2 are identical as no economic growth is included. Phase 1 presents subjects with two mobility tables and asks them to indicate their preferred tax rates, one for each mobility process. If the computer selects Phase 1 for payment, one of the two mobility tables will be randomly picked and used to determine the pre-tax distribution in t=2 to which the tax rate chosen is then applied.

Taxation

The last piece of information given in Phase 1 concerns the tax and transfers system used to determine the post-tax income distribution. We apply a standard formula to tax incomes, based on full and equal redistribution of collected tax revenues among all income classes:

$$Y_j = X_j - \tau X_j + \frac{1}{20}\tau \sum_{k=1}^{20} X_k = (1-\tau)X_j + \tau \overline{X} \tag{1}$$

where X_j is a subject's pre-tax income class after transitioning, τ the applied tax rate, and Y_j her post-tax income counting for payment. Albeit the instructions list the formula only in their appendix, they include post-tax distributions (Table 2) generated by applying τ, ranging from 0% to 100% in increments of 10%, to the pre-tax distribution.

Before indicating their preferred tax rates for the two mobility tables, subjects have to pass two comprehension tests to ensure their understanding of the experiment. One test is directed at the mobility treatment. The other validates participants' comprehension of the overall procedure. Subjects can not advance to the main experiment until both tests are correctly answered. Upon successful completion, they express their preferred tax rates, not knowing their initial pre-tax incomes. As indicated, the latter are disclosed not before submitting tax choices at the end of Phase 1 (see Fig. 1).

Phase 2

After uncovering initial pre-tax incomes, the computer program informs subjects about the start of Phase 2. Ultimately knowing their initial income position, they are asked again for their preferred tax rate dependent on the two mobility tables. Whether experimental earnings are based on subjects' choices in Phase 1 or Phase 2 is randomly determined at the end of the experiment, together with the mobility table and the applied tax rate of one participant. Before receiving payments in cash, subjects complete a questionnaire, including demographic information.

3.2 Treatments

Figure 1 outlines the procedure implementing four experimental variations, two between-subject and two within-subject.

3.2.1 Phase 1/income uncertainty vs. Phase 2/certainty (within-subject)

The first source of variation distinguishes whether subjects are uninformed or informed of their initial incomes. This paper uses Phase 1/Phase 2 and uncertainty/certainty of

Table 2: Post-tax distributions in € shown to subjects.

Switzerland

applied tax rate τ	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1^{st} quintile	4.80	5.32	5.84	6.36	6.88	7.40	7.92	8.44	8.96	9.48	10.00
2^{nd} quintile	7.15	7.44	7.72	8.01	8.29	8.58	8.86	9.15	9.43	9.72	10.00
3^{rd} quintile	8.90	9.01	9.12	9.23	9.34	9.45	9.56	9.67	9.78	9.89	10.00
4^{th} quintile	11.25	11.13	11.00	10.88	10.75	10.63	10.50	10.38	10.25	10.13	10.00
5^{th} quintile	17.95	17.16	16.36	15.57	14.77	13.98	13.18	12.39	11.59	10.80	10.00
Income ratio $5^{th}/1^{st}$	3.74	3.23	2.80	2.48	2.55	1.89	1.66	1.47	1.29	1.14	1

South Africa

applied tax rate τ	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1^{st} quintile	1.25	2.13	3.00	3.88	4.75	5.63	6.50	7.38	8.25	9.13	10.00
2^{nd} quintile	2.35	3.12	3.88	4.65	5.41	6.18	6.94	7.71	8.47	9.24	10.00
3^{rd} quintile	4.00	4.60	5.20	5.80	6.40	7.00	7.60	8.20	8.80	9.40	10.00
4^{th} quintile	7.95	8.16	8.36	8.57	8.77	8.98	9.18	9.39	9.59	9.80	10.00
5^{th} quintile	34.45	32.01	29.56	27.12	24.67	22.23	19.78	17.34	14.89	12.45	10.00
Income ratio $5^{th}/1^{st}$	27.56	15.03	9.85	6.99	5.19	3.95	3.04	2.35	1.80	1.36	1

Note: Countries' names and income ratios are not shown to participants.

initial positions interchangeably.[9]

3.2.2 Low (Switzerland)/high (South Africa) inequality, (between-subject)

To study the effect of pre-tax inequality on preferences for redistribution, we opt for a between-subject design avoiding any carry-over effects. Comparing national pre-tax inequality on a global level identified South Africa (highest inequality index, World Bank, 2014) and Switzerland (lowest, Bundesamtfür Statistik, 2017) as the two extremes on the scale. Table 1 replicates the real pre-tax distributions in quintiles scaled down to an average income of 10 €. One-half of the subjects are exposed to the Switzerland pre-tax distribution (CH, low inequality) and the other half to the South African (ZA, high inequality). Countries are not specified to exclude any confounding effects.

3.2.3 Random vs. effort based income assignment (between-subject)

While in one-half of the sessions, the computer assigns pre-tax incomes randomly to subjects, in the other half, incomes are based on the relative performance in a real effort game (Gill and Prowse, 2012). Within two minutes, subjects have to place as many sliders as possible in the center of a bar. In addition, subjects indicate their expected income quintile beforehand according to their expected performance. Although Gill and Prowse (2019) argue for the superiority of the slider task in comparison with other real-effort tasks, we intend to minimize task-specific effects on subjects' performance expectations by placing it after the first tax choice (Fig. 1).[10]

3.2.4 Low vs. high income mobility (within-subject)

Subjects state their preferred tax rate in both phases of the experiment for two 5x5 income transition matrices (Table 3). In the low (high) mobility matrix, much (little) weight lays on the diagonal resulting in a low (high) likelihood to move upward and

[9]Some authors (e.g., Durante et al., 2014) tend to assimilate the condition in Phase 1 with choice under the *veil of ignorance*. Since the latter term directs to a construct used in political philosophy to induce a position of impartiality in judging distributions from a purely normative perspective (Rawls, 1971), we refer to the uncertainty condition of initial incomes rather not by the veil of ignorance.

[10]Alternative real-effort tasks used to allocate income positions in related experiments include manual ability tests, quizzes of general knowledge, or mathematical or linguistic (reading, spelling, etc.) competence games. Results do not seem to vary greatly. E.g., Durante et al. (2014) do not find significant performance differences between a Tetris game or a general knowledge quiz.

Table 3: Income mobility tables

Low mobility

from\to	1^{st} quintile	2^{nd} quintile	3^{rd} quintile	4^{th} quintile	5^{th} quintile
1^{st} quintile	75%	25%	0%	0%	0%
2^{nd} quintile	25%	50%	25%	0%	0%
3^{rd} quintile	0%	25%	50%	25%	0%
4^{th} quintile	0%	0%	25%	50%	25%
5^{th} quintile	0%	0%	0%	25%	75%

High mobility

from\to	1^{st} quintile	2^{nd} quintile	3^{rd} quintile	4^{th} quintile	5^{th} quintile
1^{st} quintile	50%	25%	0%	25%	0%
2^{nd} quintile	25%	25%	25%	25%	0%
3^{rd} quintile	25%	0%	25%	25%	25%
4^{th} quintile	0%	25%	25%	25%	25%
5^{th} quintile	0%	25%	25%	0%	50%

downward in the income distribution. The low mobility matrix does not satisfy the POUM hypothesis - the expected income in t=2 for subjects with a median income in t=1 (i.e., subjects in the third quintile) lingers below average - while the high mobility matrix does.[11] Instructions emphasize that the pre-tax distributions remain constant across the mobility process comprising four subjects per quintile in t=1,2. The choice of a (5x5) mobility table is partly due to making the matrix functioning intelligible to subjects and partly because of maintaining a sufficient degree of real-world diversity of social classes. Feedback from a pilot experiment in which we tested subjects' comprehension of mobility tables confirmed our considerations in favor of 5x5 order matrices.

3.3 Theoretical predictions

Table 4 summarizes all treatments in view of three classical criteria, being the most directly linked to the rational and social preference models reviewed above. Afterward, we discuss further applicable effects that do not enter the most standard concepts.

[11]The low mobility matrix is inspired by existing levels of income mobility in South Africa (Finn and Leibbrandt, 2013), whereas the high mobility table replicates Scandinavian countries (Jantti et al., 2006).

3.3.1 Profit maximization

The first criterion represents expected payoff maximization (Table 4, column 2). It is equivalent to risk-neutral behavior. Accordingly, the optimal tax rate $\tau_{opt,h}$ for any subject h is given by the comparison between society's average income equal to $\overline{X} = 10$ in all treatments, and subject h's expected income before tax and transfers, denoted by $E_h[X]$. In Phase 1 treatments with random income assignment and all Phase 2 treatments, $E_h[X]$ computes by the objective probabilities. In the random Phase 1 treatments, $E_h[X] = 10$ holds for all subjects h, implying that any subject can indifferently choose her preferred tax rate τ_h in the interval $[0, 1]$, leading to an average tax rate of .5. In Phase 2, after subjects have been assigned to an income class, $\tau_{opt,h}$ depends on the respective mobility matrix. Given low mobility, it is $E_h[X] < 10$ and hence $\tau_{opt,h} = 1$, for all subjects in the three lower quintiles (60% of subjects); and $E_h[X] > 10$ hence $\tau_{opt,h} = 0$, for all subjects in the two top quintiles (40% of subjects). Opposite frequencies hold for the high mobility matrix, i.e., 40% of subjects with $\tau_{opt,h} = 1$ and 60% with $\tau_{opt,h} = 0$. Note, since the predictions identify the poorer and richer than average in terms of expected future incomes (short *prospective poor* and *prospective rich*), they directly incorporate the POUM hypothesis. In the effort treatments of Phase 1, comparing $\overline{X}$ to $E_h[X]$ depends on subject h's expected performance in the effort task.

3.3.2 Risk aversion

Risk aversion (Table 4, columns 3) implies that subjects with $E_h[X] < 10$ vote for full redistribution, i.e., $\tau_h = 1$, and subjects with $E_h[X] > 10$ prefer $\tau_h > 0$ depending on the individual risk attitude. Risk aversion can also affect the predictions by the POUM hypothesis when people with $E_h[X] > 10$ welcome redistribution because they fear the chance to move downward, which is more pronounced under high than under low mobility. Moreover, due to risk aversion, demand for redistribution must be higher when experiencing high inequality (ZA) than low inequality (CH).

3.3.3 Other-regarding preferences

The predictions in Table 4, column 4 are based on the social preference model of Charness and Rabin (2002). A person's expected payoff represents the selfish motivation while the other-regarding component is captured by a Rawlsian concern for the person with the lowest post-tax income.[12] Subjects with $E_h[X] < \overline{X} = 10$ always vote for full redistribution ($\tau_h = 1$); subjects with $E_h[X] > 10$ choose either $\tau_h = 0$ or 1 depending on their degree of inequality aversion relative to selfish motivation.

3.3.4 Further behavioral drivers

Other issues reviewed in Section 2 that are not captured by the standard theories above can alter the predictions in Table 4. First of all, the mechanism of income assignment can pivot preferences towards higher or lower demand for redistribution. Subjects considering the random less fair than the effort assignment are inclined to support more redistribution under the first than under the second condition and vice versa. In the effort treatments of Phase 1, subjects' expectations about their income position can depend on the method of income determination. Overestimating income positions due to overconfidence can depress the demand for redistribution in the effort but not in the random treatments of Phase 1. As there are more reasons to overestimate when incomes are further away than when they are closer to each other, one question is whether overconfidence grows in pre-tax inequality. A second question concerns the possibly defusing effect of income mobility on overconfidence, resulting in less demand for redistribution under low than under high mobility (the reverse POUM effect).

4 Analysis and results

4.1 Descriptive analysis

Figure 2 reports the distributions of tax rates chosen by participants.[13] The top panels 1-8 show the distributions in treatments of Phase 1, and the bottom panels 9-16 those of Phase 2. The vertical red bars mark the average tax rates.

Phase 1

[12]The original model accounts further for efficiency in the social component. Here it is disregarded since the redistribution scheme applied does not include efficiency costs.

[13]Online Appendix B reports a series of non-parametric tests in support of the descriptive analysis.

Table 4: Treatments and predictions.

Treatments				Predictions: Maximization of expected earnings[1]	Predictions: Risk aversion[2] (demand of self-insurance)	Predictions: Social preferences[3]
Phase 1	Random	ZA	Low	Any τ in $[0,1]$	$\tau = 1$	$\tau = 1$
			High			
		CH	Low			
			High			
	Effort	ZA	Low	Predictions are the same as in the treatments of Phase 2, with $E_h[X]$, which depends on subject h's expected performance in effort task.	Predictions are the same as in the treatments of Phase 2, with $E_h[X]$, which depends on subject h's expected performance in effort task.	Predictions are the same as in the treatments of Phase 2, with $E_h[X]$, which depends on subject h's expected performance in effort task.
			High			
		CH	Low			
			High			
Phase 2	Random	ZA	Low	$\tau = 1$ for subjects with $E_h[X] < 10$ (prospective poor); $\tau = 0$ for subjects with $E_h[X] > 10$ (prospective rich).	$\tau = 1$ for subjects with $E_h[X] < 10$; $\tau > 0$ for subjects with $E_h[X] > 10$, size of τ depends on the degree of risk aversion. For the same degree of risk aversion and same income quintile, τ in South Africa expected to be higher than in Switzerland.	$\tau = 1$ for subjects with $E_h[X] < 10$ and for subjects with $E_h[X] > 10$ with high degree of inequality aversion; $\tau = 0$ for subjects with $E_h[X] > 10$ and low degree of inequality aversion. For same degree of inequality aversion and same income quintile, $\tau = 1$ more likely in ZA than in CH.
			High			
		CH	Low			
			High			
	Effort	ZA	Low			
			High			
		CH	Low			
			High			

Notes: The first and the fourth sub-column in the "Treatments" column refer to the within-subject treatments, while the second and the third sub-column to the between-subject treatments. Thus, the 2×2×2×2 combinations listed in the fourth sub-column represent the 16 sub-treatments of the experiment.

1) The probability π_{hj} of subject h being in income quintile j after the mobility process (t=2), determining her expected income $E_h[X] = \sum_{j=1}^{5} \pi_{hj} X_j$ is given by: i) $\pi_{hj} = \frac{1}{5}\sum_{i=1}^{5} p_{ij}$ in the random treatments of Phase 1, where p_{ij} is the transition probability of moving from quintile i (t=1) to quintile j (t=2) in the mobility tables (low/high); ii) $\pi_{hj} = \sum_{i=1}^{5} \pi_h^i p_{ij}$ in the effort treatments of Phase 1, where π_h^i is the subjective probability of subject h to end-up in income quintile i (t=1) in the real-effort task; and iii) $p_{hj} = p_{ij}$ in all treatments of Phase 2, for any subject h who at the end of Phase 1 is in quintile i.

2) Predictions under risk aversion follow from Jensen's inequality stating that $E_h[u_h(Y_h)] \leq u_h(E_h[Y_h])$ for any increasing and concave utility function u_h, where $E_h[Y_h] = E_h\left[(1-\tau)X_h + \tau\overline{X}\right]$ is subject h's expected post-tax income, so that $u_h(E_h[Y_h]) < u_h(\overline{X})$ whenever $E_h[X_h] < \overline{X}$.

3) Predictions for social preferences are based on the following utility function adapted from Charness and Rabin (2002) and Durante et al. (2014, see Online Appendix C for a thorough discussion): $V_h = (1-\lambda)E_h[Y_h] + \lambda Y^{min}$, where $E_h[Y_h] = \sum_{j=1}^{5} \pi_{hj} X_j (1-\tau) + \tau\overline{X}$ is subject h's post-tax expected income, $Y^{min} = X^{min}(1-\tau) + \tau\overline{X}$ is society's minimum post-tax income, and $\lambda \in (0,1)$ is the relative weight of personal versus inequality concern.

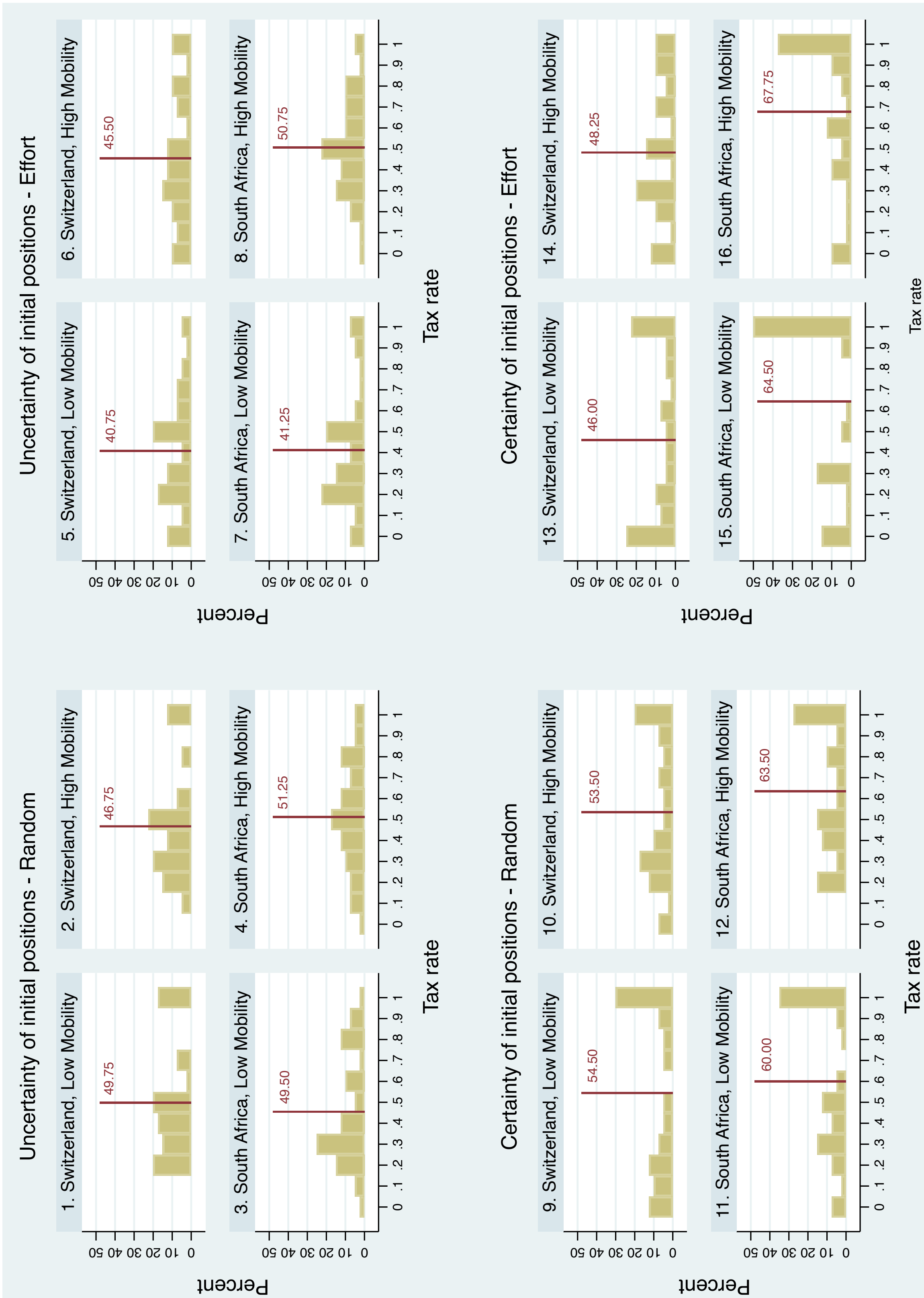


Figure 2: Tax choice histograms.

Tax rates in Phase 1 are not statistically different from .5.[14] Two exceptions are the low mobility treatments with effort (panels 5 and 7), where distributions skew slightly to the right, and average tax rates are just above .4 both for the Switzerland and the South Africa condition. Uniform distributions are consistent with the prediction by expected payoff maximization: subjects choose with equal probability any τ between $[0, 1]$. Yet, the uniformity is inconsistent with inequality aversion and risk aversion (cf. Table 4). Tax rates below .5 in the effort treatments under low mobility are suggestive of overconfidence. On the other hand, tax rates above .5 under high mobility advocate an effect we have termed as the reverse POUM hypothesis, namely that the higher chance of moving downward in the mobility process offsets people's overconfidence.

Phase 2

After lifting uncertainty of initial positions in Phase 2 (panels 9-16), we can easily detect increasing tax rates. The overall average rate between Phase 1 and Phase 2 increases by 11% ($p < .001$). The main driver of the effect comes from ZA (+17%, $p < .001$), while in the CH treatments the effect is lower and statistically not significant (+5%, $p = .180$).

The distributions in Phase 2 take on different shapes as compared to those in Phase 1. In line with the theoretical predictions in Table 4, weights move toward the ends of the tax scale, which are known to be *fat tails*. There are, however, notable deviations from the strict predictions of corner solutions. First and foremost, we observe very few choices of $\tau = 0$ across all treatments (overall 11% in Phase 2). These frequencies are lower than predicted by the principle of expected profit maximization. Whereas the three criteria specified in Table 4 project full redistribution ($\tau = 1$) for at least 60% (40%) of subjects in the low (high) mobility treatments of Phase 2, the data reports instead overall shares of 34%, respectively 24%. Only in the low mobility treatments of South Africa (panel 15), the proportions obtain the majoritarian share of 50%.

The frequency of tax choices $\tau = 1$ in Phase 2 is always greater in the low than in the high mobility treatments for corresponding conditions (e.g., in panels 9 vs. 10, 11 vs. 12, 13 vs. 14, 15 vs. 16). While this is consistent with the POUM theorem, the hypothesis itself is stronger as it requires that under low mobility more people demand

[14] A series of one-sample Kolmogorov-Smirnov tests for discrete distributions (reported in Online App. Table B2) accept the null-hypothesis of uniform distributions in all but three treatments of Phase 1, i.e., the Switzerland treatment with random assignment and high mobility ($p = .070$), and the South Africa treatments with effort (low mobility and high mobility: $p = .030$ and $p = .021$, respectively).

Table 5: Redistribution and post-tax inequality under majority rule.

	Phase 1				*Phase 2*			
Switzerland (CH)	R_LM	R_HM	E_LM	E_HM	R_LM	R_HM	E_LM	E_HM
Median tax rate	0.40	0.40	0.40	0.40	0.50	0.50	0.40	0.50
Post-tax income ratio $5^{th}/1^{st}$	2.55	2.55	2.55	2.55	1.89	1.89	2.55	1.89
South Africa (ZA)	R_LM	R_HM	E_LM	E_HM	R_LM	R_HM	E_LM	E_HM
Median tax rate	0.40	0.50	0.40	0.50	0.50	0.60	0.90	0.80
Post-tax income ratio $5^{th}/1^{st}$	5.19	3.95	5.19	3.95	3.95	3.04	1.36	1.80

Acronyms are as follows: the first digit is R/E for random/effort income assignment; the second is LM/HM for low/high mobility.

τ=1 than τ=0, but the opposite under high mobility. The histograms of Phase 2 show contrary evidence.

Post-tax inequality

Table 5 reports the level of post-tax inequality obtained by applying the majoritarian rule (median tax rates) in the treatments. Two results are worth noticing. The first confirms that post-tax inequality based on the median tax rates and measured by the post-tax income ratio between the top and the bottom quintile always amounts higher in Phase 1 than in Phase 2 between corresponding treatments. This rejects the prediction of more demand for redistribution with less income certainty. The second result follows from comparing CH to ZA treatments. Since there are virtually no differences in tax choice distributions between corresponding treatments in Phase 1,[15] taxation only partially corrects for varying pre-tax inequality within the two countries. In Phase 1, post-tax inequality is twice as large in ZA than in CH for corresponding treatments. The same holds for the random treatments of Phase 2. Only in the effort treatments of Phase 2 (last two columns in Tab. 5) we find comparable levels of post-tax inequality between countries based on substantially higher median tax rates in ZA than in CH.

We come back to the evidence on post-tax inequality after having investigated subjects' choices using regression analysis. We start with Phase 1.

[15] A series of unmatched Mann-Whitney-Wilcoxon rank-sum tests (Online Appendix Table B4) confirm the visual inspection from the histograms in Fig. 2, indicating significantly different tax rate distributions between CH and ZA only for the effort treatments of Phase 2, both with low and high mobility.

4.2 Tax choices when initial incomes are unknown - Phase 1

Table 6 reports the estimates of various tobit regressions. The dependent variable in all models is the tax rate τ_h, chosen by subject h.[16]

Table 6: Tobit regressions - Phase 1: Uncertainty of initial positions

	Phase 1 and Phase 2			Phase 1				
	(1) All	(2) ZA	(3) CH	(4) All	(5) Random	(6) Effort	(7) Effort	(8) Effort
Dependent variable	τ_h	τ_h	τ_h	τ_h	τ_h	τ_h	τ_h	τ_h
Income uncertainty	-0.148***	-0.242***	-0.053					
	(0.034)	(0.049)	(0.045)					
High inequality (ZA)	0.103**			0.014	-0.013	0.022	0.027	0.057
	(0.052)			(0.043)	(0.059)	(0.064)	(0.066)	(0.065)
Low mobility	-0.030	-0.054**	-0.006	-0.046**	-0.013	-0.080**	-0.087**	-0.081**
	(0.020)	(0.025)	(0.032)	(0.023)	(0.028)	(0.036)	(0.040)	(0.040)
Effort	-0.044	0.019	-0.111	-0.053				
	(0.053)	(0.075)	(0.078)	(0.043)				
Prospective poor from self-ass.							0.032	0.153*
							(0.065)	(0.089)
Prosp. poor from self-ass. × Female								-0.254**
								(0.119)
Female	-0.024	-0.016	-0.047	-0.030	-0.120**	0.065	0.058	0.144*
	(0.051)	(0.075)	(0.074)	(0.042)	(0.059)	(0.063)	(0.065)	(0.083)
Constant	0.614***	0.741***	0.597***	0.524***	0.564***	0.445***	0.437***	0.388***
	(0.060)	(0.077)	(0.081)	(0.046)	(0.060)	(0.057)	(0.060)	(0.065)
Observations	640	320	320	320	160	160	160	160
Log-pseudolikelihood	-442.569	-212.214	-224.090	-116.290	-45.129	-66.097	-65.940	-63.264
Pseudo R-squared	0.033	0.061	0.014	0.020	0.072	0.033	0.035	0.074

* p<.1, ** p<.05, *** p<.01.

Model (1) tests for the general effect of uncertain initial income positions. Consistent with the histograms in Figure 2, the Phase 1 dummy indicates a negative effect from income uncertainty on tax rates. The effect is highly significant, with a reduction in average tax rates between Phase 1 and Phase 2 by almost 15%.[17] The gender dummy on the whole experiment is statistically not significant.

Mobility effects

[16]Since there are between-subject and within-subject treatments, standard errors in the following regressions are always adjusted for correlation within subject h's responses.

[17]Note the difference between the tobit estimate and the one based on sample averages (+11% reported in Section 4.1), due to the correction for censored data.

Model (4) regresses preferred tax rates in Phase 1 on three dummies for high inequality, low mobility, and whether subjects are in the random or in the effort treatments. Alone the mobility dummy is negatively significant. Yet, its sign is inconsistent with the POUM hypothesis, predicting if agents are not too risk averse and hold rational expectations, tax rates under low mobility are greater than under high mobility. The evidence supports a reverse POUM effect driven by overconfidence (see below).

Random vs. effort treatments

Models (5) and (6) distinguish random from effort treatments in Phase 1. In the random treatments, only the gender dummy is statistically significant, indicating a lower demand for redistribution by women. Related studies often find the opposite (e.g., Alesina and Giuliano, 2011). Here the effect stems from a lower proportion of women choosing full redistribution (τ=1).[18] Overall, choices in the random treatments are largely consistent with risk neutrality.[19] In line with the credited effect of overconfidence, the impact of low mobility bears significance alone in the effort treatments (Model 6). The gender dummy in Model (6) is statistically not significant, while the negative impact of low mobility cuts the estimated average tax rate from .45 down to .37 (<.5, p<.012). Interestingly, the dummy for South Africa is not significant either. Different from the random treatments, however, this cannot be explained by mere risk neutrality.[20] It can be attributed to higher overconfidence in South Africa than in Switzerland through larger stakes for high performers in the effort task. Subjects' self-assessments about expected performances confirm this conjecture (Fig. 3). Accordingly, subjects overestimate (underestimate) the probability of obtaining better-than-average (lower-than-average) income quintiles. Effects are large and significant for South Africa and men, less pronounced for Switzerland, and generally not significant for females.[21]

[18]Only 15 out of 160 observations in the random treatments of Phase 1 report τ=1, of which 14 were stated by males and 1 by a female participant. Omitting the upper corner solution, the average tax rate for $\tau \in [0, 1)$ is equal to .43 for both males and females. We will return to the evidence that women are more reluctant than men to vote for full redistribution when discussing the results from Phase 2.

[19]Estimated average tax rates in Model (5) for men are .56, and .44 for women, not statistically different from .5 at p=.288 and p=.191, respectively.

[20]Note that the argument of risk neutrality postulates that subject h's expectations about her performance in the effort task imply $E_h[X]$=10, i.e., estimating the chances to end up in any income class equally likely. In this case, however, the dummy for low mobility ought to be insignificant either, as it is the case in the random treatments.

[21]The vast majority of subjects (76%) indicate that they are 'fairly confident' about their self-assessments, 18% are 'very confident', and 6% are 'not confident at all'.

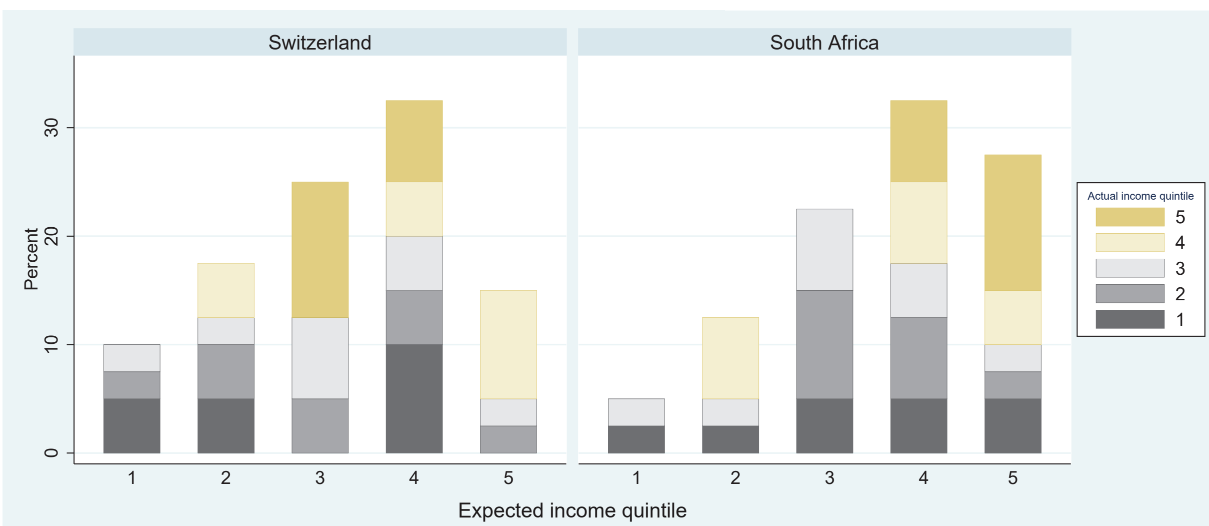
Self-assessments must be taken with care, though. They are not incentivized and based on subjects' expectations to obtain one specific quintile rather than on the distribution of subjective beliefs to end up in any quintile. Moreover, different psychological drivers can affect stated self-assessments and actual decisions, e.g., wishful thinking or optimism (Heger and Papageorge, 2018; Schwardmann and Van der Weele, 2019).

Prospective poor vs. prospective rich

It is nevertheless worth checking how self-assessments relate to tax choices. To this end, we compute subjects' expected pre-tax income $E_h[X]$ based on the self-assessments and separate subjects with $E_h[X] < 10$ from those with $E_h[X] > 10$. We term the first group as 'prospective poor from self-assessment' and the second as 'prospective rich from self-assessment'. Figure 4 shows the distribution of stated tax rates for the two groups in CH and ZA treatments. Minor differences suggest that stated self-assessments by themselves cannot explain preferred tax rates.

Nonetheless, a dummy for 'prospective poor' bears no significance in Model (7),

Figure 3: Subjects' self-assessments in the effort task.



Note: In Switzerland the overall proportions of lower-than-average (quintiles 1 and 2) and better-than-average (quintiles 4 and 5) self-assessments are .28, respectively .48 (difference-of-proportion test d=1.85, p=.064). In South Africa the proportions in the same order are .18 and .60 (d=3.90, p<.001). For females the proportions are .25 and .50 (d=1.264, p=.206) in Switzerland; and .285 and .333 (d=0.334, p=.739) in South Africa; for males the proportions are .29 and .46 (d=1.38, p=.167) in Switzerland; and .05 and .90 (d=5.198, p<.001) in South Africa.

Figure 4: Prospective poor/rich self-assessed in effort treatments of Phase 1

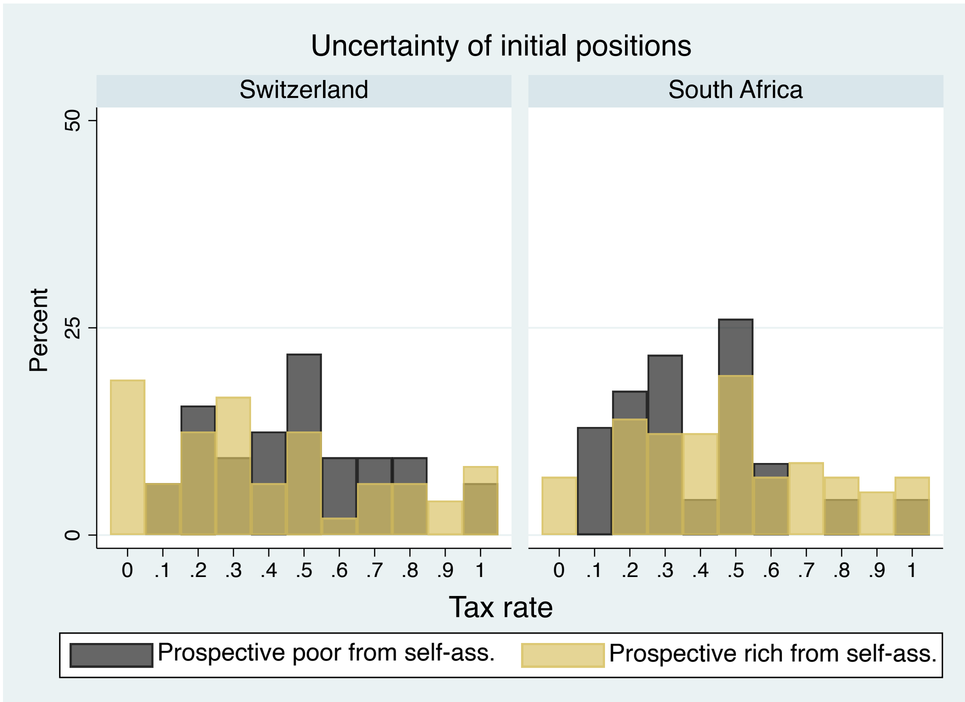


Table 6. Since fewer females exhibit overconfidence in self-assessments, Model (8) interacts dummies for female and 'prospective poor' to improve estimates. While both dummies for 'prospective poor' and female turn positive now, the interaction term becomes negative by an amount which compensates almost entirely for the two positive dummies ($0.153 + 0.144 - 0.254 = 0.043$, p=.581).[22] This indicates that women are less exuberant than males to inflate stated self-assessments in the experiment and that self-assessments capture only part of the effect arising from overconfidence.[23]

We sum up the evidence of Phase 1 as follows.

Result 1. *When subjects are uncertain about initial income positions, self-interest and risk neutral behavior dictate their demand for redistribution, whereas risk aversion and inequality*

[22]Remark that in this case, the lower tendency of women to vote for τ=1 cannot explain the negative effect of 'prospective poor' females, since in all effort treatments of Phase 1, only 11 subjects vote for full redistribution (five male and six female participants).

[23]Tobit regressions in Online Appendix Table D2 confirm gender differences in the degree of overconfidence (Buser et al., 2020). A measure for revealed overconfidence in Phase 1, comparing subjects' expected income quintiles to realized income quintiles, finds a significant negative influence on the chosen tax rate among men, whereas the contrary for women. By specifying *critical overconfidence* as expecting an above-mean-income while realizing a below-mean-income, we find that the pronounced bias among men leads to significantly reduced tax preferences.

aversion are rejected as explanatory drivers (Fig. 2, Table 6, Model 4). That means subjects choose similar tax rates under low and high inequality in treatments with random income assignment (Table 6, Model 5). When initial income positions depend on effort, subjects' choices are further affected by general overconfidence (Fig. 3). This biased behavior sets in stronger under high inequality (South Africa) than under low inequality (Switzerland), realizing in similar low tax rates across the two countries and causing a reverse POUM effect after all. As a result, post-tax inequality remains higher in South Africa than in Switzerland (Table 5).

4.3 Tax choices when initial incomes are known - Phase 2

Table 7 provides results of tobit regressions in Phase 2, after which subjects are informed of initial positions but before the transition process determines subjects' final pre-tax incomes. Model (1) encompasses only a dummy for gender, which is statistically not significant. The constant (0.636) exceeds 0.5 (p=.002), indicating an influence

Table 7: Tobit regressions - Phase 2: Certainty of initial positions.

	(1) Phase 2	(2) Phase 2	(3) Phase 2	(4) Phase 2 Random	(5) Phase 2 Effort
Dependent variable	τ_h	τ_h	τ_h	τ_h	τ_h
High inequality (South Africa)		0.232*** (0.087)	0.237*** (0.070)	0.124 (0.087)	0.330*** (0.111)
Low mobility		-0.006 (0.038)	-0.133*** (0.039)	-0.109** (0.050)	-0.158** (0.062)
Effort		-0.032 (0.086)	-0.038 (0.069)		
Prospective poor			0.610*** (0.070)	0.533*** (0.087)	0.697*** (0.113)
Female	0.010 (0.086)	-0.022 (0.085)	-0.077 (0.068)	-0.224** (0.087)	0.081 (0.107)
Constant	0.636*** (0.065)	0.554*** (0.083)	0.337*** (0.066)	0.481*** (0.080)	0.165* (0.086)
Observations	320	320	320	160	160
Log-pseudolikelihood	-291.393	-285.176	-232.401	-103.544	-120.593
Pseudo R-squared	0.000	0.021	0.202	0.221	0.228

* p<.1, ** p<.05, *** p<.01.

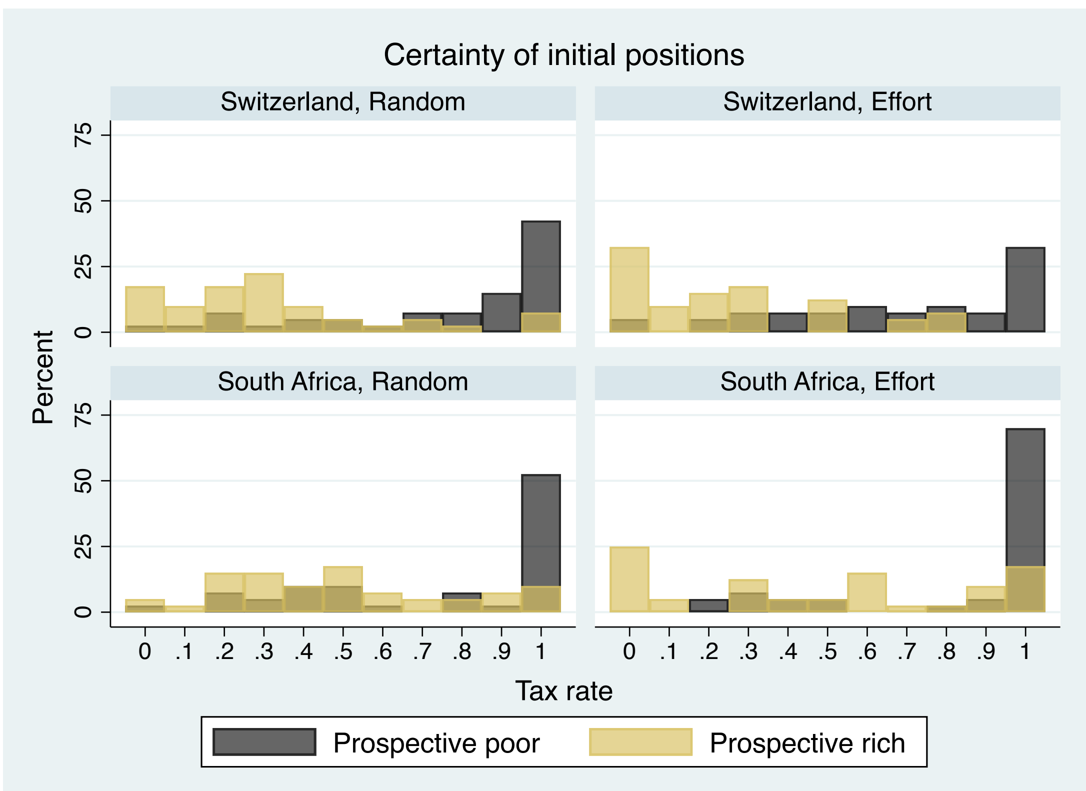
of risk aversion and inequality aversion in Phase 2.[24]

Model (2) adds dummies for high inequality, low mobility, and effort-based income assignment. The dummy for inequality is highly significant, indicating that tax rates stated in Phase 2 are 23% higher in ZA than in CH. The dummies for effort and low mobility do not exert significant effects, violating the POUM hypothesis.

Prospective poor vs. prospective rich

Model (3) adds a dummy for the 'prospective poor' ($E_h[X]$<10). Were the data fully explained by maximization of expected earnings, the coefficient on the dummy ought to equal 1 while all other coefficients should be 0, including the constant. Instead, the dummy coefficient is significantly less than 1 (p<.01), and the constant significantly greater than 0.

Figure 5: Prospective poor and prospective rich in Phase 2.



[24]Strictly speaking, either risk aversion or inequality aversion alone can explain demand for redistribution greater than predicted by the principle of expected profit maximization. Yet, estimations of the structural preferences model based on Charness and Rabin (2002) and Durante et al. (2014) in Online Appendix C confirms that both risk aversion and inequality aversion are present in Phase 2.

The dummy coefficient lower than 1 indicates that less 'prospective poor' than predicted vote for full redistribution, while the positive constant implies that less 'prospective rich' ($E_h[X]$>10) than predicted by maximization of expected earnings vote for zero redistribution. The second observation can be explained with risk aversion or inequality aversion, while the first violates both theories. Moreover, the dummies on high inequality (positive) and low mobility (negative) are highly significant, which can be, at least for the latter, explained by risk aversion.

Models (4) and (5) conduct separate regressions for the random and the effort treatments. The dummy for high inequality is only significant across effort treatments. Similarly, the dummy coefficient for 'prospective poor' is higher, and the constant lower in the effort than in the random treatments. These results signal that the redistributive conflict between 'prospective poor' and 'prospective rich' deems more polarized in effort than in random treatments, particularly so in the high inequality context. Similarly to Phase 1, there is a negative gender effect in the random treatments due to a lower propensity of women to vote for full redistribution.

The polarization of preferences between 'prospective rich' and 'prospective poor' in Phase 2 becomes visible in Figure 5, showing distributions of reported tax rates for the two income groups divided between low/high inequality and random/effort assignment. Table 8 deepens the analysis of such behavior employing probit regressions separated for random and effort assignment. The dependent variable in the probit model for 'prospective poor' equals 1 if subject h reports a tax rate τ_h=1, and 0 otherwise. In the probit model for 'prospective rich', the dependent variable is 1 if subjects choose τ_h=0, and 0 otherwise.

The probit models of Table 8 and the histograms in Figure 5 illustrate that 'prospective rich' are more likely to be fully selfish in effort treatments (Model 2) than in random treatments (Model 1). The predicted probability of τ=0 at mean values is 27% in the effort compared to 6.9% in the random treatment. 'Prospective rich' also become less selfish in the random treatment with growing inequality (marginal effect of ZA in Model (1) is -13%). Less so in the effort treatment. The positive sign of the low mobility dummy in Models (1) and (2) for 'prospective rich' is in line with risk aversion. In the probit for 'prospective poor' the dummy is positive but only marginally significant in the random treatment (Model 3).[25] As anticipated, the gender dummy is significantly negative in Model (3) with large marginal effects (-36%). In contrast, gender does not play a significant role in the effort treatments, which corroborates the evidence of similar behavior between men and women when income positions are effort-based (except for stated self-assessments).

Interestingly, in Model (4) for effort treatment 'prospective poor' are more ready to impose full expropriation on the rich in South Africa than in Switzerland (marginal effect of dummy is +36%). Thus, while the data confirms general reluctance by the poor to expropriate the rich, it also indicates that this timidity shrinks substantially in the effort treatments of high inequality.[26] We sum up the evidence from Phase 2 as follows.

Result 2. *After Phase 2 reveals initial income positions, subjects' tax choices are apprehended by risk aversion and inequality aversion, less by risk-neutral behavior (Table 7, Model 1). Other factors influence subjects' preferences, too. Demand for redistribution is overall greater under high than under low inequality, yet only when incomes are assigned through the effort task and*

Table 8: Probit regressions - prospective rich and prospective poor in Phase 2.

	(1) Phase 2 - Random Prosp. rich	(2) Phase 2 - Effort Prosp. rich	(3) Phase 2 - Random Prosp. poor	(4) Phase 2 - Effort Prosp. poor
Dependent variable	$\Pr(\tau_h = 0)$	$\Pr(\tau_h = 0)$	$\Pr(\tau_h = 1)$	$\Pr(\tau_h = 1)$
High inequality (South Africa)	0.836*	-0.227	0.298	1.054***
	(0.432)	(0.349)	(0.385)	(0.395)
Low mobility	1.056***	0.722***	0.326*	0.365
	(0.395)	(0.272)	(0.181)	(0.223)
Female	-0.247	-0.354	-1.068***	-0.155
	(0.435)	(0.329)	(0.389)	(0.395)
Constant	-1.375***	-0.658**	0.142	-0.637**
	(0.417)	(0.292)	(0.346)	(0.318)
Observations	80	80	80	80
Log-pseudolikelihood	-23.015	-44.228	-47.767	-48.841
Pseudo R-squared	0.182	0.078	0.137	0.119

* p<.1, ** p<.05, *** p<.01.

[25]A positive sign is consistent with the rationale behind the POUM hypothesis. Although the definitions of 'prospective poor' and 'prospective rich' are already based on expected incomes, all 'prospective poor' have better chances to move up under high than low mobility.

[26]Using probit regression to compute predicted probabilities of the 'prospective poor' to demand full redistribution gives for ZA 71% in the effort compared to 53% in the random treatment. For CH, probabilities are 32% in the effortand 41% in the random treatment.

not randomly. The distributional conflict between 'prospective poor' and 'prospective rich' also emerges more polarized when effort rather than luck determines income positions (Models 4-5). Under high inequality, this competition pushes tax rates close to full redistribution. In all other treatments, preferred taxation remains well below full redistribution, including individuals who expect to be poor. This reluctance to expropriate the rich is more pronounced among women.

5 Discussion

The final section recaps the results in light of the redistribution preference models reviewed in Section 2. We combine the main findings to elaborate on the idea of an inequality trap and to point out questions for future research.

5.1 What shapes redistributive preferences?

A first observation distinguishes redistributive preferences between the two phases in the experiment. While tax choices in Phase 1 appear to be mainly driven by selfish considerations, behavior in Phase 2 is overall better explained by a mix of motivations, including risk aversion and social concerns. The evidence in Phase 1 is surprising as rational choice theory assumes that demand for self-protection grows in uncertainty. Not to mention related work, which argues that missing transparency about the relative standing in the income ladder provokes pro-social behavior (see Section 2.2).

A possible explanation for the lack of social concern in Phase 1 are equal ex-ante chances among all individuals to clinch any income position. This might be perceived as a situation of equal or fair opportunities and, for this reason, a situation society does not need to correct for.

Certainly, a relevant 'ego-centric' reason for low tax choices in Phase 1 is subjects' overconfidence about the likelihood of reaching top income positions. The bias is apparent in the effort treatments; in random treatments, overconfidence cannot affect responses. Misperception and over-optimism about the own prospects in life are behavioral effects well-known in the literature and documented in experiments on preferences for redistribution (Durante et al., 2014). We add two relevant features. First, by providing room for overconfidence in the social mobility process, we find that the bias can nullify the concavity implication of the actual mobility process and induce a reverse POUM effect. Second, we observe a positive relationship between the level of inequality in a society and personal overconfidence. Whether due to optimistic expectations or genuine beliefs to be 'better' than others, the effects of overconfidence in the context of redistributive preferences can contribute to an inequality trap, discussed in more detail in the following Section 5.2.

When subjects are informed about income positions, there remains some behavior opposing any logical understanding of economic principles. Possibly the most puzzling one represents a sub-sample in the random treatment of Phase 2. Despite being handicapped by initial income positions prohibiting them with certainty to leave the below-mean income sector in the mobility process, most of these subjects still refrain from demanding full redistribution. In other words, they voluntarily forgo the chance to equalize earnings regardless of no apparent reason in the random treatment why some subjects are entitled to larger payoffs than others. A large fraction (about 50% on the whole) with an expected income lower than the mean does not support full redistribution either. Classical arguments appealing to the notion of rational agents cannot explain such reluctance to expropriate the rich. It cannot even be attributed to social factors causing secondary divides between subjects benefiting from redistribution. Cultural and ideological factors, including concepts such as reference point theory, instead may provide a plausible interpretation. Subjects enter the lab unconsciously equipped with ideas, attitudes, experiences, and other stimuli. In consequence, anchors based on those experiences and impulses can affect subjects' decisions. For example, as people are not used to full redistribution in reality, they may also abstain from it in the lab. Some could further suppress the aptitude to maximize personal earnings because of strong political views on the illegitimacy of expropriating taxation.

Nonetheless, while these restraints can explain part of the evidence, the effect strength is also dependent on condition and context. In the high inequality/effort treatment of Phase 2, preferred tax rates by the majority of individuals approach 100%. This evidence bears relevance for the debate on the perceived legitimacy of income differences. Some scholars have argued that when income depends on effort rather than luck, earnings are perceived as more legitimate, and thus demand for redistribution sinks. Our results from the South Africa treatments find the opposite. When incomes are assigned through the effort task, demand for redistribution is higher, the distributional conflict is more polarized, and the income gap between poor and rich closes almost entirely through increasing tax rates (Table 5).

5.2 An inequality trap?

We witness spreading social inequality combined with declining demand for fiscal redistribution since the 1970s. The present analysis shows that greater income inequality nudges people to overestimate their chances of obtaining a high position on the income ladder. Their support for income taxes lessens, and inequality continues to grow. On top of that, as the wealth ambitions of rich aspirants are better preserved under a rigid than a mobile transition matrix, we find that low mobility further depresses redistribution preferences. What can be called an inequality trap does not only affect social welfare today. Its vicious circle works like a downward spiral against the 'self-regulating power' of democracy - economic redistribution - to adjust inequality tomorrow.

Is there a way out? Our analysis offers some answers. First, it reveals that overconfidence grows in pre-tax inequality. Second, it highlights when misperception and reasons for overconfidence dissolve, demand for redistribution builds up and reduces post-tax inequality. Although there exists little empirical data to reality-check the finding of inequality-driven overestimation, the results of the few studies represent confirming evidence.[27] Survey samples of fairly equal societies exhibit less overestimation of relative income, social mobility, or general inequality than samples of less equal populations. Reducing pre-tax inequality and raising awareness for people's relative income position in society are two measures to break out of the described inequality trap. Other survey and lab studies also attest changes in perception and framing an influence on preferences for redistribution (Norton and Ariely, 2011), on voting behavior and acceptance of tax rates (e.g., *fiscal illusion;* Sausgruber and Tyran, 2005, 2011), or even on individual work effort levels (He, 2020; Weber and Schram, 2017).

5.3 Concluding remarks

This study examines individual preferences for redistribution relative to the level of pre-tax inequality. We divide subjects into two experimental societies. One-half is allotted the scaled-down pre-tax income distribution of South Africa, while the other

[27] Cruces et al. (2013) and Karadja et al. (2017) document little overestimation of relative income in their surveys of Argentinian (Swedish) households. Argentina (Sweden) ranks among the least unequal countries in South America (worldwide). Cojocaru (2014) finds greater prospects of upward mobility for EU member states than non-EU, former Socialist economies. Western European countries generally expose greater inequality levels than ex-Soviet states. Kraus and Tan (2015) report considerable mobility overestimation in a US sample. Note, the US is among the least equal societies worldwide.

half faces the distribution of Switzerland. Subjects exhibit significantly more optimism about their income position in the high inequality condition (South Africa). The top income standing out may seduce people to overestimate the small probability of ending up there. Moreover, we find that individuals primed with the less equal pre-tax income distribution also accept more inequality in the post-tax distribution. We construe both findings as practical examples of an inequality trap: unequal societies suffer from greater overestimation of relative income and tolerance of inequality, both leading to reduced demand for redistribution. The danger of a society's further destabilization once stuck in an inequality trap should not be dismissed. More empirical and experimental research is needed to confirm these findings and their applicative value for policy-makers.

Appendices

A Experimental instructions

Translated from Italian. Example: South Africa/effort treatment.

You and the other 19 participants take part in this experiment. The experiment lasts about one hour and consists of two phases. You will receive a 5 € participation fee. In addition, you have the chance of further earnings based on the decisions you make during the experiment. A random mechanism at the end of the experiment determines for which of the two phases in the experiment you are paid immediately after the experiment ends. Your decisions and earnings are kept confidential.

We start with an experimenter reading aloud the instructions for the first phase. The instructions for the second phase will be explained later. At the end of these instructions, you can ask questions before the experiment starts. The experiment concludes with a short questionnaire. During the experiment, it is not permitted to speak or communicate in any form with other participants. Comprehension of the following instructions is critical to maximize your earnings beyond the 5 € for your participation. If you have a question at any time during the experiment, you can raise your hand, and an experimenter will come to your desk and assist you.

Instructions for the first phase

In this phase of the experiment, there are two periods. In period 1, all participants are assigned a gross income from a specific income distribution. This income constitutes the gross income of period 1. In period 2, all participants will receive the gross income of period 2. The gross income in period 2 is determined by a potential increase or decrease of the gross income from period 1 according to an income transition table. This table transforms the gross income of period 1 into the gross income of period 2. Your additional payment in the experiment is the net income you receive in period 2. The net income for period 2 is determined by applying a tax and transfer rate to your gross income of period 2.

Your decision is choosing the tax and transfer rate to be applied to the gross incomes of period 2. This choice will be made before knowing the gross income that was assigned to you in period 1. To determine your period 1 gross-income from the initial income distribution, you and the other participants will compete in a skill task. Your performance relative to the other participants in the skill competition will determine your gross income for period 1. Prior to the skill competition, we will ask you for a self-assessment of your following performance. (*Alternatively in the random-assignment treatment:* In period 1, you will be randomly assigned by the computer to a gross income from the income distribution.) Now we describe the various parts of the experiment.

The gross income distribution in period 1

The following table shows the gross income distribution of one of the top 40 economies in the world, scaled down to an average gross income of € 10.00. This distribution is made up of 5 income classes, containing 4 participants each. Hence, the participants' incomes resemble the gross income distribution of a particular country. The quantities in the right column of the table represent the gross incomes assigned to the income classes in period 1. According to the table, this means that four participants receive an income of 1.25 €, four an income of 2.35 €, four an income of 4.00 €, four an income of 7.95 €, and the remaining four participants will be assigned an income of 34.45 €.

Distribuzione dei redditi lordi

Fascie di reddito	Reddito lordo
prima	1.25 €
seconda	2.35 €
terza	4.00 €
quarta	7.95 €
quinta	34.45 €

How is gross income assigned in period 1?

Your income in period 1 will be one of those in the table. As indicated above, your exact gross income in period 1 will be determined based on your performance in relation to the performance of the other participants in a skill task.

In the skill competition, the computer screen will display a series of "sliding bars". Using the mouse and the directional keys of the keyboard, you need to place the cursor,

initially sitting on the left end of the bar, on the central value "50" for as many bars as possible. The skill task lasts 120 seconds. The four participants with the highest score (most complete bars), i.e., the four participants on positions 1 to 4, receive an income of 34.45 €. An income of 7.95 € is assigned to the four participants ranking on positions 5 to 8. An income of 4.00 € is awarded to the four participants on positions 9 to 12. An income of 2.35 € is awarded to the four participants on positions 13 to 16. An income of 1.25 € will be awarded to the four participants on positions 17 to 20. In the event of a tie, for example, for 12th and 13th place, the computer will randomly assign each participant to one of the two income classes in question. The skill task takes place at the end of the first phase of the experiment, such that the choices for the tax and transfer rate in period 2 will take place before knowing the income assigned in period 1.

(*Alternatively, in the random-assignment treatment:* Your income in period 1 will be one of those you find in the table. It will be randomly assigned to you by the computer. The computer will randomly assign an income of 34.45 € to four participants, an income of 7.95 € to four, an income of 4.00 € to four, an income of 2.35 € to four, and an income of 1.25 € to the remaining four participants. The random assignment will take place at the end of the first phase of the experiment, such that the choices for the tax and transfer rate in period 2 will take place before knowing the income assigned in period 1.)

Income transition table

In period 2, the positions in the gross income distribution are reassigned according to a transition table. The table does not change the gross income distribution, only positions among participants. The transition table specifies the probability of reaching a certain gross income in period 2 given a certain gross income in period 1. For each cell of the transition table, the row indicates the income class in period 1 and the column the corresponding income class in period 2. There will be two transition tables that can be applied to the gross income distribution in period 1 for two different participant reassignments of income classes in period 2. The figure below exemplifies a screenshot similar to what you will find in the experiment. *(Note, the actual instructions show the tables also without red markings.)*

Tabella A di transizione dei redditi

	a prima fascia (1.25 €)	a seconda fascia (2.35 €)	a terza fascia (4.00 €)	a quarta fascia (7.95 €)	a quinta fascia (34.45 €)
da prima fascia (1.25 €)	75%	25%	0%	0%	0%
da seconda fascia (2.35 €)	25%	50%	25%	0%	0%
da terza fascia (4.00 €)	0%	25%	50%	25%	0%
da quarta fascia (7.95 €)	0%	0%	25%	50%	25%
da quinta fascia (34.45 €)	0%	0%	0%	25%	75%

Tabella B di transizione dei redditi

	a prima fascia (1.25 €)	a seconda fascia (2.35 €)	a terza fascia (4.00 €)	a quarta fascia (7.95 €)	a quinta fascia (34.45 €)
da prima fascia (1.25 €)	5[illegible]%	25%	0%	25%	0%
da seconda fascia (2.35 €)	25%	25%	25%	25%	0%
da terza fascia (4.00 €)	25%	0%	25%	25%	25%
da quarta fascia (7.95 €)	0%	25%	25%	25%	25%
da quinta fascia (34.45 €)	0%	25%	25%	0%	50%

To make an example for table A, assume a participant with gross income of 2.35 € in period 1 corresponding to the second class. In period 2, her or his gross income will be 2.35 € with 50% probability (see below), 1.25 € with 25%, 4.00 € with 25%, 7.95 € with 0%, and 34.45 € with 0%. Instead, to exemplify table B, let us imagine a participant with a period 1 gross income of 34.45 €, in period 2, her gross income will be 1.25 € with 0% (see below), 2.35 € with 25%, € 4.00 with 25%, € 7.95 with 0%, and € 34.45 with 50%.

Remember that the transition table does not change the gross income of the five classes nor their distribution, but only the reassignment of participants to the five income classes between period 1 and period 2.

Taxes and transfers

We will now describe how taxes and transfers transform the gross income distribution into net incomes. First, each participant's gross income is taxed at a proportional tax rate t. The rate may vary between 0% and 100% in increments of 10%. Second, the collected taxes are redistributed equally among all participants. Each participant will thus receive an identical amount, independent of what she or he personally contributed. (The appendix contains the formula to determine net income based on a given tax rate). Each participant chooses her preferred tax rate t to be applied proportionally to all gross incomes, the proceeds of which will be distributed equally among all participants. To facilitate the choice, a table similar to the following shows all possible tax rates from 0% to 100% in increments of 10%, which, applied to the gross income distribution generates net incomes.

For example, if the tax rate is $t = 0\%$, then no tax is collected. Therefore each participant earns exactly her or his gross income of period 2 (see below). E.g., $t = 20\%$ implies that 20% of each participant's gross income in period 2 will be divided among all participants, and each person will receive an equal share of the tax revenues plus the remaining 80% of his or her gross income in period 2 (see below). If $t = 100\%$, each participant will contribute 100% of her period 2 gross income into the tax fund and everyone will then receive an identical net income equal to 10.00 €.

Distribuzioni dei redditi netti per ciascuna aliquota fiscale possibile

L'aliquota fiscale	*t=0%*	*t=10%*	*t=20%*	*t=30%*	*t=40%*	*t=50%*	*t=60%*	*t=70%*	*t=80%*	*t=90%*	*t=100%*
prima fascia	1.25 €	2.13 €	3.00 €	3.88 €	4.75 €	5.63 €	6.50 €	7.38 €	8.25 €	9.13 €	10.00 €
seconda fascia	2.35 €	3.12 €	3.88 €	4.65 €	5.41 €	6.18 €	6.94 €	7.71 €	8.47 €	9.24 €	10.00 €
terza fascia	4.00 €	4.60 €	5.20 €	5.80 €	6.40 €	7.00 €	7.60 €	8.20 €	8.80 €	9.40 €	10.00 €
quarta fascia	7.95 €	8.16 €	8.36 €	8.57 €	8.77 €	8.98 €	9.18 €	9.39 €	9.59 €	9.80 €	10.00 €
quinta fascia	34.45 €	32.01 €	29.56 €	27.12 €	24.67 €	22.23 €	19.78 €	17.34 €	14.89 €	12.45 €	10.00 €

The choice for tax rate t must be made for each of the two transition tables presented in the experiment. At the end, one of the two transition tables will be randomly selected by the computer. The tax rate for that table indicated by a participant randomly drawn by the computer determines the net incomes in period 2, which are paid to the participants in case this phase of the experiment is chosen for payment. Since your stated tax rates for each table can be the one drawn, it is in your own interest to think properly about your choices and report them as accurately as possible. The identity of the drawn participant will not be made public during or after the experiment, nor will you be informed if you were the one selected.

We have reached the end of the instructions for phase 1. To verify your understanding of the transition table please fill in the test table in the next window. (Your answers in the test table do not affect your earnings.) Upon completion, we ask you to answer a few comprehension questions to ensure that you understand the general instructions of phase 1. We invite you to ask for clarification of the instructions in case of any doubts. After all questions are answered, the experiment begins.

Appendix:
The formula to determine the participants' net income given a specific tax rate is the one below. In the formula X_i represents the gross income of participant i in period 2; Y_i is her net income in period 2 (after taxes and transfers), and t the tax rate.

$$Y_i = X_i - tX_i + \frac{1}{20} t \sum_{h=1}^{20} X_h$$

B Non-parametric tests

This section reports results from non-parametric tests. In the tables below, we use acronyms for the 16 treatments constructed as follows. The first digit U/C refers to uncertainty (Phase 1)/certainty (Phase 2) of initial positions, the second digit R/E to random/effort income assignment, the third and fourth digits LM/HM to low/high mobility, and the fifth and sixth digits CH/ZA to Switzerland (low inequality)/South Africa (high inequality). E.g., U_R_LM_CH stands for the treatment with uncertain income positions (Phase 1), random income assignment, low mobility, and low inequality.

Table B1 documents evidence from unmatched Mann-Whitney-Wilcoxon tests conducted to check for potential session effects. Recall that we ran two separate sessions with 20 participants for each treatment. The tests show that for all but three treatments, tax choices stated by the participants of the two corresponding sessions in each treatment can be considered as drawn from the same distribution. The three exceptions are: the high mobility condition in Phase 1 of the ZA-random and the CH-effort treatments, and the high mobility condition in Phase 2 of the ZA-random treatment. Furthermore, we test for the validity of the regression results reported in the text (Tables 6, 7, and 8) by including alternatively only one of the two sessions of each treatment and confirm that results are robust. We also control for specific effects (e.g., gender) between each session pair but do not find any irregularity.

Table B2 shows the results of one-sample Kolmogorov-Smirnov tests of the null hypothesis that the distributions of participants' choices in each experimental treatment can be considered as uniformly drawn. The test is based on the statistic $D = \sup_x \|F_0(x) - F_{data}(x)\|$ where $F_0(x)$ is the hypothesized distribution and $F_{data}(x)$ the

Table B1: Session effects, unmatched Mann-Whitney-Wilcoxon rank-sum tests.

Uncertainty			Certainty		
Treatment	z	p	*Treatment*	z	p
U_R_LM_CH	-1.469	.142	C_R_LM_CH	-0.509	.611
U_R_HM_CH	-1.590	.112	C_R_HM_CH	-0.478	.633
U_R_HM_ZA	1.150	.250	C_R_LM_ZA	0.999	.318
U_R_HM_ZA	1.715	.086*	C_R_HM_ZA	2.143	.032**
U_E_LM_CH	0.136	.891	C_E_LM_CH	1.288	.227
U_E_HM_CH	2.081	.037**	C_E_HM_CH	0.873	.383
U_E_LM_ZA	0.438	.661	C_E_LM_ZA	0.029	.977
U_E_HM_ZA	0.861	.390	C_E_HM_ZA	-0.195	.845

* $p < .1$, ** $p < .05$, *** $p < .01$.

Table B2: One-sample Kolmogorov-Smirnov test for discrete distributions.

Uncertainty			Certainty		
Treatment	D	p	*Treatment*	D	p
U_R_LM_CH	.182	.142	C_R_LM_CH	.243	.017**
U_R_HM_CH	.205	.070*	C_R_HM_CH	.143	.385
U_R_HM_ZA	.139	.425	C_R_LM_ZA	.259	.009***
U_R_HM_ZA	.189	.116	C_R_HM_ZA	.255	.011***
U_E_LM_CH	.179	.152	C_E_LM_CH	.159	.263
U_E_HM_CH	.129	.513	C_E_HM_CH	.114	.679
U_E_LM_ZA	.230	.030**	C_E_LM_ZA	.409	.000***
U_E_HM_ZA	.238	.021**	C_E_HM_ZA	.342	.000***

* $p < .1$, ** $p < .05$, *** $p < .01$.

empirical distribution function of the observed data. Since subjects choose tax rates from the discrete value set $\{0, 0.1, ..., 1\}$, we use the statistic D for discrete uniform distributions (Arnold and Emerson, 2011).[28] As discussed in the text, the tests indicate that empirical distributions in Phase 1 are mostly consistent with the uniform distribution. Instead, very high p values reject the null distribution in all ZA treatments of Phase 2.

Table B3 reports matched Wilcoxon signed-rank tests for the within-subject treatments, that is uncertainty (Phase 1) versus certainty (Phase 2) of initial positions and low vs. high mobility. Table B4 reports unmatched Mann-Whitney-Wilcoxon rank-sum tests for the between-subject treatments, i.e., CH vs. ZA and random vs. effort-based income assignment. In the tables, the star ($*$) in the digit position of the acronyms indi-

Table B3: Matched Wilcoxon signed-rank tests.

Uncertainty vs. Certainty			Low vs. High mobility		
Treatment	z	p	*Treatment*	z	p
*_R_LM_CH	-0.401	.688	U_R_*_CH	0.839	.401
*_R_HM_CH	-1.245	.213	U_R_*_ZA	-1.425	.154
*_R_LM_ZA	-2.415	.015**	U_E_*_CH	-0.251	.802
*_R_HM_ZA	-3.638	.003***	U_E_*_ZA	-2.910	.004***
*_E_LM_CH	-0.122	.906	C_R_*_CH	-0.271	.787
*_E_HM_CH	-1.070	.284	C_R_*_ZA	-0.512	.608
*_R_LM_ZA	-3.162	.002***	C_E_*_CH	-0.744	.457
*_R_LM_ZA	-3.244	.001***	C_E_*_ZA	-1.130	.258

* $p < .1$, ** $p < .05$, *** $p < .01$.

Table B4: Unmatched Mann-Whitney-Wilcoxon rank-sum tests

Switzerland vs. South Africa			Random vs. Effort		
Treatment	z	p	*Treatment*	z	p
U_R_LM_*	0.763	.445	U_*_LM_CH	1.235	.217
U_R_HM_*	-1.053	.292	U_*_HM_CH	0.325	.745
U_E_LM_*	0.044	.965	U_*_LM_ZA	0.763	.446
U_E_HM_*	-1.047	.295	U_*_HM_ZA	0.141	.888
C_R_LM_*	-0.893	.372	C_*_LM_CH	1.064	.287
C_R_HM_*	-1.420	.156	C_*_HM_CH	0.698	.485
C_E_LM_*	-2.191	.029**	C_*_LM_ZA	-0.573	.567
C_E_HM_*	-2.711	.006***	C_*_HM_ZA	-0.839	.401

* $p < .1$, ** $p < .05$, *** $p < .01$.

[28] In the most standard Kolmogorov-Smirnov test, the distribution $F_0(x)$ is continuous, so that the distribution of D does not depend on the hypothesized distribution. The tests reported here are based on the methodology for discrete null distributions proposed by Arnold and Emerson (2011).

cates the testing condition: e.g., $*$ in the first position refers to the test of uncertainty vs. certainty. The tests confirm the main visual conclusions discussed in Section 4. Regarding the positive effect in the ZA effort treatments of Phase 1 with respect to the high vs. low mobility control, it is also worthwhile pointing out that whereas the ZA effort condition of Phase 1 is the only treatment exhibiting a significantly negative effect, all but one of the individual tests report negative signs. This is contrary to the POUM hypothesis. Note that the Wilcoxon test conducted on the whole treatments provide overall evidence against the POUM ($z = -2.2, p = .025$).

Tables B5 and B6 report matched and unmatched tests between treatment and control group of each treatment condition. Besides confirming the results in the main text, they provide further qualifications, in particular emphasizing the stronger impact on the sub treatments by the high inequality (ZA) manipulation compared to the low inequality (CH) one. The tests validate that the difference between the two inequality conditions is more articulated under certainty (Phase 2) than uncertainty (Phase 1).

Table B5: Matched Wilcoxon signed-rank tests (aggregate).

Uncertainty vs. Certainty			Low vs. High mobility		
Treatment	*z*	*p*	*Treatment*	*z*	*p*
*_R_	-3.547	.000***	U_*_	-1.898	.057*
*_E_	-3.769	.000***	C_*_	-1.233	.217
*_	-5.159	.000***	_*_	-2.238	.025**
*_CH	-1.270	.204	_R_*	-0.596	.551
*_ZA	-6.004	.000***	_E_*	-2.505	.012**
*_LM	-3.154	.002***	_*_CH	-0.223	.823
*_HM	-4.425	.000***	_*_ZA	-3.179	.015**
*_R_LM	-1.955	.051*	U_R_*	-0.321	.748
*_E_LM	-2.494	.012**	U_E_*	-2.238	.025**
*_R_HM	-3.280	.010***	C_R_*	-0.552	.581
*_E_HM	-3.007	.003***	C_E_*	-1.190	.234
*_R_CH	-1.096	.273	U_*_CH	0.427	.669
*_E_CH	-0.699	.485	U_*_ZA	-3.206	.001***
*_R_ZA	-4.103	.000***	C_*_CH	-0.685	.493
*_E_ZA	-4.496	.000***	C_*_ZA	-1.156	.248
*_LM_CH	-0.400	.689	_R_*_CH	-0.449	.653
*_HM_CH	-1.616	.106	_R_*_ZA	-1.363	.173
*_LM_ZA	-3.925	.000***	_E_*_CH	-0.792	.423
*_HM_ZA	-4.740	.000***	_E_*_ZA	-3.033	.002***

* $p < .1$, ** $p < .05$, *** $p < .01$.

Table B6: Unmatched Mann-Whitney-Wilcoxon rank-sum tests (aggregate)

Switzerland vs. South Africa			Random vs. Effort		
Treatment	*z*	*p*	*Treatment*	*z*	*p*
U_*_	-0.711	.477	U_*	1.121	.263
C_*_	-3.502	.001***	C_*	0.285	.774
_*_	-2.961	.003***	_*_	0.967	.334
R_*_	-1.221	.222	LM_*_	1.243	.214
E_*_	-2.928	.003***	HM_*_	0.100	.921
LM_*	-1.337	.181	_*_CH	1.676	.094*
HM_*	-3.021	.003***	_*_ZA	-0.373	.709
U_R_*	-0.212	.832	U_LM_*	1.486	.137
U_E_*	-0.763	.445	U_HM_*	0.146	.884
C_R_*	-1.580	.114	C_LM_*	0.348	.728
C_E_*	-3.368	.001***	C_HM_*	0.010	.992
U_LM_*	0.517	.605	U_*_CH	1.107	.268
U_HM_*	-1.510	.131	U_*_ZA	0.550	.582
C_LM_*	-2.207	.027**	C_*_CH	1.254	.210
C_HM_*	-2.907	.004***	C_*_ZA	-1.010	.313
_R_LM_*	-0.162	.871	LM_*_CH	1.653	.098*
_R_HM_*	-1.666	.096*	LM_*_ZA	0.060	.952
_E_LM_*	-1.675	.094*	HM_*_CH	0.677	.498
_E_HM_*	-2.575	.009***	LM_*_ZA	-0.524	.600

* $p < .1$, ** $p < .05$, *** $p < .01$.

This discrepancy grows stronger in the effort than in the random treatments and rather under certainty than uncertainty of initial positions. This is supportive of the results derived by the regression analyses in the paper and summarized in Result 1 (Section 4.2) and Result 2 (Section 4.3).

C A model of structural preferences

While the identification of a single theory able to explain subjects' behavior is not the purpose of this work, it is nonetheless worthwhile investigating the extent to which a sufficiently general model can fit the data. With a similar purpose, Durante et al. (2014) adapt the social preferences model by Charness and Rabin (2002) to test their data. Doing the same we compare our estimates to those of Durante et al. (2014).

Charness and Rabin (2002) propose a simple theory of social preferences, valid for both strategic games and multiperson situations, in which people's preferences are expressed by a convex combination of selfish and social motivations. In the original model the selfish motivation represents a person's own expected payoff, while the disinterested social component is formed by a convex combination of concerns for equity, expressed in the Rawlsian form of caring for the worst-off person in society, and efficiency. Remember, redistributive taxation occurs at no cost in our experiment such that efficiency considerations can be excluded. Durante et al. (2014) extend the model to include the individual risk attitude in the personal motivation. The resulting utility function for subject h in our experiment can be written as:

$$V_h = (1-\lambda)\left[(1-\gamma)\,E[Y] + \gamma(-\sigma_Y)\right] + \lambda Y^{min}, \tag{2}$$

where $E[Y]$ and σ_Y denote the expectation of own (post-tax) income, respectively its standard deviation. The term Y^{min} expresses the Rawlsian equity concern for the person with the lowest post-tax income.[29] According to the model, the structural preference parameters of interest in our experiment are the utility weights λ and γ.

The model encompasses as special cases the three main criteria of selecting tax rates discussed in the text (see Table 4), namely: I) maximization of expected earnings, occurring when both λ and γ equal zero; II) risk aversion, in the form of a mean-variance utility, when $\lambda = 0$ and $\gamma \in (0,1)$; and III) inequity aversion (with no risk aversion), when $\lambda \in (0,1)$ and $\gamma = 0$.

To derive the theoretical predictions more formally, let the three terms in the utility function, $E[Y]$, σ_Y, Y^{min}, be expressed as functions of tax rate τ, that is:

$$E[Y] = \sum_{j=1}^{5} \pi_{hj} X_j (1-\tau) + \tau\overline{X}, \tag{3}$$

$$\sigma_Y = \sqrt{\sum_{j=1}^{5} \pi_{hj}\left(X_j(1-\tau)\right)^2 - \left[\sum_{j=1}^{5} \pi_{hj} X_j (1-\tau)\right]^2}, \tag{4}$$

$$Y^{min} = X^{min}(1-\tau) + \tau\overline{X}, \tag{5}$$

where π_{hj} is the subjective probability of subject h being in income quintile j before taxation, X_j is the pre-tax income in quintile j, and $\overline{X}$ and X^{min} the society's mean and minimum pre-tax income. Clearly, while $\overline{X} = 10$ in all treatments, π_{hj}, X_j and X^{min}

[29] Remark the extra term σ_Y in the utility function concerning the extension proposed by Durante et al. (2014) to the original specification by Charness and Rabin (2002) .

depend on treatments and subjective probabilities, as discussed in the paper.

Using the three expressions in utility function (2) and taking the derivative with respect to τ gives:

$$\begin{aligned}\frac{\partial V_h}{\partial \tau} &= (1-\lambda)(1-\gamma)\left[\overline{X} - \sum_{j=1}^{5} \pi_{hj} X_j\right] + \\ &\quad \gamma(1-\lambda)\sqrt{\sum_{j=1}^{5} \pi_{hj} X_j^2 - \left[\sum_{j=1}^{5} \pi_{hj} X_j\right]^2} + \lambda\left[\overline{X} - X^{min}\right]\end{aligned}$$

which satisfies the predictions discussed in section 3.3 given at least one of the two structural parameters λ and γ equals 0. If λ and γ are inside the interval $(0, 1)$, all three motivations play a role in subjects' preferences. Nevertheless, note that since utility function (2) is linear in the tax rate, the model always predicts corner solutions at $\tau = 0$ or 1, depending on the values of π_{hj}, X_j, etc. in treatments and on the utility parameters λ and γ. In this sense, the model can be considered as benchmark limiting case.

Estimates of λ and γ can be obtained following the method of Durante et al. (2014), which is based on the conditional logit model of McFadden (1973). The method requires constructing an observation for each subject h in any treatment for each possible tax rate $\tau \in K = \{0, 0.1, ..., 1\}$. It maximizes utility function (2) making random errors, which, under conditions of "type I extreme value" distribution, imply that the probability for subject h choosing a certain tax rate $\tau_h = \tau$, with $\tau \in K$, is given by:

$$P(\tau_h = \tau) = \frac{e^{V_{h\tau}}}{\sum_{k \in K} e^{V_{hk}}}.$$

The resulting likelihood function is then maximized to estimate the parameters β_1, β_2, and β_3 in utility function (2) written as:

$$V_h = \beta_1 EY + \beta_2 \sigma_Y + \beta_3 Y^{min}$$

The estimates of the β_l are finally used to obtain the structural preference parameters of function (2) according to the transformations:

$$\lambda = \frac{\beta_3}{\beta_1 + \beta_2 + \beta_3}; \qquad \gamma = \frac{\beta_2}{\beta_1 + \beta_2}$$

The estimates of the model obtained in our experiment are reported in Table D1. They exhibit great variability between treatments of Phase 1 (uncertainty of initial positions) and Phase 2 (certainty). Model (1) pools the data of all experimental treatments. All coefficients show the expected sign: those on personal variables, namely own expected income and standard deviation, are highly statistically significant; the coefficient on society's minimum income is mildly significant. Models (2) and (3) investigate treatments of Phase 1: Model (2) regards all treatments, while Model (3) alone effort treatments. The random treatments of Phase 1 are not reported because the maximization algorithm does not converge when the data of the random treatments are estimated alone. Nevertheless, results of Models (2) and (3) show that the utility specification in equation (2) is unsuitable for explaining subjects' behavior in Phase 1: note, in particular, parameter β_3 considering society's minimum income exposes a negative sign, contrary to the model predictions. As a consequence, also the utility weights λ and γ of the utility function are outside the predicted domain $[0,1]$. Model (4) pools the data for the treatments of Phase 2. All coefficients are highly statistically significant and with the expected signs. Models (5) and (6) separate between the random and effort treatments of Phase 2. Concerning the former treatments, convergence requires not using the data from the CH treatment with low mobility (possibly due to little variation in the data, particularly standard deviation of own incomes). The separate regressions (5) and (6) confirm the predicted signs of the coefficients, even if their significance is generally weaker than in the pooled model (4) due to fewer observations.

Overall, the estimated models in Table D1 indicate that subjects follow very different behavioral rules in Phase 1 and Phase 2 of the experiment. Especially tax choices in Phase 1 depart substantially from models that include social concerns. This is consistent with the evidence summarized in Result 1 (Section 4.2). On the other hand, choices in Phase 2 are overall more in line with utility model (2). The results from model (4), possibly the most reliable due to the largest degree of freedom, indicate that subjects place a relative weight on personal motivations about 4.7 times higher than on social concern (i.e., $\frac{1-\lambda}{\lambda} = \frac{0.824}{0.176} = 4.68$). Concern for own payoff is affected by risk aversion (ratio of about $\frac{1}{2.4}$ as measured in terms of a negative concern for the standard deviation of own payoff relative to the expected value, i.e., $\frac{\gamma}{1-\gamma} = \frac{0.309}{0.691}$). We find similarities to Durante et al. (2014). For example, Table 3, column (2) in Durante et al. (2014), reporting results for the treatments most similar to ours, finds estimates of $\lambda = 0.134$ and $\gamma = 0.110$, which are not too far from ours. Nevertheless, the whole set of regres-

Table D1: Estimation of Charness and Rabin (2002) - Durante et al. (2014) utility

	(1) Phase 1 & Phase 2	(2) Phase 1	(3) Phase 1 Effort	(4) Phase 2	(5) Phase 2 Random	(6) Phase 2 Effort
Expected pers. income (β_1)	0.326***	0.194***	0.244***	0.423***	0.261***	0.610***
	(0.088)	(0.057)	(0.063)	(0.084)	(0.083)	(0.041)
St. dev. of pers. income (β_2)	-0.082***	-0.265***	-0.345***	-0.190***	-0.074***	-0.298***
	(0.240)	(0.010)	(0.014)	(0.050)	(0.099)	(0.489)
Minimum soc. income (β_3)	0.104*	-0.434***	-0.393***	0.131**	0.137*	0.085
	(0.054)	(0.083)	(0.016)	(0.061)	(0.071)	(0.118)
λ	0.203***	-17.461	-1.974***	0.176*	0.290	0.086
	(0.060)	(109.260)	(0.732)	(0.099)	(0.219)	(0.108)
γ	0.201***	0.577***	0.584***	0.309***	0.221	0.329***
	(0.023)	(0.063)	(0.072)	(0.014)	(0.176)	(0.038)
(1-λ)	0.797***	18.461	2.974***	0.824***	0.710***	0.914***
	(0.060)	(109.260)	(0.732)	(0.099)	(0.219)	(0.108)
Cases	640	320	160	280	120	160
Log-pseudolikelihood	-1408.897	-719.404	-361.323	-563.653	-249.211	-302.255

Note: Standard errors in parentheses. * p<.1, ** p<.05, *** p<.01.

sions reported in their Table 3 also confirm that the structural weights in equation (2) vary substantially between contexts, pointing out that subjects' tax choices depend on considerations which go beyond those underlying the utility specification.

D Additional tables

Tobit regressions in Table D2 confirm gender differences in the degree of overconfidence (cf. Buser et al., 2020). A measure for revealed overconfidence in Phase 1, comparing subjects' expected income quintiles to realized income quintiles, finds a significant negative influence on the chosen tax rate among men, whereas the contrary for women. Specifying *critical overconfidence* as expecting an above-mean-income while realizing a below-mean-income, Model (8) states that the pronounced bias among men leads to significantly reduced tax preferences. Although similarly prone to overoptimism about income quintiles, women of this type indicate substantially higher tax rates. The overconfidence measures cannot explain the general tax rate jumps when moving from Phase 1 to Phase 2 (Table D2, Models 1-4).

Table D2: Tobit regressions - Overconfidence about income quintile in effort treatments

	Phase 1 and Phase 2				Phase 1			
	(1) Overcon-fidence	(2) OC Female	(3) Critical OC	(4) Crit. OC Female	(5) Overcon-fidence	(6) OC Female	(7) Critical OC	(8) Crit. OC Female
Dependent variable	τ_h	τ_h	τ_h	τ_h	τ_h	τ_h	τ_h	τ_h
Income uncertainty	-0.167***	-0.171***	-0.154***	-0.181***				
	(0.054)	(0.054)	(0.055)	(0.053)				
High inequality (ZA)					0.024	0.028	0.016	0.075
					(0.066)	(0.065)	(0.063)	(0.061)
Low mobility					-0.080**	-0.080**	-0.080**	-0.081**
					(0.036)	(0.036)	(0.036)	(0.036)
Female	0.140*	0.135*	0.139*	0.123	0.063	0.030	0.064	-0.052
	(0.078)	(0.076)	(0.078)	(0.080)	(0.064)	(0.064)	(0.064)	(0.067)
OC (expected - actual quintile)					-0.004	-0.045**		
					(0.016)	(0.020)		
OC × Female						0.075**		
						(0.030)		
Critical OC							-0.068	-0.264***
							(0.076)	(0.075)
Critical OC × Female								0.534***
								(0.139)
Phase 1 × OC	-0.002							
	(0.016)							
Phase 1 × OC × Female		0.031						
		(0.024)						
Phase 1 × critical OC			-0.072					
			(0.083)					
Phase 1 × critical OC × Fem.				0.193				
				(0.132)				
Constant	0.551***	0.553***	0.551***	0.558***	0.446***	0.466***	0.461***	0.480***
	(0.072)	(0.072)	(0.072)	(0.072)	(0.056)	(0.056)	(0.060)	(0.060)
Observations	320	320	320	320	160	160	160	160
Log-pseudolikelihood	-243.383	-242.871	-243.072	-242.483	-66.068	-63.287	-65.535	-57.323
Pseudo R-squared	0.034	0.036	0.035	0.038	0.033	0.074	0.041	0.161

* p < .1, ** p < .05, *** p < .01.

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