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Might Have Thought**

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Effort and Redistribution: Better Cousins Than One Might Have Thought^{*}

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Abstract

We use survey and experimental data to explore how effort choices and preferences for redistribution are linked. Under standard preferences, redistribution would reduce effort. This is different with social preferences. Using data from the World Value Survey, we find that respondents with stronger preferences for redistribution tend to have weaker incentives to engage in effort, but that the reverse does not hold true. Using a lab experiment, we show that redistribution choices even increase in imposed effort. Those with higher ability are willing to help the needy if earning income becomes more difficult for everybody.

Keywords: Effort, redistribution, survey data, simultaneous equation models, experiment

JEL: C31, C91, D31, J28

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1. Motivation

Increasing economic welfare by providing conditions for economic growth while, at the same time, ensuring a level of income equality which is accepted by society are two main goals of governments. In trying to reach these goals, governments face a trade-off: If governments tax income more heavily, everything else held constant, they have more scope for redistributing income, which may be desirable to meet fairness concerns. However, the higher the tax rate, the lower the incentives of those with a particularly high ability to work hard. Ultimately, a higher tax rate may mean less money for redistribution. Empirically, we observe that the degree of redistribution has been growing in many countries (Organisation for Economic Cooperation and Development 2011: chapter 7). The standard explanation would be that the majority of voters with lower income expropriate their compatriots with a higher income. This policy trade off may change, however, if individuals have social preferences and prefer a more equal distribution of incomes.

In this paper, we investigate the relationship between support for redistributive policies and effort, both theoretically and empirically. If individuals hold standard preferences as, for instance, in Persson et al. (2000), support for redistribution and effort are inversely related. Individuals with higher than average ability exert more effort, but vote against redistribution. If redistribution is imposed, they reduce effort. If, in contrast, individuals have social preferences and are sufficiently averse against advantageous inequity as in (Fehr and Schmidt 1999), those with high ability may support redistribution. Individuals are even more likely to favor redistribution if inequity aversion is sensitive to fluctuations of earning possibilities over time. We thus have competing predictions.

We use two complementary approaches to test these predictions empirically. The first approach has the advantage of higher external validity and broader geographical and temporal coverage, but forces us to rely on a rather elaborate econometric model for identification. We use cross-country survey data from the *World Value Survey*, following previous work analyzing preferences for redistribution (Alesina and Fuchs-Schündeln 2007; Alesina and Giuliano 2009). In contrast to these previous studies, we estimate a simultaneous equation model, which explicitly allows for reverse causality between effort and redistribution. With this data, we can also investigate longer-run patterns, and we can control for the macroeconomic environment. We are able to instrument either preference, and thereby overcome the identification problem resulting from the fact that, potentially, the willingness to exert effort and support for redistribution are determined interactively.

The second and complementary empirical approach is a lab experiment. While redistribution preferences have previously been elicited in the lab, no experiment has simultaneously manipulated effort and elicited redistribution choices, and has manipulated redistribution levels and has elicited effort choices; this is what we do. In the lab, identification and hence internal validity are straightforward, but we replace labor market risk with the risk for student partici-

pants to leave the lab with less money than their peers. We thus have to face the characteristic loss in external validity. More specifically, within subjects, we sequentially (i) induce effort and elicit redistribution decisions, and (ii) induce a redistribution level and elicit effort choices. In the survey data, we cannot observe ability directly, which is a likely determinant of both effort and redistribution preferences. And all we can see is *stated support for* redistribution explaining *stated* willingness to exert effort, and *stated* willingness to exert effort explaining *stated support for* redistribution. By contrast, the lab experiment allows explaining effort *choices* by the *actual* level of redistribution and *decisions* for a level of redistribution by the *actual* (imposed) degree of effort. Through random assignments, we can identify causal effects.

We find that those in favor of more redistribution, and those exposed to a regime with more redistribution, are less willing to exert effort. Yet the opposite relationship does not hold: In the survey, support for redistribution is not explained by stated willingness to exert effort. In the lab, participants even choose a *higher* degree of redistribution if they are exogenously forced to exert higher effort. These findings are consistent with social preferences.

Our findings shed new light on the political process determining the degree of redistribution. They suggest that even a substantial fraction of those who have to pay the bill support more redistribution. Yet we also find that the willingness to exert effort declines as the degree of redistribution increases. These preference patterns face policy makers with a hard choice: According to our data, a substantial majority supports greater redistribution, but in the future, all will be worse off due to the negative effect on effort.

In the following second part, we explain in which ways our paper goes beyond what has already been done. In the third part, we sketch a theoretical model that shows the critical role of social preferences for understanding the relationship between effort and support for redistribution at the individual level. We test the predictions in Part Four, based on survey data from the *World Value Survey*. Part Five provides complementary experimental evidence, and Part Six concludes.

2. Earlier Findings

2.1 Survey Evidence

Previous work has used similar survey data to analyze the determinants of preferences for redistribution. Fong (2001) uses data from a Gallup survey to test whether redistribution preferences result from selfish motives, implying that those who believe in a greater need for help to themselves are also the main supporters. She finds a significant effect of income, as a plausible proxy, but this effect is small. There is an independent, strong effect of beliefs about the

role of effort, luck, and opportunity in life outcomes. Social preferences turn out the best explanation for redistribution preferences.

Alesina and Fuchs-Schündeln (2007) use German reunification as a natural experiment to analyze people's redistribution preferences. Their data come from the *Socio-Economic Panel* (SOEP), and they use region-time interactions to model exogenous variations of preferences. They show that East Germans are more in favor of redistribution than West Germans. Alesina and Giuliano (2009) use data from different sources, including the *World Value Survey*, to analyze redistribution preferences as well. They include fairness preferences and stated willingness to work hard as control variables, but they do not analyze the reverse causality of these variables on redistribution preferences. Their main explanatory variables are individual characteristics, and they control for the macroeconomic environment during respondents' youth. They find that historical experiences, cultural factors, and personal histories affect preferences for equality.

Our approach differs from these studies because we are interested in the reciprocal relationship between effort and support for redistribution. Hence, we analyze the feedback between support for redistribution and effort, and we control for the macroeconomic environment. Our results suggest that modeling effort and redistribution simultaneously is indeed important: Support for redistribution affects stated effort choices, but not vice versa.

2.2 Experimental Evidence

A number of experimental papers have tested redistribution preferences. In a first set of papers, individuals show their willingness at a point of time when their exogenous income is known. Hence, "effort" is not manipulated. Durante and Putterman (2009) have groups of 21 participants. All but one are assigned the equivalent of a 20th fraction of the US income distribution in the year 2000, either randomly or reflecting their performance in a quiz. The randomly selected 21st participant is a "dictator", deciding on a proportional tax. The proceeds are redistributed equally among all group members. The mean tax is close to 50% in the random assignment condition, and some 37% in the quiz condition. Tyran and Sausgruber (2006) randomly give 2 group members high, 2 medium, or 1 low earnings. Knowing their income, participants can vote for redistribution such that the high earners bail out the one low earner. Decision is by majority, such that the low and the 2 medium earners can impose redistribution on the high earners. Almost all low and most medium earners vote for this scheme, as does a third of the high earners. Different from our setting, in both experiments income is assigned, not earned, and unrelated to ability .

In the next experimental step, individuals choose their income risk for a given level of redistribution. Hence, the redistribution choice is not modeled. Specifically Cabrales et al. (2012) had participants interact for 50 announced rounds in fixed groups of 9. In the first stage of

each period, each participant independently decided whether to receive a fixed income or to buy a lottery with an expected value above the fixed income, but the risk of ending up with a lower payoff. In the second stage, knowing the realizations of the lotteries, and using different voting schemes, participants decided whether to redistribute all period income equally. The authors find that participants are more likely to vote in favor of redistribution if they have low income. In the final rounds, no group combines a willingness to buy lotteries with a high degree of redistribution. Davidovitz and Kroll (2004) have subjects choose between a risk-free and a risky asset. Individual choices define the probability with which the risky asset is chosen. If it is, in the baseline all participants have the same realization of the lottery, while in the treatment, realizations for all participants are individual (but from the same distribution). Higher equality motivates participants to take more risk. These experiments are related to ours, in that we use redistribution (exclusively) as a safeguard against risk. But the trade-off with effort is not investigated.

The next step is letting participants decide upon a redistribution scheme *before* they know in which way they will be affected by an income lottery. Yet earnings do not result from effort, and they are unrelated to ability. Selten and Ockenfels (1998) give one or two of three players a chance to earn 10 Deutsche Mark (DM), while the remaining players earn 0. Before earnings are randomly assigned, participants can commit to compensating the losers. On average, winners are willing to transfer 3 DM, irrespective of the number of losers. This shows a willingness to give when earnings (exclusively) depend on luck.

In the previously reported experiments, ability is not a treatment variable. This changes in several papers that focus on redistribution preferences (but do not manipulate effort). It is shown that differences in effort are seen as a justification for income differences, whereas differences in (innate) ability are not (Schokkaert and Overlaet 1989; Schokkaert and Capeau 1991; Konow 2000). Checchi and Filippin (2004) experimentally test the “prospect of upward mobility hypothesis”. They find that less affluent individuals indeed oppose redistribution, if they have reason to expect that they will become disproportionately more prosperous in the future. In contrast to our experimental set up, they do not measure effort. Beckman et al. (2004) essentially designed an experiment about distribution, not about *redistribution* as we do. Participants decide in groups of five how to split a pie. The group chooses with majority between two unequal distributions. In the baseline, when they vote, participants know how much each scheme gives them. In the treatment, they decide under the veil of uncertainty. If participants do not know their individual share, they oppose redistribution the more intensely the higher the efficiency loss. This holds no longer true if they decide knowing how this will affect them individually. Again, no effort decisions are elicited (further, less closely related experiments are reported by Tausch et al. 2010).

The closest analogue to our approach in the experimental literature is a paper by Frohlich and Oppenheimer (1990). Knowing the redistribution scheme, participants had to engage in a real effort task: They formed groups of five and had one condition where participants decided on a

redistribution scheme under the veil of ignorance. In the other condition, it was imposed that average income was maximized, but with a floor constraint. The marginal pay rate had considerable returns to scale. When they could choose, almost all groups chose the same scheme as was imposed on the other groups. Productivity was not negatively affected by redistribution, and it actually increased when the scheme was self-selected. In their task, there was considerable room for learning, which could explain these results. Our design differs in that we not only test performance conditional on redistribution, but, in a fully symmetric design, also redistribution conditional on performance. Moreover, we unpack performance in an effort and an ability component. Using the strategy method, we explore a full range of effort and redistribution levels. Finally, our task is unaffected by learning. In earlier papers, Frohlich et al. (1987a; 1987b) had shown that the redistribution principle they use in this experiment is the most preferred (also see Herne and Suojanen 2004).¹

Essentially, what we contribute to the experimental literature is a direct test of the expectation derived from the assumption that tax payers hold social preferences. Such individuals should favor (some) redistribution even if they do not individually benefit. Yet this does not guarantee that their effort choices remain unaffected by the resulting decrease in the productivity of labor. With our design, we are able to elicit both choices, of effort and of a redistribution level, from the same individual.

3. Effort and Preferences for Redistribution: Theoretical Motivation

To motivate our empirical analysis of the determinants of preferences for redistribution and effort, we capitalize on a model of effort choice and preferences for redistribution by Persson, Tabellini et al. (2000: chapter 6). We enrich the objective function of that model along the lines of the canonical model by Fehr and Schmidt (1999), to account for the possibility that individuals are inequity averse. We also allow for utility to depend on an exogenous reference payoff to capture the sensitivity of redistribution preferences to exogenous (macroeconomic) shocks in earning abilities.

We do not endogenize the political process. This would require fixing the objective function of politicians and the fraction of strong and weak individuals in the electorate. We want to say only in which ways effort choices react to exogenously imposed redistribution, and in which ways tax preferences react to effort choices, given earning ability is heterogeneous.

¹ Krieger and Traub (2008) also combine survey evidence with an experiment, yet have a different research question. They study policy preferences for pension schemes. Neustadt and Zweifel (2010) use contingent valuation to elicit preferences for income redistribution in a telephone survey. Klor and Shayo (2010) find that social identity tilts votes for a redistribution scheme in favor of the group of which the subjects happen to be a member, an issue that we do not consider here.

We proceed in three steps. In the baseline version of the model, there is redistribution, but individuals have standard preferences. In the second version, participants are inequity averse as in Fehr and Schmidt (1999). In the third version, we modify the model by Fehr and Schmidt and make individuals sensitive to deviations from a reference payoff.

3.1 Standard Preferences

We are interested in a conflict between individuals of different earning ability with regard to work effort and taxes. Earnings of each individual depend on her own labor effort as well as a redistributive component. Society (a social planner) redistributes income ex post such that pre-tax differences in income are reduced by the tax rate.

To see the resulting conflict, we study a society of two individuals – one with strong (s) and one with weak (w) earning ability. If the strong individual exerts labor effort l_s , she receives a corresponding labor income. If the weak individual exerts effort l_w , the payoff is multiplied by $\varphi < 1$, reflecting her lower productivity. We thus normalize the strong individual's ability to 1. Consequently, φ is given by the ratio of earning abilities. The weaker individual's total utility is given by

$$\pi_w = \varphi l_w + \tau \left(\frac{\varphi l_w + l_s}{2} - \varphi l_w \right) - \frac{1}{2} l_w^2 \quad (1)$$

where labor income is given by effort l_w , multiplied by ability $\varphi < 1$. The second term is transfer income, and the third term gives the non-linear disutility of effort. The government transfers income from those with earning above to those with earning below the mean. Hence, transfer income is determined as the difference between this individual's earnings φl_w and the mean earnings of society. The tax rate is given by $\tau < 1$. Because the weak individual has a labor income below the mean, she receives a net transfer.

By analogy, the strong individual earns

$$\pi_s = l_s - \tau \left(\frac{\varphi l_w + l_s}{2} - \varphi l_w \right) - \frac{1}{2} l_s^2 \quad (2)$$

Because labor income of the strong individual is above the mean, she pays taxes.

Individuals have two choice variables: they choose their optimal level of labor supply and the optimal tax rate. Optimizing with regard to effort, we obtain the following first order conditions:

$$l_w^* = \varphi \left(1 - \frac{1}{2} \tau \right), l_s^* = 1 - \frac{1}{2} \tau \quad (3)$$

Strong individuals exert more effort than weak individuals, given $\varphi < 1$. Effort of both individuals decreases in the tax rate. For the weak individual, higher taxes imply higher transfers. Hence, she can keep her income constant with lower effort. For the strong individual, higher taxes imply lower net income, hence she prefers to work less.

The model is linear in taxation, which is why we have corner solutions. Individuals either support taxation such that both individuals have the same (gross) income, or they are opposed to any redistribution. The first order conditions (FOC) with respect to the tax rate are thus given by

$$FOC_w^\tau = \frac{1}{2}(l_s - \varphi l_w), FOC_s^\tau = -\frac{1}{2}(l_s - \varphi l_w) \quad (4)$$

where the subscript denotes the individual ($s = \text{strong}$, $w = \text{weak}$), and the superscript denotes the choice variable (here: the tax rate τ). As one should expect, individuals hold opposite tax preferences. The weak individual supports taxation, while the strong individual is against.

In sum, the standard model yields three testable propositions:

Hypothesis 1: *Labor supply (effort) increases in individual ability and decreases in the tax rate.*

Hypothesis 2: *Individual tax preferences depend on individual ability relative to other members of the community: individuals with high ability are opposed to taxation. Individuals with low earning ability prefer a positive tax rate.*

Hypothesis 3: *Individual tax preferences and labor supply (effort) are negatively correlated at the individual level.*

1.1 Inequity Aversion

So far, we have assumed that individuals hold standard preferences, and thus care only about other individual's choices or payoff to the extent that it affects their own monetary payoff. In the next step, we allow individuals to also care about others and about the distribution of income in a society. Hence, we extend the baseline model to a society of two individuals who hold fairness preferences along the lines of Fehr and Schmidt (1999). In contrast to the model with standard preferences, we now assume that individuals also care about relative income.

Now in the policy debate over redistribution, the focus is on income differentials, not on payoff differences. The policy debate thus tends to bracket (differences in the) disutility of labor. Since we want to make a contribution to our understanding of this policy debate, we modify the Fehr/Schmidt model and consider inequity in (gross) income, not in (net) payoff. Because we define one individual to be weak, she (potentially) receives disutility only from disadvantageous inequity ("is my own income lower than the income of the stronger individual?").

Likewise, the strong individual only (potentially) receives disutility from advantageous inequity (“is my own income higher than the income of the weaker individual?”).²

To ease notation, we define (gross) income of the two individuals as:

$$m_w = \varphi l_w + \tau \left(\frac{\varphi l_w + l_s}{2} - \varphi l_w \right) \quad (5)$$

$$m_s = l_s - \tau \left(\frac{\varphi l_w + l_s}{2} - \varphi l_w \right) \quad (6)$$

Utility is then given by each individual’s own payoff and a term that captures inequity aversion:

$$u_w = \pi_w - \alpha(m_s - m_w) \quad (7)$$

$$u_s = \pi_s - \beta(m_s - m_w) \quad (8)$$

Both individuals have lower utility if the payoff for the strong individual is higher than the payoff for the weak individual. The sensitivity of individuals towards inequity differs though. Fehr and Schmidt make the plausible assumption that $\alpha > \beta$: individuals are more sensitive to being worse than being better off.

As before, we find the individually optimal level of labor supply by taking first order conditions and solving:

$$l_w^{*fs} = \varphi \left(1 - \frac{1}{2}\tau - \alpha\tau + \alpha \right), l_s^{*fs} = 1 - \frac{1}{2}\tau + \beta\tau - \beta \quad (9)$$

where optimal choices are indicated by an asterix (*), and superscripts denote that we assume (modified) Fehr-Schmidt preferences. Note a number of implications. For both individuals, there is a direct and an indirect effect of inequity aversion. Through the direct effect, the individual aims at reducing the inequity by adjusting effort. This can be achieved if the weak individual increases and the strong individual reduces effort. The indirect effect is conditional on the tax rate. The more the weak individual is averse against inequity, the more she reacts to a higher tax by reducing effort: the transfer income substitutes for earned income. By contrast, the more the strong individual is averse against inequity, the more she supports taxation. Actually, we can directly read off (9) that the critical β is $\frac{1}{2}$. With $\beta > \frac{1}{2}$, the strong individual works harder if the tax is heavier: she increases the amount that can be redistributed. Tax preferences follow from first order conditions of (7) and (8) with respect to τ :

$$\begin{aligned} FOC_w^{fs} &= \left(\alpha + \frac{1}{2} \right) (l_s - \varphi l_w) \\ FOC_s^{fs} &= \left(\beta - \frac{1}{2} \right) (l_s - \varphi l_w) \end{aligned} \quad (10)$$

2 Fehr and Schmidt utility therefore simplifies to a version without max operators.

The most important implication of (10) concerns the tax preference of the strong individual. Provided she is sufficiently averse against inequity (i.e. provided $\beta > \frac{1}{2}$), she supports a positive tax rate.

This leads to an additional hypothesis:

Hypothesis 4: *If strong individuals are sufficiently inequity averse, they too support taxation.*

3.3 Aversion Against Income Differing from a Reference Income

In the policy debate, redistribution is often not only motivated with the desire to reduce income differentials. Policy makers are also sensitive to the idea that everybody should dispose of an absolute income sufficient to cover her ordinary needs. Yet, nations differ widely in their definition of this level. Some of this variation results from differences in policy preferences. But the willingness of those who earn more to help those in need also depends on the standard of living of the representative household, under ordinary circumstances. We label this the “reference payoff”, and one can think about it as the steady state of an economy in the absence of business cycle fluctuations. We cover these political attitudes by a second variant of the model by Fehr and Schmidt (1999). In this variant, sensitivity to inequity is conditional on earning prospects, in comparison with what is characteristic for this population.

Technically, we capture this additional concern by letting income m for all individuals fluctuate in a symmetric interval $\vartheta \in [1 - a, 1 + a], a < 1$ such that actual income is given by $m = \vartheta \bar{m}$, with \bar{m} being the expected value of income, i.e. at $\vartheta = 1$, and ϑ being a random draw from a uniform distribution over the entire interval. In this variant of the model, inequity aversion is the more pronounced the more earning abilities are below the reference payoff. Inequity aversion is attenuated the easier it is to earn income, compared with the reference income. Hence utility is given by a modified version of (7) and (8),

$$u_w = \pi_w - \frac{\alpha}{\vartheta(m_s - m_w)} \quad (11)$$

$$u_s = \pi_s - \frac{\beta}{\vartheta(m_s - m_w)} \quad (12)$$

Proceeding the same way as in the two previous variants of our model, we get optimal labor supply

$$l_w^{*r} = \varphi \left(1 - \frac{1}{2} \tau - \frac{\alpha \tau}{\vartheta} + \frac{\alpha}{\vartheta} \right), l_s^{*r} = 1 - \frac{1}{2} \tau + \frac{\beta \tau}{\vartheta} - \frac{\beta}{\vartheta} \quad (13)$$

As expected, with $\vartheta = 1$ (13) is identical with (9). Yet if society is in dire circumstances, i.e. with $\vartheta < 1$, both the direct and the indirect effect of inequity aversion are affected since then

$\frac{\beta}{\vartheta} > \beta$. The direct effect induces the strong individual to reduce effort, and $\left(\frac{\beta}{\vartheta} - \frac{1}{2}\right)^r$ is more likely to be positive. At the same time, her effort is less easily deterred by taxation, since $\left(\frac{\beta}{\vartheta} - \frac{1}{2}\right)^r$ is more likely to be positive. The opposite pattern holds for the weak individual. Compared with (9), the direct channel becomes more important. Since $\frac{\beta}{\vartheta} > \alpha$, the weak individual increases effort even more, to reduce the undesired inequity. However her own efforts are even more strongly deterred by the transfer income.

In similar ways, fluctuation of earning possibilities affects tax preferences. Compared with (10), the only change in (14) is, in both equations, the first term, which is now divided by ϑ . Since $\frac{\beta}{\vartheta} > \beta$, strong individuals are even more likely to support taxation:

$$\begin{aligned} FOC_w^r &= \left(\frac{\alpha}{\vartheta} + \frac{1}{2}\right) (l_s - \varphi l_w) \\ FOC_s^r &= \left(\frac{\beta}{\vartheta} - \frac{1}{2}\right) (l_s - \varphi l_w) \end{aligned} \quad (14)$$

This leads to

Hypothesis 5: *Individuals with high earning ability are more likely to support taxation if they are averse against situations in which individuals with low earning ability fall below a reference payoff.*

With these predictions on the link between effort and redistribution preferences under standard and social preferences at hand, we now turn to empirical tests on the hypotheses derived. We begin with an analysis of survey evidence, in which we explicitly model the simultaneity of effort and redistribution preferences. We then turn to experimental lab evidence which inter alia helps addressing the endogeneity problem beleaguering survey data.

4. Redistribution versus Effort: Survey Evidence

The dependent variables in our empirical model using survey data are preferences for redistribution and effort. We obtain information on these variables from the *World Value Survey* (WVS), which has been used frequently to test preferences for redistribution (see, e.g., Alesina and Giuliano 2009). It also contains information about respondents' preferences towards work and leisure. It is a repeated cross-sectional survey of values and attitudes which was conducted in a large number of countries in five waves over a time span of more than 25 years (1981-2008). We restrict our analysis to OECD countries in order to work with a sufficiently homogenous country sample, while providing heterogeneity with regard to institutional structures. Given the structure of the data, we cannot exploit individual-level dynamics, and we cannot include individual-specific fixed effects to account for unobserved heterogeneity. But we can analyze preferences for redistribution and effort for a large number of individuals in many countries and years.

Our measure for effort (l_i) uses the answer to the question whether an individual considers it important to have an opportunity to use initiative at work.³ This question is a 0/1-answer to multiple features that are important at the work place. Respondents were free to mention multiple features. The advantage of this measure is that it asks for the preference to engage in effort for respondents, both active and non-active in the workplace at the time of the survey. The disadvantage is that it does not measure actual effort.

There is no direct question in the survey asking about preferences for redistribution in terms of preferences for taxation. Instead, redistribution preferences (τ_i) are measured using answers to the question whether incomes should be made more equal. Respondents are asked to answer this question on a scale ranging from “1 = *Incomes should be made more equal*” to “10 = *We need larger income differences as incentives*”. The question is embedded in a section of the survey which asks about respondent’s political preferences. Although the question could also be understood as referring to the desirability of high or small income dispersion of market incomes, respondents are likely to take it as a statement about governmental redistribution as well. Both variables are scaled such that a higher value indicates stronger preferences towards effort and redistribution, respectively. Details on the data definitions are given in the Appendix.

Descriptive statistics shown in Graph 2 show that preferences for effort and redistribution are not constant over time. According to the *World Value Survey*, the average proportion of respondents mentioning that it is important to have the opportunity to use initiative at work (“effort”) increased from 44% to 55% over the four waves along which the survey was conducted (1981-84 versus 1999-2004). At the same time, support for greater income equality strengthened. Across all countries, this would suggest a positive correlation between effort and redistribution preferences.

Because participants in our experiments reported in Section 5 below have been recruited in Germany, it is instructive to compare the responses of German respondents in the *World Value Survey* to those from other countries. Generally, the opportunity to use initiative at work is considered important by about 55% of the respondents in Germany. This share is above-average and, in contrast to other countries, there is a declining trend over time. At the end of the time period, this ratio was similar for Germany as for the other countries. As regards preferences for redistribution, German respondents prefer somewhat higher degrees of redistribution at the end of the sample period. There has been an increasing trend for this variable in Germany unlike in most other countries.

3 To check the robustness of our results, we have additionally used answers to the question whether hard work brings success (to measure effort preferences), whether higher pay for higher effort is considered fair, and whether job security is considered important (to measure redistribution preferences). Qualitative results are similar and are available upon request.

Following previous work by Alesina and Fuchs-Schündeln (2007); Alesina and Giuliano (2009), we control for the following observed individual-specific characteristics: age and age squared, gender, marital status (omitted category: “single or never married”), employment status (omitted category: “other”), income group (omitted category: “high income”), and church membership. Inter alia, these variables capture individual employment records and the probability of becoming unemployed or of being out of work.

Macroeconomic conditions can have an impact on the preferences for protection through the social security system and the incentives to work. GDP growth is used a general proxy for the macroeconomic environment. High GDP growth may increase effort, because effort pays off, but it may also increase demands for redistribution. We additionally include information on top marginal income tax rates as a general measure of the degree of redistribution via the tax system.

4.1 Empirical Model

Our measure for initiative at work is a dummy, while the preference for redistribution is measured on a scale from 0 to 10. For the binary variable, we use a probit model, for the (quasi) continuous variable, we use an OLS model, but we have checked the robustness of our findings using an ordered probit model. Country fixed effects are included in all regressions.⁴ In order to account for the fact that country-year characteristics are identical for all individuals in a given year in a given country, we cluster standard errors at the country-year-level.

4.1.1 Instrumentation Strategy

Identifying the impact of effort preferences on preferences for redistribution (and vice versa), while accounting for the potential endogeneity of the regressors, requires finding appropriate instruments. We use the following variables: For effort, we expect a dummy for the respondent being protestant to have a positive impact. This would be in line with the work by Becker and Wössmann (2009) who show that, historically, protestantism was associated with economic prosperity and with better education. Also, we expect a relation between willingness to exert effort and the individual’s perception of and attitude towards earning a living in the economy. In an environment where people may safely assume that there is a strong positive correlation between higher effort and higher income, they should be more likely to engage in effort. We proxy this expectation by the stated willingness to “trust”. On the normative side, people should be more inclined to exert high effort if they believe that a high income *should* reflect higher effort. The willingness to engage in high effort and the statement that it is justifiable to accept a bribe (as one source of income unrelated to effort) should therefore be correlated negatively.

4 Note that the macrovariables and time-country fixed effects cannot be included simultaneously.

As regards preferences for redistribution, we have three main variables which are expected to affect only this variable, but not effort choices. The first is measured at the individual level, and it describes the characteristics *of the neighborhood*. Due to the fixed costs of moving, these characteristics can be considered exogenous for the individual in the short to medium run. When asked about the characteristics of their neighborhood, respondents can answer whether neighbors have a different race or a different religion, whether they are drug addicts, alcoholics, whether they belong to a militant minority, or whether they have a criminal record. We create a new variable which equals one if one of these conditions is fulfilled. The intuition is that a more homogenous and less adverse neighborhood increases the probability that people favor redistribution. We expect a negative impact.

The second variable that should affect preferences for redistribution (but not effort) measures the tightness of *employment protection legislation*. It is an index running from 1 to 5, and a higher value indicates stricter employment protection legislation. Redistribution preferences are influenced by living in a context where redistribution is more generous. We would thus expect to find a positive link between individual preferences for redistribution and employment protection legislation.

Finally, high *growth volatility* indicates that macroeconomic risks are high. We therefore expect this variable to have a positive effect on redistribution preferences. GDP growth volatility is calculated as the standard deviation of GDP growth over a five year period.

Ultimately, the data need to tell whether the above variables are suitable instruments. Table 1 thus shows the results for single equation models using the “opportunity to use initiative at work” and preferences for a more equal allocation of income as the dependent variables. We report the results of instrumental variable regressions and additionally show the first-stage regression results. The signs for the instruments are in line with expectations: People who trust more and who are protestant are more likely to answer that it is important to use initiative at work; people who find it acceptable to take bribes and who value leisure more do less so. Preferences for greater redistribution are negatively correlated with adverse conditions in the neighborhood and positively correlated with employment protection legislation and growth volatility.

4.1.2 Regression Results

Theory suggests that preferences for redistribution and effort are negatively correlated at the individual level. Our results confirm this prior, but they also show that this is no two-way correlation (Table 1): The (instrumented) preference for redistribution has a negative impact on effort, and this effect becomes stronger when moving from (unreported) probit regressions to IV estimates. But the (instrumented) effort measure – which is negative and significant in a simple OLS model – does not have a significant impact on preferences for redistribution. Causality thus seems to run from redistribution preferences to effort, but not vice versa.

Our empirical model explains about 5% of the individual effort and about 8% of the redistribution preferences, which is similar to other work in the field. In Alesina and Giuliano (2009), for instance, the R^2 in models for redistribution preferences ranges from 0.09-0.15. The model is in line with our theoretical priors in the sense that respondents with medium or low incomes are less likely to answer that it is important to use initiative at work, and are more in favor of redistribution. Also, the finding that those who are self-employed are consistently less in favor of redistribution than non-self-employed persons is in line with expectations, given that the self-employed can be expected to be more risk-taking and engage in higher effort.⁵ Higher growth has a positive impact on preferences for redistribution and lowers effort. Finally, preferences for redistribution and the top marginal tax rate at the country level are positively correlated, as expected.

We have run a couple of tests checking the robustness of our results with regard to the specific choice of the IV model. For the model reported in columns (1) and (2) of Table 1, the qualitative results are robust with regard to estimating the model using 2SLS or GMM and with regard to different options for clustering the errors. The Durbin-Hausman-Wu test rejects that “effort” is endogenous, but this result is somewhat sensitive to the specific choice of instruments. The Hansen Test is insignificant, which implies that the overidentification restriction is valid. However, when additionally including the instruments which we conjecture to be important for redistribution preferences, these are significant as well: employment protection legislation has a negative and significant impact on effort; the heterogeneity of the neighborhood has a positive impact. Adding these variables causes the Hansen Test to become significant, though, implying that in this specification the overidentification restriction is not valid. Although we should not trust this specification too much, this shows the problem to find instruments affecting one variable only.

The `ivprobit` command provides less flexibility with regard to testing the quality of the instruments. The first main difference to the redistribution equation is that effort has a negative and significant impact in the regular probit model and in different versions of the IV models. Moving from probit to an IV-probit estimator, the estimated coefficient increases and the standard error decreases, suggesting that the probit estimator is indeed biased. Moreover, the correlation coefficient measuring whether the error terms of the first and the second stage regression are correlated is highly significant, indicating that preferences for redistribution are endogenous. Hence, our model suggests that preferences for redistribution have a negative impact on effort, but it is difficult to find instruments which affect one, but not the other.

5 Results for the remaining individual-specific variables are largely in line with priors and with previous empirical evidence: men are generally less in favor of redistribution than women, but gender has no impact on effort preferences; age has a non-linear impact; unemployment status (after controlling for income) has no impact on redistribution preferences or effort; family status has no important impact on redistribution preferences; and church members put less emphasis on redistribution but higher emphasis on own initiative.

4.2 Simultaneous Equation Model

So far, we have included preferences for redistribution in the equation for effort preferences, and vice versa, but we have not taken into account that the two might be jointly determined at the individual level. Solving the problem that standard estimates of simultaneous equation models are biased and inconsistent would be straightforward if we were to deal with two continuous variables. Such systems can be consistently and efficiently estimated using three-stage least squares methods (Zellner and Theil 1962). However, because one of our main dependent variables (the opportunity of using initiative in a job) is a dichotomous variable, we need a system estimator which takes this into account.

We employ an instrumental variables estimation using the procedure suggested by Maddala (1983); Keshk (2003) for systems where one of the endogenous variables is dichotomous. Using a two-stage procedure, we create instruments for the endogenous variables, and we substitute them for the endogenous counterparts in the structural equations of interest.

Let preferences for redistribution $\tau_{it} = \tau_{it}^*$ be a fully observed variable, and effort preferences be given by $l_{it} = 1$ if $l_{it}^* > 0$ and $l_{it} = 0$ otherwise.⁶ We estimate a two-stage probit least squares (2SPLS) model. In the first step, the following reduced-form equations are estimated:

$$\tau_{it} = \Pi'_1 \mathbf{X}_{it} + v_{1,it} \quad (7a)$$

$$l_{it}^{**} = \Pi'_2 \mathbf{X}_{it} + v_{2,it} \quad (7b),$$

where i is a country index and t denotes time. Note that $\mathbf{X}_{1,it}$ is a composite vector which includes all exogenous variables included in the first structural equation (8a) ($\mathbf{X}_{1,it}$) and in the second structural equation (8b) ($\mathbf{X}_{2,it}$). Equation (7a) is estimated using OLS, and equation (7b) is estimated using a probit model to obtain the $(K \times 1)$ -vector of parameter coefficients $\hat{\Pi}'_1$ and $\hat{\Pi}'_2$. The fitted values $\hat{\tau}_{it} = \hat{\Pi}'_1 \mathbf{X}_{it}$ and $\hat{l}_{it}^{**} = \hat{\Pi}'_2 \mathbf{X}_{it}$ from these equations are used as regressors for the second stage regressions. The covariates \mathbf{X}_{it} include all exogenous regressors from both equations in the simultaneous equations model.

Panel (a) of Table 2 shows the results for the first stage regressions, focusing on the variables used as instruments in Table 1. The remaining regressors are included in the model, but are not shown to save space. Qualitatively, the results are the same as before, but they show the problem pointed out earlier: while there are a couple of variables affecting effort, but not preferences, for redistribution, the reverse does not hold.

Step two involves estimating the structural equations of interest:

$$\tau_{it}^* = \gamma_1 \hat{l}_{it}^{**} + \beta_1 \mathbf{X}_{1,it} + \varepsilon_{1,it} \quad (8a)$$

6 The presentation of the empirical model follows Keshk (2003).

$$l_{,it}^{**} = \gamma_2 \hat{\tau}_{it}^* + \beta_2 \mathbf{X}_{2,it} + \varepsilon_{2,it} \quad (8b),$$

where $\mathbf{X}_{1,it}$ and $\mathbf{X}_{2,it}$ are the exogenous explanatory variables affecting effort and redistribution preferences, respectively. Equation (8a) is estimated using OLS, and equation (8b) is estimated using a probit model. Estimation needs to take into account that the standard errors are biased, and (Keshk 2003) derives the corresponding adjustment factors. We implement this procedure by invoking the procedure `cdsimeq` in *Stata*. The model would not be identified if the same set of variables was included in vectors $\mathbf{X}_{1,it}$ and $\mathbf{X}_{2,it}$.

In terms of the feedback between effort and redistribution, Table 2 confirms the main conclusion from Table 1: redistribution preferences have a negative and significant impact on effort, but not vice versa. It is also interesting to note that, while moving from a single-equation OLS (or probit) to an IV model had virtually no impact on the estimates for the remaining control variables, this is not the case when moving to a system estimation. Most importantly, the impact of the income level and self-employment status on initiative becomes insignificant when modeling effort and redistribution jointly.

In sum, from our analysis of survey data we can draw the following conclusions:

- Hypothesis 1 states that effort increases in individual ability and decreases in the tax rate. One proxy for individual ability is the actual income level. In the single-equation model, we indeed find a positive correlation between income and the willingness to engage in effort. Yet, once we simultaneously model effort and redistribution preferences, low- and middle-income respondents do not think any less than more affluent respondents that effort at work pays off for them. In this sense, Hypothesis 1 is not confirmed by the data, and we also find no significant impact of the marginal tax rate.
- Hypothesis 2 states that individuals with low individual ability prefer higher tax rates. This hypothesis is supported by our finding that low-income, middle-income, and unemployed respondents are more likely to favor redistribution.
- Hypothesis 3 states that effort and redistribution preferences are negatively correlated at the individual level. Redistribution preferences indeed have a negative impact on the opportunity to use initiative at work, but not vice versa. One implication of this finding is that increased incentives to engage in effort must not necessarily come at the expense of less redistribution.

5. Redistribution versus Effort: Experimental Evidence

The survey data have allowed estimating the relationship between effort (l_i) and tax/redistribution preferences (τ_i) in a world where ability is heterogeneous. Yet, there are several difficulties with the survey data. First, our ability to isolate the feedback between the

two variables which are endogenously chosen by each individual hinges on the quality of the instruments. Second, individual real-world choices might differ from answers given in an interview. Third, the interview questions have been designed without having our research questions in mind. Fourth with the survey data, we cannot address Hypothesis 4 because we do not have information on individuals' social preferences. We cannot address Hypothesis 5 because the data is cross-sectional. We do not observe at the individual level how tax preferences react to a negative change in the general economic climate. For all these reasons, we complement our analysis with experimental evidence.

5.1 Design

In the lab, we cannot standardize or induce those determinants of ability that a participant has acquired at birth or during her education. But we can measure this ability and control for it. And we can induce differences in the ability to solve specific tasks. Moreover, we can make sure that participants act in groups, the heterogeneity of which we control. The general set up of our joint effort-and-redistribution experiment is given in Tables 3a-3c. The task is fully computerized. Participants earn a fixed piece rate for each problem they solve correctly.

To measure ability and to induce effort, we use a task developed by (Mazar et al. 2008). In tables of different size, participants are asked to find the one pair of numbers that add up to 10, as in Table 3a. The experiment then proceeds in three steps, eliciting effort and redistribution choices by inducing the respective other parameter.

5.1.1 Phase 1: Measuring Ability

In the first phase of the experiment, we measure individual ability. Participants see problems as in Table 3a. They see one problem at a time on a computer screen and have to tick the two cells that add up to 10 with the mouse. In each problem only two cells match in this way. Participants earn money only if the answer is correct. Participants have announced 10 minutes to solve as many problems as they can. Problems are presented in the sequence of easy (2x2 tables), ordinary (3x3 tables), and difficult (4x4 tables) problems. The first phase gives us an individual-specific measure of ability, i.e., the number of problems a participant has solved correctly. Moreover, it gives participants a chance to familiarize themselves with the task so that they can make meaningful choices in the later parts of the experiment.

5.1.2 Phase 2: Elicit Redistribution Preferences

In the second phase, we elicit redistribution preferences by asking participants to fill in Table 3b. We randomly compose groups of four. Participants know that each group has one member from each of the ability quartiles. They are reminded of their own performance in the

first phase. They further learn to which of the four ability classes they belong, and they are informed about the average performance of all four members of their group in the first phase.

The second phase measures redistribution preferences. Specifically, using the strategy method (Selten 1967), we ask participants to decide for each level of effort and for each difficulty of the task how much redistribution they desire. To that end, in each cell, each participant enters a percentage. Participants are told that, at the end of the experiment, one of these cells will randomly be determined to be payoff-relevant. Participants know they will have to exert the assigned effort in the cell singled out at the end of the experiment if they do not want to lose their entire income from the experiment. Redistribution is financed from the proceeds of a tax that is proportional to income. Effort is fixed in percent of the number of problems this participant has correctly solved in the first phase in the range [30%, 120%], in steps of 10%. To illustrate: if the individual had solved 10 problems correctly in phase 1, and the 60% level is randomly selected to be payoff-relevant, she has to solve 6 problems correctly.

We have chosen these parameters to have sufficient variance in our explanatory variable and to reflect a macro-environment that makes earning the same amount of money as before easier (think of growth effects) or more difficult (think of technical progress making it more difficult to earn money in some professions). The tax rate and thereby the size of the lump-sum transfer is determined by the median of the statements by the four group members. Technically, for each cell we use the mean between the second and the third highest percentage, in the respective group. Through randomly determining the difficulty of the task, we induce a handicap. Within the framework of the theoretical model, the random choice of table size has the interpretation of an exogenous shock that shifts mean ability upwards (if size is 2x2, $\vartheta > 1$ in the model) or downwards (if size is 4x4, $\vartheta < 1$ in the model).

5.1.2 Phase 3: Elicit Effort Preferences

In the third phase, we elicit effort preferences by asking participants to fill in Table 3c. Using the same task and the same procedure, we fix a tax rate. Again, each group member receives a quarter of total tax revenue, irrespective of her own effort and income. We now vary tax rates in the range [0%, 45%], in steps of 5%, where the upper limit is intended to reflect marginal tax rates observed in the real world. We now ask participants to commit to a number of problems they are prepared to solve (correctly) for each tax rate and difficulty of the task (with the maximum fixed at 50 problems). Feedback from redistribution choices is withheld until all participants have also taken effort choices, which is why the order in which participants have taken these decisions cannot play a role. Again, participants are informed that, after they have taken all choices, the computer will randomly determine one of the cells to be payoff-relevant. For this cell, participants are requested to exert the effort to which they have committed. All participants did.

Note that our design directly matches the theoretical model. The number of problems a participant solves in the first part of the experiment informs us about ability acquired by birth and education. This allows us to measure φ . In the second part of the experiment, we exogenously impose effort l_i . In the third part of the experiment, we manipulate the tax rate τ .

5.1.3 Conducting the Experiment

The experiment was conducted at the Bonn EconLab in December 2011. 96 student subjects of various majors (55.2% female) were invited using the *Online Recruitment System for Economic Experiments* (ORSEE) (Greiner 2004). The experiment was fully computerized, using the *Zurich Toolbox for Readymade Economic Experiments* (zTree) (Fischbacher 2007). With a series of computerized control questions, we made sure that all participants understood the tasks. The experiment lasted approximately 2 hours. On average, participants needed 14 minutes 51 seconds to complete the tasks resulting from their choices in Parts 2 and 3. The first participant left after 1 minute 16 seconds (because this participant had to solve only a very small number of easy tasks). The last participant left after 49 minutes 28 seconds (because this participant had chosen to solve the maximum of 50 problems in the third part of the experiment, and tasks were taken from 4x4 cells in both parts of the experiment). Participants received a piece rate of 40 Cents per problem solved. On average they earned 26.36 € (approximately 34.14 US-\$), range [9.75, 52.64 €].

5.2 Descriptive Statistics

As expected, participants' ability was quite heterogeneous. In the first part, during 10 minutes, they solved between 5 and 44 problems (mean: 23.02, median 22). The mean in the lowest class (quartile) was 12.96, in the second class 19.79, in the third class 25.42, and in the best class 33.92.

Redistribution votes, and hence redistribution preferences, were strongly left-skewed (Graph 3a). 23 of all 96 participants did not want any redistribution. 15 participants wanted on average at least 5% redistribution. Only 4 participants wanted on average 50% or more redistribution. By contrast, effort choices were spread out over the entire range, with peaks at all prominent numbers (Graph 3b). Graph 3c replicates the analysis from the *World Value Survey*, but now uses incentivized choices, rather than mere answers to survey questions. As one sees, very high redistribution preferences (choices) are associated with low effort preferences, and vice versa. Ability (graphically displayed by membership in one of the four ability classes) has a strong effect on effort preferences, but is not systematically associated with redistribution preferences.

While this is interesting in its own right, in the following we focus on the effect of exogenously manipulated effort which participants knew they would have to actually exert at the end of

the experiment. This gives us both a cleaner and a more fine-grained measure of effort as a determinant of redistribution preferences.

5.3 Regression Results

We revert to regression analysis because this gives us the possibility to control for confounding factors. We have a panel dataset with 30 effort choices, with 10 different levels of imposed effort, and three different handicaps for each participant. Moreover, when they make effort choices, participants are aware of the mean ability of their group, they know to which ability class they belong, that one participant from each quartile of the distribution is in their group, and that redistribution will take place within their specific group. For all these reasons, choices of individuals are nested within groups.

We match the data-generating process by a mixed effects model, with a separate error term for individuals, and another error term for groups. This statistical model assumes that all error terms are uncorrelated with the explanatory variables. We test this assumption with a Hausman test that compares coefficients from the mixed-effects model with an alternative model that has individual fixed effects only.⁷ The test never turns out to be significant. This justifies using the more efficient random effects model. It also allows us to estimate coefficients for explanatory variables that do not vary within participants.

5.3.1 Explaining Effort Choices

Table 4 shows the determinants of effort choices. We find a significant effect of ability throughout, in the expected direction. The more problems a participant has solved in the first phase, the more problems she is also willing to solve in the third phase, despite the fact that this may involve redistribution. This willingness is not conditional on the mean effort level in the group (model 2). Participants want to solve more problems if tasks are easy and less problems if tasks are difficult (model 4). Even conditional on all these explanatory variables, the higher the imposed degree of redistribution, the lower the willingness to exert effort (model 5). We thus fully support **Hypothesis 1**. The dampening effect of redistribution on effort, however, is not dramatic. The maximum redistribution rate is 0.45. Even for that rate, the statistical model predicts a reduction of effort only from about 23 to 18 problems, i.e., a reduction by 21% (model 5).

⁷ Because individuals are nested in groups, these fixed effects automatically capture any non-random effects at the group level. For the first three models, we do not have a “time”-variant regressor, which is why we cannot perform the Hausman test. To make the test possible, we rerun these models and additionally control for task difficulty, which is the equivalent of time in our data-generating process.

5.3.2 Explaining Redistribution Choices

When analyzing redistribution choices, as is done in Table 5, we get a somewhat different picture.⁸ We find a significantly weaker preference for redistribution if earning money is easy, and a significantly stronger preference for redistribution if earning money is difficult (model 4). Recall that effort is imposed as a percentage of the problems this participant has correctly solved in phase 1. This variable has a significant positive effect (model 5). If everybody has to exert higher effort, the willingness to redistribute increases. The prospect of more time for leisure does not explain redistribution choices (model 6). Recall that, in the *World Value Survey*, we had not found a significant effect of effort *preferences* on redistribution preferences. Here we find an effect of *imposed* effort, but it is not negative (as in the theoretical model), but positive. The two significant effects both suggest: if the community is in dire circumstances, all stand together and help each other; if all can easily fend for themselves, all see much less urge for ex post corrections of income through redistribution. This stands in clear contradiction to a model with standard preferences (**Hypothesis 3**). By contrast, our data directly support **Hypothesis 5**: On average, individuals with strong earning ability care for individuals with weaker earning ability falling below a reference payoff.

We, finally, consider the effect of ability on redistribution preferences. In none of the linear mixed effects models (models 1-6) do we find a significant effect. This changes only with a different choice of functional form. In model 7, we estimate a random effects Tobit model, with censoring from below.⁹ We now find the significant negative effect predicted by the theoretical model: the more a participant outperformed the remaining members of her group in the first phase, the less she is in favor of redistribution, and vice versa. The Tobit model assumes that some of those participants who have voted for zero redistribution actually would have preferred a negative redistribution rate. This is intuitive. Such participants care about relative payoffs, and would want society to pay a premium to high performers. With this qualification, we support **Hypothesis 2**.

6. Concluding Remarks

The global financial crisis and the European sovereign debt crisis have had severe repercussions on the real economy. They have also triggered policy discussions on the trade off between redistribution and growth. On the one hand, the crises have shown the fragility of insurance systems relying on financial markets, as private investors have suffered substantial losses. The ability of governments to shield their electorates from the perils of international markets has been called into question. Many workers have experienced increased labor mar-

8 Because we did not allow participants to choose more than 50 problems, we also re-estimated all models as random effects Tobit models, with upper censoring. Coefficients and significance levels are very similar. These additional estimates are available from the authors upon request.

9 Because there is no generally acknowledged mixed-effects Tobit estimator, we add group fixed effects to the model with a participant random effect.

ket risks, and they demand greater protection by their government. On the other hand, governments will have little room for maneuver as public households have to deal with the increasing burden of public debt. Hence, a key question is how policymakers can align redistributive policies and fiscal consolidation without jeopardizing future economic growth.

The trade off between redistribution and growth is a core macroeconomic policy question. We investigate this question from the perspective of individual preferences by analyzing the link between individual preferences for effort and redistribution. Our empirical evidence using survey and experimental data is motivated by a simple theoretical framework using both, standard preferences and preferences incorporating inequity aversion. If all individuals hold standard preferences, the model predicts that those who have high ability will exert more effort and will be opposed to (more) redistribution. Hence, policies which increase redistribution have negative implications for effort, and those exerting high effort are in favor of little redistribution. If individuals are averse against inequity, however, results are less clear cut, and stronger individuals might in fact favor higher levels of redistribution. Our model suggests that this is particularly likely if they are averse against weaker individuals' income falling below what they had in the past and thus a reference payoff.

We have tested the implications of this model using survey and experimental data, and our research has three main findings.

First, both, in the survey and in the lab, we support the predicted negative effect of redistribution on effort. The more income is redistributed, i.e., the higher the tax rate, and the higher the degree of redistribution financed from this tax, the more the willingness to exert effort declines.

Second, in the survey data, we also find clear support for the negative relationship between ability and redistribution preferences predicted by the model. The more money a person is able to earn, the less she favors redistribution. Surprisingly, when we elicit actual redistribution choices in the lab, we find the same relationship only if we use a Tobit model that allows for the possibility of society even paying a premium for high performance.

Third, both in the survey and in the lab, we qualify the link between redistribution and effort preferences expected by a model with standard preferences. If we simultaneously estimate the effect of effort preferences on redistribution preferences, and vice versa, we still find the negative effect of redistribution on effort, but we no longer find a negative effect of effort on redistribution. In the lab, we find a significant effect, but it even is positive. If the design of the experiment forces (all) participants to exert high effort, on average even those with high ability are in favor of more redistribution. The effect is even more pronounced if an exogenous shock makes earning money more difficult for everybody. This suggests that the standard theoretical model misses a "solidarity" motive. Experimental participants apparently do see re-

distribution less as an opportunity for equalizing income, and more as a technology for giving everybody a “fair” minimum income if the economy is in dire circumstances.

Of course, strictly speaking, the results of our empirical exercises cannot easily be transferred outside the boundaries of our survey and experimental set-ups. Drawing policy lessons from the survey data is subject to changes in the environment and thus to the Lucas critique, and experiments never capture all effects that might matter in reality. Still, we believe that our results could be potentially relevant for the current policy debate in the following sense: In the past five years since the outbreak of the world financial crisis, a series of severe shocks has hit the world economy. The labor market responses to this shock will depend on preferences for redistribution. Our data suggests that even many of those with high earning ability, and of those who currently exert high effort, would be in support of helping those who have been hit by the crisis. Yet, if the degree of protection increases, this risks having a negative feedback effect on effort and growth.

Through this channel, in the long run, more redistribution may even be bad for growth *and* fairness. For the higher the redistributive burden, the smaller the fraction of income an individual may influence by working harder. If income is at least partly determined by luck, the portion of income inequality resulting from luck becomes the more important the less effort matters (Alesina and Giuliano 2009). The resulting distribution of incomes would be considered less “fair”. Both our survey and our lab evidence point to an additional, more direct channel. If there is more redistribution, the willingness to exert effort decreases. The degree of redistribution directly and negatively affects effort preferences. This poses a hard choice for policy makers. When the decision in favor of more redistribution has to be taken, there might be little opposition, if not positive support even by those with a high contemporaneous preference for effort. Yet, later on, the economy will suffer from the fact that the higher burden of redistribution dampens the willingness to exert more effort. In this sense, policy preferences can be considered short-sighted. The electorate seems to suffer from inconsistency in its preferences for redistribution.

7. Literature

- Alesina, Alberto and Nicola Fuchs-Schündeln (2007). "Good-bye Lenin (or not?). The Effect of Communism on People's Preferences." *The American Economic Review* 97(4): 1507-1528.
- Alesina, Alberto and Paola Giuliano (2009). "Preferences for Redistribution." NBER Working Paper.
- Becker, Sascha O. and Ludger Wössmann (2009). "Was Weber Wrong? A Human Capital Theory of Protestant Economic History." *Quarterly Journal of Economics* 124(2): 531-596.
- Beckman, Steven R., John P. Formby and James W. Smith (2004). "Efficiency, Equity and Democracy. Experimental Evidence on Okun's Leaky Bucket." *Research on Economic Inequality* 11: 17-42.
- Cabrales, Antonio, Rosemarie Nagel and José V. Rodríguez Mora (2012). "It is Hobbes, not Rousseau. An Experiment on Voting and Redistribution." *Experimental Economics* 15: ***.
- Checchi, Daniele and Antonio Filippin (2004). "An Experimental Study of the POUM Hypothesis." *Research on Economic Inequality* 11: 115-136.
- Davidovitz, Liema and Yoram Kroll (2004). "On the Attitude Towards Inequality." *Research on Economic Inequality* 11: 137-147.
- Durante, Ruben and Louis Putterman (2009). Preferences for Redistribution and Perception of Fairness. An Experimental Study
- Fehr, Ernst and Klaus M. Schmidt (1999). "A Theory of Fairness, Competition, and Cooperation." *Quarterly Journal of Economics* 114: 817-868.
- Fischbacher, Urs (2007). "z-Tree. Zurich Toolbox for Ready-made Economic Experiments." *Experimental Economics* 10: 171-178.
- Fong, Christina M. (2001). "Social Preferences, Self-interest, and the Demand for Redistribution." *Journal of Public Economics* 82(2): 225-246.
- Frohlich, Norman and Joe Oppenheimer (1990). "Choosing Justice in Experimental Democracies with Production." *The American Political Science Review* 84(2): 461-477.
- Frohlich, Norman, Joe Oppenheimer and Cheryl L. Eavey (1987a). "Choices of Principles of Distributive Justice in Experimental Groups." *American Journal of Political Science* 31(3): 606-636.

- Frohlich, Norman, Joe Oppenheimer and Cheryl L. Eavey (1987b). "Laboratory Results on Rawls's Distributive Justice." *British Journal of Political Science* 17(01): 1-21.
- Greiner, Ben (2004). An Online Recruiting System for Economic Experiments. *Forschung und wissenschaftliches Rechnen* 2003. K. Kremer and V. Macho. Göttingen: 79-93.
- Herne, Kaisa and Maria Suojanen (2004). "The Role of Information in Choices over Income Distributions." *Journal of Conflict Resolution* 48(2): 173.
- Keshk, Omar M.G. (2003). "CDSIMEQ. A Program to Implement Two-stage Probit Least Squares." *The Stata Journal* 3(2): 1–11.
- Klor, Esteban and Moses Shayo (2010). "Social Identity and Preferences Over Redistribution." *Journal of Public Economics* 94: 269-278.
- Konow, James (2000). "Fair Shares. Accountability and Cognitive Dissonance in Allocation Decisions." *American Economic Review* 90(4): 1072-1091.
- Krieger, Tim and Stefan Traub (2008). Back to Bismarck? Shifting Preferences for Intragenerational Redistribution in OECD Pension Systems <http://www.uni-graz.at/socialpolitik/papers/Krieger.pdf>.
- Maddala, Gangadharrao Soundalyarao (1983). *Limited-dependent and Qualitative Variables in Econometrics*, Cambridge Univ Pr.
- Mazar, Nina, On Amir and Dan Ariely (2008). "The Dishonesty of Honest People. A Theory of Self-Concept Maintenance." *Journal of Marketing Research* 45(6): 633-644.
- Neustadt, Ilja and Peter Zweifel (2010). *Economic Well-Being, Social Mobility, and Preferences for Income Redistribution. Evidence from a Discrete Choice Experiment*
- Organisation for Economic Cooperation and Development (2011). *Divided We Stand. Why Inequality Keeps Rising*. Paris, OECD.
- Persson, Torsten, Guido Tabellini and Isabelle Brocas (2000). *Political Economics*, MIT press.
- Schokkaert, Erik and Bart Capeau (1991). "Interindividual Differences in Opinions about Distributive Justice." *Kyklos* 44(3): 325-345.
- Schokkaert, Erik and Bruno Overlaet (1989). "Moral Intuitions and Economic Models of Distributive Justice." *Social Choice and Welfare* 6(1): 19-31.

- Selten, Reinhard (1967). Die Strategiemethode zur Erforschung des eingeschränkt rationalen Verhaltens im Rahmen eines Oligopolexperiments. Beiträge zur experimentellen Wirtschaftsforschung. E. Sauer mann. Tübingen, Mohr: 136-168.
- Selten, Reinhard and Axel Ockenfels (1998). "An Experimental Solidarity Game." *Journal of Economic Behavior & Organization* 34(4): 517-539.
- Tausch, Franziska, Jan Potters and Arno Riedl (2010). Preferences for Redistribution and Pensions. What Can We Learn from Experiments?
http://www.cesifo.de/DocCIDL/cesifo1_wp3156.pdf.
- Tyran, Jean-Robert and Rupert Sausgruber (2006). "A Little Fairness May Induce a Lot of Redistribution in Democracy." *European Economic Review* 50(2): 469-485.
- Zellner, Arnold and H. Theil (1962). "Three-stage Least Squares. Simultaneous Estimation of Simultaneous Equations." *Econometrica* 30(1): 54-78.

8. Appendix

8.1 World Value Survey

OECD countries only. Variables “v” refer to most recent waves.

1. Proxy for Effort

“Opportunity to use initiative” (c016)

Here are some more aspects of a job that people say are important. Please look at them and tell me which ones you personally think are important in a job? “An opportunity to use initiative”

0 'Not mentioned', 1 'Mentioned'

2. Preferences for Redistribution

“Incomes should be made more equal” (e035, v116)

1 = incomes should be made more equal, ..., 10 = we need larger income differences

Re-scaled such that 10 = incomes should be made more equal, ..., 1 = we need larger income differences

Years: 1989, 1990, 1991, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2005, 2006, 2007, 2008

Further individual-specific variables:

Age and age squared (x003, v237), Church membership (a065, a098, v24), Employment status (x028, v241) (omitted category: “other”), Gender (x001, v235), Income group (x047r, v253) (omitted category: “high income”), Justifiable to accept a bribe (f117), Leisure is important (a003), Marital status (x007, v55) (omitted category: “single or never married”), Neighbors are drinkers (a126), Neighbors are drug addicts (a131), Neighbors belong to a militant minority (a137), Neighbors have a criminal record (a124), Neighbors have a different race (a125), Neighbors have a different religion (a135), People can be trusted (a165), Protestant (f025 = 62)

1.2 Country-Level Variables

GDP growth and volatility

World Bank, World Development Indicators, GDP growth volatility is the moving-average standard deviation of GDP growth

Labor market regulations

Data have been compiled by Bassanini and Duval (2006) and are available online. We use the following indicators: (i) *Benefit replacement rates*: percentage of average before tax earnings

covered through unemployment and social insurance programs. (ii) *Employment protection legislation (EPL)*: Index of tightness of employment protection legislation where a higher value indicates tighter legislation.

Top marginal tax rates

Personal income top marginal tax rates.

Sources: Data before 2000 has been taken from Source: World Tax Database, Office of Tax Policy Research. Downloaded from <http://www.wtdb.org/index.html> on July 16, 2002; data after 2000 are taken from the OECD tax database, www.oecd.org/ctp/taxdatabase

Social Security

Social security contributions as percentage of GDP. Missing data have been linearly extrapolated.

Sources: OECD (2008) Revenue Statistics 1965-2007, downloaded from the OECD tax database, www.oecd.org/ctp/taxdatabase

Summary Statistics

This Table shows the summary statistics for the variables used in the regressions. The number of observations differs from those reported in the following Tables because not all questions have been asked in all countries in all survey waves.

Variable	Observations	Mean	Std. dev.	Minimum	Maximum
Age	139,583	43.390	17.096	15.000	101.000
Age squared (/10 ³)	139,583	2.175	1.631	0.225	10.201
Children (0/1)	129,403	0.755	0.430	0.000	1.000
Church member (0/1)	131,541	0.235	0.424	0.000	1.000
Divorced (0/1)	140,857	0.044	0.205	0.000	1.000
Full time (0/1)	137,647	0.410	0.492	0.000	1.000
GDP growth (annual %)	140,254	2.323	3.827	-14.570	11.350
GDP volatility (%)	114,306	1.845	1.491	0.211	8.808
Hard work brings success	75,285	6.432	2.698	1.000	10.000
Higher pay for higher effort considered unfair	117,248	0.194	0.395	0.000	1.000
House wife (0/1)	137,647	0.140	0.347	0.000	1.000
Incomes should be made more equal	104,863	5.395	2.861	1.000	10.000
Log trade share	138,463	3.847	0.497	2.606	5.249
Low income (0/1)	120,785	0.348	0.476	0.000	1.000
Male (0/1)	142,229	0.477	0.499	0.000	1.000
Married (0/1)	140,857	0.643	0.479	0.000	1.000
Medium income (0/1)	120,785	0.375	0.484	0.000	1.000
Part time (0/1)	137,647	0.081	0.272	0.000	1.000
Retired (0/1)	137,647	0.170	0.376	0.000	1.000
Self-employed (0/1)	137,647	0.072	0.259	0.000	1.000
Separated (0/1)	140,857	0.015	0.122	0.000	1.000
Use initiative at work (0/1)	124,094	0.500	0.500	0.000	1.000
Student (0/1)	137,647	0.058	0.234	0.000	1.000
Top marginal tax rate in respondent's country	132,933	0.465	0.143	0.115	0.930
Unemployed (0/1)	137,647	0.054	0.226	0.000	1.000
Union member (0/1)	127,691	0.172	0.377	0.000	1.000
Widowed (0/1)	140,857	0.072	0.258	0.000	1.000

Table 1: Determinants of Effort and Preferences for Redistribution (IV Estimates)

	(1)	(2)	(3)	(4)
	Equality, 2nd stage	Equality, 1st stage (dep. var.: initiative)	Initiative, 2nd stage	Initiative, 1st stage (dep. var.: equality)
Incomes should be made more equal			-0.117*** (0.045)	
Important in job: use initiative (0/1)	0.219 (0.379)			
Age	0.019*** (0.006)	0.002*** (0.001)	0.013*** (0.003)	0.018*** (0.005)
Age squared (/10 ³)	-0.198*** (0.062)	-0.036*** (0.010)	-0.153*** (0.027)	-0.176*** (0.054)
Male (0/1)	-0.266*** (0.033)	0.034*** (0.005)	0.035* (0.021)	-0.309*** (0.028)
Children (0/1)	0.011 (0.047)	-0.026*** (0.008)	-0.097*** (0.019)	0.031 (0.039)
Low income (0/1)	0.951*** (0.057)	-0.106*** (0.007)	-0.230*** (0.051)	0.872*** (0.034)
Medium income (0/1)	0.592*** (0.043)	-0.073*** (0.006)	-0.150*** (0.035)	0.569*** (0.029)
Full time (0/1)	-0.145 (0.119)	0.032 (0.020)	0.067 (0.050)	-0.229** (0.105)
Part time (0/1)	-0.141 (0.125)	0.003 (0.021)	-0.015 (0.052)	-0.128 (0.111)
Self-employed (0/1)	-0.458*** (0.128)	0.045** (0.022)	0.082 (0.060)	-0.540*** (0.113)
Retired (0/1)	0.062 (0.123)	0.014 (0.021)	0.015 (0.051)	-0.053 (0.110)
House wife (0/1)	-0.038 (0.123)	-0.019 (0.021)	-0.105** (0.051)	-0.109 (0.110)
Student (0/1)	-0.267* (0.139)	0.073*** (0.024)	0.164*** (0.061)	-0.320*** (0.121)
Unemployed (0/1)	0.056 (0.132)	-0.022 (0.022)	-0.073 (0.055)	0.092 (0.118)
Married (0/1)	-0.054 (0.053)	0.010 (0.010)	-0.026 (0.023)	-0.103** (0.045)
Divorced (0/1)	0.005 (0.085)	0.054*** (0.015)	0.065* (0.035)	-0.064 (0.071)
Separated (0/1)	-0.033 (0.124)	0.060*** (0.021)	0.06 (0.049)	0.006 (0.106)
Widowed (0/1)	0.047 (0.078)	-0.018 (0.014)	-0.120*** (0.034)	-0.098 (0.071)
Church member (0/1)	-0.081** (0.036)	0.038*** (0.006)	0.091*** (0.017)	-0.142*** (0.030)
GDP growth (annual %)	0.186*** (0.022)	-0.008** (0.004)	-0.025** (0.011)	0.157*** (0.026)
Top marginal tax rate	4.491*** (0.665)	-0.649*** (0.107)	-0.315 (0.413)	1.880** (0.877)

	(1) Equality, 2nd stage	(2) Equality, 1st stage		(3) Initiative, 2nd stage	(4) Initiative, 1st stage
<u>Instruments</u>					
Trust (0/1)		0.052** (0.005)	Neighbors different		-0.197*** (0.031)
Protestant (0/1)		0.015** (0.008)	Employment protection legislation		0.803*** (0.106)
Bribe		-0.009*** (0.002)	Growth volatility		0.226*** (0.053)
Leisure		-0.029*** (0.003)			
Observations	40,806			45,713	45,713
(Pseudo) R ²	0.079				
Durbin-Wu-Hausmann endogeneity test	2.32		Wald test of exogeneity	2.76	
Hansen J	1.94		Probability exogenous	0.09	
Minimum eigenvalue statistic	55.42				
Shea's partial R ²	0.005				

Notes to Table 1: Table 1 shows the determinants of effort and redistribution preferences based on data from five waves of the World Value Survey using data for OECD countries. Second stage models are estimated using maximum likelihood. A full set of year and country fixed effects is included. Column (1) shows the 1st stage regression for an instrumental variables regression (*ivregress*) using the variable “Incomes should be made more equal (Scale 1-10)” as the dependent variable. Instruments for “effort” are trust, protestant, leisure important, and accepting a bribe. Column (2) has the corresponding 2nd stage regressions. Column (3) shows the 1st stage regressions for an instrumentation variables (*ivprobit*) regression using the variable “Important to use initiative at work (0/1)” as the dependent variable. Instruments for “equality” are employment protection legislation, neighbors are different and growth volatility. Column (4) has the corresponding second stage regression. The omitted categories for employment status is the category “other”, for family status “single or never married”, and for income “high income”. The constant term is not reported. ***, **, * = significant at the 1%, 5%, 10%-level. Standard errors in parenthesis.

Table 2: Simultaneously Modelling Effort and Preferences for Redistribution

This table shows the determinants of effort and redistribution preferences based on data from five waves of the World Value Survey using data for OECD countries. A full set of year and country fixed effects is included. Panel (a) presents the results for the first stage regressions (control variables omitted); panel (b) for the second stage regressions. Estimates in columns (1) and (2) of Panel (b) are based on the simultaneous equation model proposed by Maddala (1983) and implemented by Keshk (2003). The variables “Important to use initiative” and “Incomes should be made more equal” are the predicted values from the first stage regressions described in the main body of the text. The omitted categories for employment status is the category “other”, for family status “single or never married”, and for income “high income”. Estimates in columns (3) and (4) present the corresponding single-equation estimates. ***, **, * = significant at the 1%, 5%, 10%-level. Standard errors in parenthesis.

(a) First stage regression

	Dependent variable: Equality (1-10)			Dependent variable: Initiative (0/1)		
	Coef.		Std. Err.	Coef.		Std. Err.
Neighbors different	-0.150	***	0.037	0.041	***	0.018
Employment protection legislation	0.466	***	0.105	-0.110	**	0.051
Growth volatility (%)	0.153	***	0.064	0.004		0.031
Trust (0/1)	0.015		0.030	0.133	***	0.015
Protestant (0/1)	-0.036		0.044	0.052	**	0.022
Accepting a bribe	-0.007		0.011	-0.030	***	0.005

(b) Second stage regressions

	(1) Simultaneous equation model Equality	(2) Initiative	(3) OLS Equality	(4) Probit Initiative
Initiative (0/1)	0.100 (0.184)		-0.437** (0.038)	
Equality (1-10)		-0.240** (0.087)		-0.041** (0.004)
People can be trusted (0/1)		0.136*** (0.016)		0.132** (0.020)
Protestant (0/1)		0.044* (0.023)		0.052* (0.026)
Accepting a bribe		-0.032*** (0.006)		-0.031** (0.007)
Neighbors different	-0.154*** (0.038)		-0.146** (0.049)	
Employment protection legislation	0.477*** (0.107)		0.446 (0.230)	
Growth volatility	0.150** (0.065)		0.15 (0.181)	
GDP growth (annual %)	0.069** (0.034)	-0.030** (0.014)	0.06 (0.091)	-0.042* (0.018)
Top marginal tax rate	5.877*** (0.815)	0.815 (0.706)	5.656* (2.169)	-0.617 (0.431)
Age	0.018** (0.006)	0.011** (0.004)	0.020** (0.006)	0.007 (0.005)
Age squared (/10 ³)	-0.182** (0.067)	-0.154*** (0.038)	-0.213** (0.063)	-0.114* (0.045)
Male (0/1)	-0.274*** (0.036)	0.022 (0.029)	-0.253** (0.033)	0.075** (0.025)
Children (0/1)	0.037 (0.051)	-0.080** (0.026)	0.013 (0.054)	-0.085** (0.021)
Low income (0/1)	0.928*** (0.073)	-0.096 (0.081)	0.841** (0.064)	-0.277** (0.032)
Medium income (0/1)	0.598*** (0.055)	-0.082 (0.054)	0.537** (0.047)	-0.199** (0.019)
Full time (0/1)	-0.218* (0.125)	0.06 (0.067)	-0.187 (0.157)	0.101 (0.058)
Part time (0/1)	-0.181 (0.131)	-0.03 (0.071)	-0.175 (0.164)	0.005 (0.064)
Self-employed (0/1)	-0.572*** (0.137)	0.024 (0.085)	-0.531** (0.178)	0.134* (0.061)
Retired (0/1)	-0.064 (0.128)	0.037 (0.068)	-0.051 (0.174)	0.047 (0.060)
House wife (0/1)	-0.11 (0.128)	-0.092 (0.068)	-0.128 (0.172)	-0.07 (0.058)
Student (0/1)	-0.344** (0.151)	0.137* (0.081)	-0.283 (0.187)	0.201* (0.081)
Unemployed (0/1)	0.032 (0.138)	-0.05 (0.073)	0.013 (0.175)	-0.056 (0.058)
Married (0/1)	-0.103* (0.056)	0.004 (0.031)	-0.095 (0.066)	0.026 (0.027)
Divorced (0/1)	-0.026	0.131**	0.01	0.135**

	(0.092)	(0.046)	(0.071)	(0.041)
Separated (0/1)	0.009	0.111*	0.034	0.108
	(0.128)	(0.066)	(0.112)	(0.064)
Widowed (0/1)	0	-0.046	-0.013	-0.044
	(0.082)	(0.043)	(0.073)	(0.043)
Church member (0/1)	-0.072*	0.092***	-0.04	0.105**
	(0.042)	(0.019)	(0.043)	(0.026)
Constant	1.078**	0.952***	1.479	0.719**
	(0.352)	(0.200)	(0.772)	(0.228)
Observations	32,647	32,647	32,647	32,647
(Pseudo) R^2	0.085	0.047	0.09	

Table 4: Explaining Effort Choices

The dependent variable measures effort choices, conditional on imposed degree of redistribution and difficulty of task. Results from a linear mixed effects model, with random effects for individual and group. *Mean ability* = mean number of problems solved within the group of 4, *easy task* = 2x2 tables, *difficult task* = 4x4 tables, reference category: 3x3 tables; *imposed redistribution* = percentage of group income redistributed equally, *time for leisure* = total time this participant took for actually solving the tasks from phases 2 and 3. The number of observations (*N*) is 2,880. Hausman test insignificant on all models. *** $p < .001$, ** $p < .01$, * $p < .05$. Standard error in parenthesis.

	Model 1	Model 2	Model 3	Model 4	Model 5
Ability	0.442** (0.144)	0.492** (0.147)			
Mean ability		-0.935 (0.637)			
Ability – mean ability			0.492** (0.147)	0.492** (0.147)	0.492** (0.147)
Easy task				9.447*** (0.306)	9.447*** (0.298)
Difficult task				-6.939*** (0.306)	-6.939*** (0.298)
Imposed redistribution					-10.562*** (0.846)
Constant	11.367** (3.538)	31.742* (14.313)	21.549*** (1.198)	20.713*** (1.211)	23.089*** (1.255)
<i>N</i>	2,880	2,880	2,880	2,880	2,880
p model	.0022	.0028	.0008	<.0001	<.0001

Table 5: Explaining Redistribution Choices

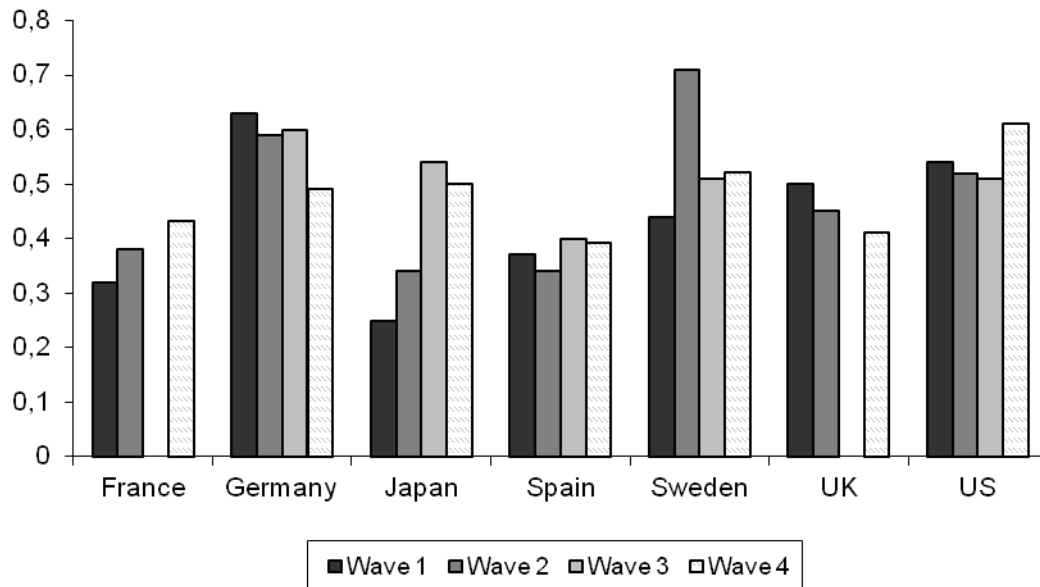
The dependent variable measures each participant's votes on the chosen percentage of redistribution for 30 combinations of imposed effort and difficulty per participant. Model 1-6 are linear mixed effects models, with error terms for individual and group; model 7 is a random effects Tobit, with group fixed effects, censoring from below at 0. *Ability* = number of problems solved in phase 1, *mean ability* = mean number of problems solved within the group of 4, *easy task* = 2x2 tables, *difficult task* = 4x4 tables, reference category: 3x3 tables, *imposed effort* = percentage of problems solves in phase 1, *time for leisure* = total time this participant took for actually solving the tasks from phases 2 and 3. The number of observations (*N*) is 2,880. Hausman test insignificant on all models. *** p < .001, ** p < .01, * p < .05. Standard error in parenthesis.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Ability	-0.276 (0.185)	-0.280 (0.190)					
Mean ability		0.074 (0.824)					
Ability – mean ability			-0.280 (0.190)	-0.280 (0.190)	-0.280 (0.190)	-0.298 (0.193)	-0.725* (0.348)
Easy task				-1.796*** (0.424)	-1.796*** (0.417)	-1.796*** (0.417)	-3.009*** (0.645)
Difficult task				3.347*** (0.424)	3.347*** (0.417)	3.347*** (0.417)	4.944*** (0.635)
Imposed effort					5.697*** (0.593)	5.697*** (0.593)	9.344*** (0.912)
Time for leisure						-0.001 (0.003)	0.002 (0.007)
Constant	19.066*** (4.529)	17.451 (18.528)	12.713*** (1.547)	12.196*** (1.566)	7.923*** (1.628)	6.736* (2.955)	4.602 (15.542)
N	2,880	2,880	2,880	2,880	2,880	2,880	2,880
p model	.1356	.3270	.1409	<.0001	<.0001	<.0001	<.0001

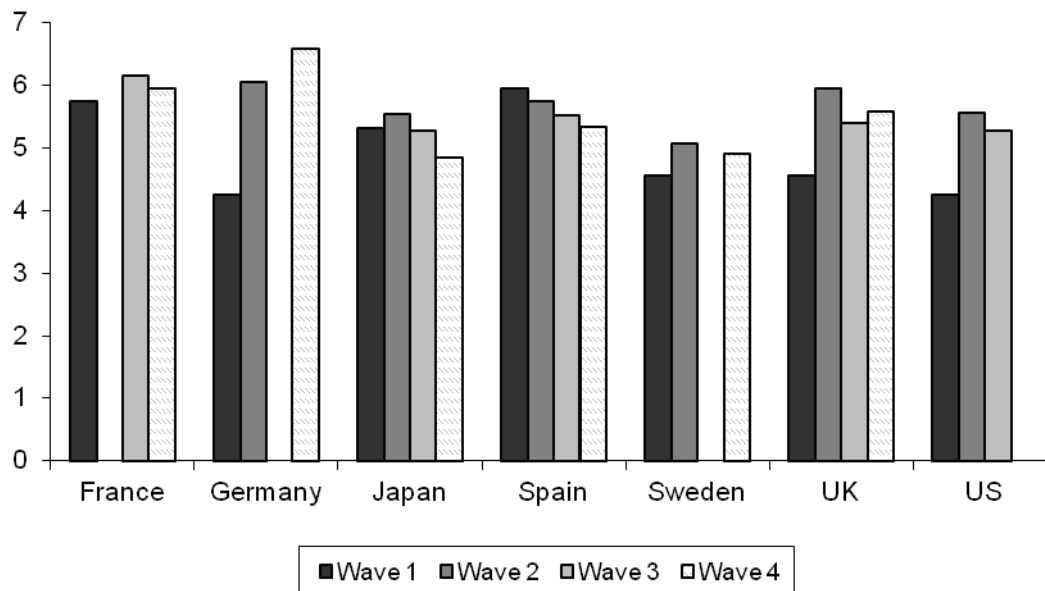
Graph 2: Preferences for Redistribution and Effort

This table shows the mean responses to the questions “Opportunity to use initiative” (0/1) and “Incomes should be made more equal” (10-1) of the World Value Survey. The four waves capture the years 1981-84, 1989-93, 1994-99, and 1999-2004. Not all questions have been asked in all countries in each wave.

(a) “Opportunity to use initiative” (0/1)

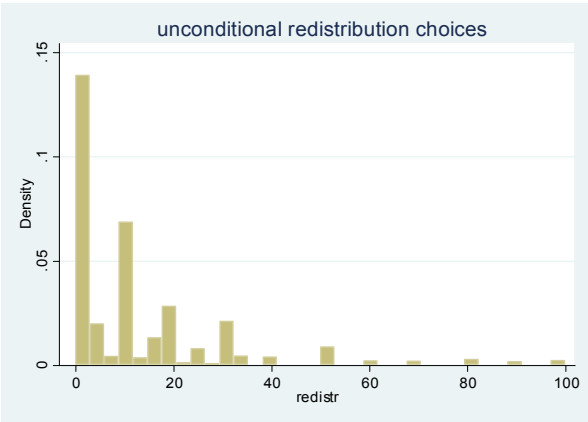


(b) “Incomes should be made more equal” (1-10)

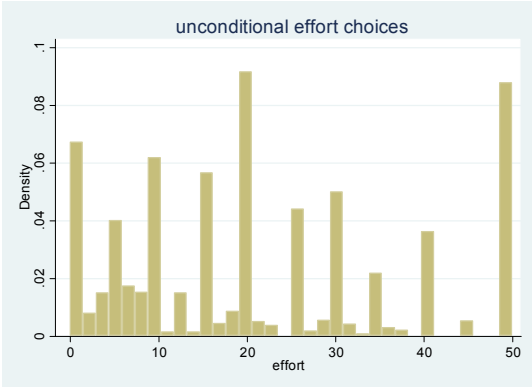


Graph 3: Descriptive Statistics Lab Experiment

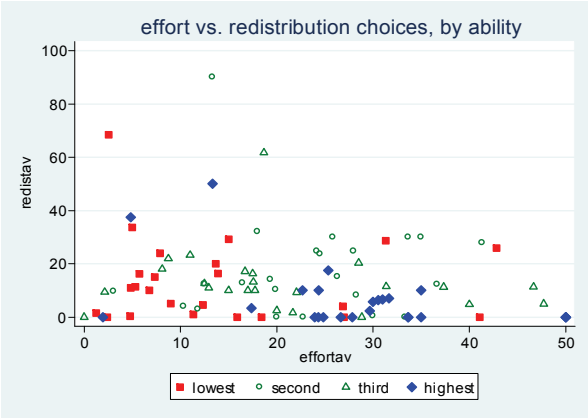
(a) Distribution of Redistribution Choices



(b) Distribution of Effort Choices



(c) Redistribution Preferences Conditional on Effort Preferences



General Instructions for Participants

Welcome to our experiment!

If you read the following instructions carefully, you can earn a substantial amount of money, depending on your decisions. It is therefore very important that you read these instructions carefully.

During the experiment, any communication with the other participants is strictly forbidden. Disobeying this rule will lead to exclusion from the experiment and from all payments. If you have any questions, please raise your hand. We will come to you.

In the first three parts of the experiment, we shall speak not of Euro, but instead of Taler. Your income is hence initially calculated in Taler. What you earn is converted into Euro at the end of the experiment, at the rate of

1 Taler = 40 Cent

The sum you have earned in the course of the experiment will be paid to you **in cash** and in Euro.

In this experiment, you will make decisions. The consequences of these decisions depend not only on your own behavior, but also on chance. We shall explain in more detail further on what role chance plays. How the other participants in the experiment behave is not relevant for your payments in the first part of the experiment.

The experiment consists of five parts. We will explain each part separately.

Part One

In the first part of the experiment, we will show you a number of tables on your screen, which look like this:

4.67	4.81	3.05
5.82	5.06	4.28
6.36	5.19	4.57

Your task is to click on the two cells that add up to 10. In every table, there is always only one single pair that adds up exactly to 10. You have one try each time. If your answer is correct, you will receive one Taler.

The tables differ in size. We will present the tables to you in the following order:

2 x 2

3 x 3

4 x 4

Your income does not depend on the number of cells. For every task solved correctly, you will hence receive one Taler.

This part of the experiment lasts exactly 10 minutes.

Part Two

In the second part of the experiment, you have exactly the same task as in the first part. For each table in which you correctly define the number pair that adds up to 10, you will once again receive payment of one Taler. Here, however, you are only shown tables of one particular size. The computer will determine – at random and with the same likelihood for each case – whether your tasks consist of tables with size 2×2 , 3×3 , or 4×4 . All participants are shown tables of the same size.

The computer will also determine randomly how many tasks all experiment participants have to solve in this part of the experiment. Only once you have completed as many tasks as the computer has determined will you receive a payoff for this part and the other parts of the experiment. We will show you these tasks at the end of the experiment. There is no time limit. As soon as the first participant has solved all of the required tasks, we will begin with the payoff. You do not have to wait for the last participant to finish. We will determine the number of tasks according to, and depending on, the statistics from the first part of the experiment. The required number of correctly solved tasks lies between 30 and 120 % of the number of tasks you have correctly solved in the first part. If the number was low, the number required in this part of the experiment will hence also be lower. If it was high, the number required in this part of the experiment will also be higher. If the result is not a whole number, we will choose the next smallest whole number.

In this part of the experiment, you are part of a group of 4 participants. We form this group according to the following principle: We use the results from the first part to divide all participants in the lab into 4 classes. The 25% who did worst are placed in the first class. The 25% who did best are placed in the second class. All remaining participants make up the last two classes. From each class, we randomly assign one participant to each group. We will tell you which class you belong to and how many tasks all 4 participants in your group solved correctly on average in the first part.

Each group can adjust the participants' income. In order to do this, each participant determines what percentage of the income shall be used for this purpose. We will show you the following table in return:

%	30	40	50	60	70	80	90	100	110	120
2x2										
3x3										
4x4										

For each percentage of tasks and for each number of cells, please write in this table what percentage of the income should be retained and equally distributed among all 4 group members.

The computer will then, first of all, determine the number of tasks to be solved, as well as the size of the table. For the chosen situation, the computer will then determine whether and, if so, to what extent the income will be adjusted. The computer will place the four group members' decisions in an order that follows the percentage that group members would be willing to part with. The mean between the second-highest and the third-highest percentage is determined as the adjustment.

The following example sheds some more light on this mechanism:

Let us assume the 4 group members have chosen compensation of 22, 35, 25, and 0 % for the case in question. The second-highest value is 22 %, and the third-highest value is 25 %. The average value between these two values is 23.5 %. In order to finance the adjustment, each participant receives a gross income (100%) minus 23.5 %. In other words, everyone gets 76.5 % of their gross income. The remaining income of all participants is divided by 4 and distributed evenly amongst the participants.

Part Three

In the third part of the experiment, the basic task is the same as in the first and second parts. All decisions and payments are made independently of the decision made in Part Two of the experiment.

For each table in which you correctly determine the pair of numbers that adds up to 10, you will once again receive a payment of one Taler. Just as in the second part of the experiment, you will only see tables of one particular size. The computer will once again decide, randomly and with equal probabilities, whether your tasks will consist of tables of the size 2 x 2, 3 x 3, or 4 x 4. All participants will see tables of the same size in this part of the experiment also. Once again, you will form a group of four players with the same participants you played with in the second part.

In this part of the experiment, the computer determines the amount of the ex-post compensation amongst the group members. It lies between 0 % (no compensation) and 45 %, in equal steps of 5 %. The computer chooses a random percentage. All percentages can occur with equal probabilities. Again, compensation is earned by all members of the group. The entire sum that all members have earned will be distributed evenly between all four group members.

In this part of the experiment, we would ask you please to state – for every compensation rate and for all three table sizes – how many tasks you wish to solve. Please note that the number you enter is binding. You are obliged to comply with your commitment at the end of the experiment, once the computer has completed all random decisions. Only once you fulfill this obligation will you receive your payoff for this part and all other parts of the experiment. There is no time limit. As soon as you have fulfilled your obligations from the second and third part of the experiment, we will begin with the payoff. You therefore do not have to wait for all others to finish. Please make your decisions for every compensation rate and for every table size. We will show you the following table in return:

%	0	5	10	15	20	25	30	35	40	45
2x2										
3x3										
4x4										

Part Four

We are interested in knowing how you rate the other participants' behavior. We have two questions on this.

1. *In your opinion, how many tasks have all participants (including yourself) correctly solved in the first part of the experiment?*

Please give an integer number. If necessary, we will round the actual number. If your estimate does not deviate from the actual (rounded) number by more than +2 or -2 tasks, you will receive an additional 1 €. If your estimate does not deviate from the actual (rounded) average by more than +5 or -5 tasks, you will receive an additional 50 Cent.

2. *In your opinion, what compensation percentage have participants chosen on average if they had to get exactly the same number of tasks right as in the first part, and if the tables had 3x3 cells?*

Please give an integer number once again. If necessary, we will round the actual number. If you have guessed this number exactly, you will receive an additional 1 €. If your estimate does not deviate from the actual (rounded) average by more than +5 or -5, you will receive an additional 50 Cent.

For recapitulation purposes, we will now show you the complete table on your screen. We have marked the cell our question relates to. However, please fill in only the box in which we ask you for your estimate of the average.

%	30	40	50	60	70	80	90	100	110	120
2x2										
3x3								x		
4x4										

Part Five

In the fifth and final part of the experiment, only your decisions count. You do not need to complete any further tasks.

In this part of the experiment, we would ask you please to make a choice between **Options A and B** in **10 different cases**. These 10 cases are shown to you in a list on your screen. Each of the two lotteries consists of **2 possible monetary winnings**, one high and one lower, paid with different probabilities.

Options A and B are presented on the screen as in the following **example**:

Case	Option A	Option B	Your decision
1	2.00 Euro with a probability of 10% <u>or</u> 1.60 Euro with a probability of 90%	3.85 Euro with a probability of 10% <u>or</u> 0.10 Euro with a probability of 90%	<input type="checkbox"/> Option A <input type="checkbox"/> Option B

The computer uses a random program that will determine exactly your payment according to the given probabilities.

For this example, this means:

With a probability of 10 %, Option A will earn 2 Euro; and with a probability of 90 %, Option A will earn 1.60 Euro.

With a probability of 10 %, Option B will earn 3.85 Euro; and with a probability of 90 %, Option B will earn 0.10 Euro.

On the right-hand side, you now have to click whichever option you have chosen.

Please note that at the end of the experiment only one of these 10 cases is actually paid out to you. All cases are equally probable, and the computer will choose **a payoff-relevant case**.

Following that, there will be a draw to determine whether, for the payoff-relevant case, the **higher winnings** (2.00 Euro or 3.85 Euro) or the **lower winnings** (1.60 Euro or 0.10 Euro) will be paid out.

Questionnaire

Finally, we would ask you please to answer the following questions. Your answers will also remain anonymous.

How old are you?

Are you male or female?

Are you enrolled in a university?

If yes: What subject are you studying?

If no: What is your occupation?

Have you ever been employed full-time?

Have you ever been out of work?

Are you part of a religious community?

If yes: Which one?

What is your family status? (married, in cohabitation, divorced, separated, widowed, single)

Do you have children?