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The Tradeoff Between Redistribution and Effort: Evidence from the Field and from the Lab

Claudia M. Buch
Christoph Engel

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Abstract

Building on a theoretical model we test the hypothesis that effort choices and preferences for redistribution are simultaneously determined. Using cross-country panel data from the *World Value Survey*, we find that it is important to model preferences for redistribution and effort choices simultaneously. While respondents with stronger preferences for redistribution tend to have smaller incentives to engage in effort, 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.

JEL-Code: C310, C910, D310, J280.

Keywords: effort, redistribution, World Value Survey, simultaneous equation models, experiment.

Claudia M. Buch
Department of International Macroeconomics and Finance
University of Tübingen
Tübingen / Germany
claudia.buch@uni-tuebingen.de

Christoph Engel
Max Planck Institute for Research on Collective Goods
Bonn / Germany
engel@coll.mpg.de

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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. Because government is unable to impose work effort, government actually cannot hold everything else constant. Ultimately, a higher tax rate may mean less money for redistribution. Of course, the effect is even more pronounced in a dynamic perspective because a high tax rate risks stifling growth. The smaller the gross national product, the less future generations may redistribute. In a democracy, redistribution policies reflect redistribution preferences of the electorate, albeit of course indirectly and imperfectly. In this paper, we focus on the development of the desired level of redistribution and thus the political preferences in the electorate, while simultaneously accounting for the fact that redistribution affects effort.[1]

We address the following research question: What determines preferences for redistributive policies and effort, and how are these preferences related? In answering this question, we make the following contributions to the literature. First, we use cross-country data from the *World Value Survey* to analyze the interaction between preferences for effort and for redistribution. We estimate the link between effort and redistribution in a simultaneous equation model, which explicitly takes the links between these two variables into account. The added advantage of this method is that we can investigate longer-run patterns in the data and that we can control for the macroeconomic environment. We are also able to instrument either preference, and thereby overcome the identification problem resulting from the fact that, in the field, both preferences are determined interactively. Second, we complement the analysis of survey data with a lab experiment where we sequentially (i) induce effort and elicit redistribution decisions, and (ii) induce a redistribution level and elicit effort choices. This takes account of the fact that identification is never perfect with field data. In the field, we cannot directly observe ability, which is a likely determinant of both effort and redistribution preferences. And all we can see is redistribution *preferences* explaining effort preferences, and effort *preferences* explaining the desire for redistribution. The lab experiment allows explaining effort *choices* by the actual level of redistribution and *decisions* for a level of redistribution by the actual degree of effort.

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[1] Note that we abstract from the additional complications resulting from the constitution of the polity, and from the political processes unrolling in this institutional setting at any given point in historical time

We find that preferences are fundamentally inconsistent. 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 field, preferences for redistribution are not explained by preferences for effort. In the lab, participants even choose a higher degree of redistribution if they are exogenously forced to exert higher effort. This suggests an alternative explanation for the fact that the degree of redistribution has been growing in many countries (Organisation for Economic Cooperation and Development 2011**:** chapter 7). This may be expected even in the absence of a majority of less able voters who use majority vote to expropriate their compatriots with a higher income. Our data 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. The potential inconsistency of preferences faces policy makers with a hard choice: According to our data, a substantial majority supports greater redistribution, but at the same time, all will be worse off due to the negative effect on preferences for 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 an existing theoretical model which shows the trade-off between effort and redistribution at the individual level. We then investigate the implications of the model in Part Four, based on survey data from the *World Value Survey*. Part Five provides experimental evidence on this trade-off, and Part Six concludes.

2 Earlier Findings

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 data sources, including the *World Value Survey*, to analyze redistribution preferences as well. They include fairness preferences and preferences for hard work 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 interaction between effort and redistribution preferences. Hence, we analyze the feedback between redistribution preferences and effort, and we control for the macroeconomic environment. Our results suggest that modeling effort and redistribution simultaneously is indeed important: Preferences for redistribution affect effort choices, but not vice versa.

A number of experimental papers have tested redistribution preferences. The closest analogue to our approach in the experimental literature is a paper by (Frohlich and Oppenheimer 1990). 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. Knowing the redistribution scheme, participants had to engage in a real effort task. 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, Oppenheimer et al. 1987**;** Frohlich, Oppenheimer et al. 1987) had shown that the redistribution principle they use in this experiment is the most preferred (also see Herne and Suojanen 2004).

(Cabrales, Nagel 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. Our experiment most importantly differs in two respects: We implement a real effort task, and we exogenously impose (in one stage) effort and (in the next stage) a redistribution scheme.

(Durante and Putterman 2009) have groups of 21 participants. All but one are assigned the equivalent of a 20^{th} fraction of the US income distribution in the year 2000, either randomly or reflecting their performance in a quiz. The randomly selected 21^{st} 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. They do not test the effects on, nor manipulate, effort. (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. (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 (further, less closely related experiments are reported by Tausch, Potters et al. 2010).

Several papers have 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. However, they do not measure effort either. (Beckman, Formby et al. 2004) essentially designed an experiment about distribution, not about *re*distribution. 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.

(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. The setup is related to ours, in that we use redistribution (exclusively) as a safeguard against risk. But again the trade-off with effort is not investigated. (Krieger and Traub 2008) also combine field 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 bracket.

3 Effort and Preferences for Redistribution: Theoretical Motivation

To motivate our empirical analysis on the determinants of preferences for redistribution and effort, we draw on a simple model of effort choice and preferences for redistribution by (Persson, Tabellini et al. 2000**:** chapter 6). Each individual *i* maximizes a utility function which depends on consumption and leisure:

$$w_i = c_i + V(x_i) \tag{1}$$

where c_i is consumption and $V(x_i)$ is the utility of time not spent at work (x_i), i.e., of leisure. We assume $V_x > 0$. The budget constraint for the individual is given by:

$$c_i \leq (1-\tau) l_i \tag{2}$$

Hence, consumption cannot exceed the sum of labor income. The income an individual earns when being employed is given by labor income l_i minus taxes where τ is the marginal tax rate. Without loss of generalization, wages are equalized to one.

The household's time constraint is given by

$$1 + e_i \geq x_i + l_i \tag{3}$$

where e_i denotes individual labor productivity, i.e., an individual's "innate ability", which is distributed according to $F(\cdot)$, with mean *e* and median $e_m < e$. This constraint gives l_i the additional interpretation of working hours.

Households make two simultaneous decisions. First, they decide on their optimal labor supply, while taking the probability of becoming unemployed and the economy-wide marginal tax rate as given. Second, individuals decide which marginal tax rate is optimal for them, given their preferences and labor supply (effort) decision.

Optimal labor supply decision is given by the following first order condition:

$$1 - \tau = V_x(1 + e_i - l_i) \tag{4}$$

The marginal benefit from additional labor supply in terms of higher (net) wages must be equal to the marginal cost in terms of less leisure time. Solving for optimal labor supply gives:

$$l_i = 1 + e - \frac{1}{V_x(1-\tau)} + e_i - e \tag{4'}$$

or $l_i = L(\cdot) + e_i - e$ where $L(\cdot) = L(e, \tau)$ $L_e(\cdot) > 0, L_\tau(\cdot) < 0$. Equation (4') leads to

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

Averaging across all individuals *i* gives the average labor supply $l = L(\cdot) + e - e = L(\cdot)$. Hence the government's budget f needs to meet the following condition:

$$f \leq \tau \cdot l \qquad (5).$$

Individual *i*'s tax preference can then be derived by substituting the government budget constraint and the optimal labor supply decision of the household into the utility function to obtain total indirect utility as a function of the tax rate:

$$w_i = (1-\tau)[L(\cdot) + (e_i - e)] + \tau \cdot L(\cdot) + V(1 - L(\cdot) + e) \qquad (1')$$

Optimizing (1') with respect to the optimal tax rate for individual *i* yields:[2]

$$\frac{\partial w_i}{\partial \tau_i} = (e_i - e) - \tau_i \cdot L_\tau(\cdot) = 0 \qquad (6).$$

where average labor supply decreases the higher the tax burden: $L_\tau(\cdot) < 0$. This equation implicitly defines the optimal tax rate, and we obtain

> **Hypothesis 2**: *Individual tax preferences depend on individual ability relative to the median voter: individuals with high individual ability ($e_i - e > 0$) prefer an income subsidy (negative tax rate); individuals with a low individual ability ($e_i - e < 0$) prefer positive tax rates.*

The model implies that effort and the desired degree of redistribution are intrinsically linked at the individual level. Individuals with below-average ability are more likely to be in favor of redistribution, and vice versa, and individuals with lower ability have a less pronounced preference for exerting effort Combining Hypothesis 1 and 2 yields:

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

While this model motivates our research , we cannot directly test the model . To do that, we would have to generate point predictions for effort and redistribution preferences or choices. That would presuppose that we fully specify the functions $V(.), L(.)$ and $F(.)$, both regarding functional form and parameters. The model is silent on those. The purpose of the model is to help us understand how effort preferences and preferences for redistribution are related, and to test the qualitative predictions about this relationship.

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[2] Note that this result assumes that the envelope theorem holds, i.e., $\partial l_i / \partial \tau = 0$ and, consequently, also $\frac{\partial (V(.))}{\partial \tau} = 0$

Disentangling this mutual interdependence of redistribution and effort empirically is not a trivial task. Ability that determines both cannot easily be observed by the researcher, and it is difficult to find instruments that affect effort and not redistribution preferences – or vice versa. Our empirical strategy proceeds in two steps. In a first step, we use the *World Value Survey* to analyze the interdependence of effort choices (l_i) and redistribution preferences (τ_i) in the field by estimating the determinants of effort and redistribution preferences using a system of equations. The system estimator explicitly allows modeling the effect of effort on redistribution preferences, and of redistribution preferences on the willingness to exert effort. The advantage of the field data is that they provide information for a large number of countries and years, hence allowing the measuring of preferences across countries and time.

In the field, though, individual ability (e_i) and average ability (e) can at best be captured indirectly. Also, our field data is a repeated cross-section. Consequently, we cannot account for unobserved individual specific heterogeneity. We therefore complement the field evidence by an experiment. In the experiment, we first hold redistribution schemes and thus (τ) constant and elicit effort choices (l_i). From the same participants, we then elicit redistribution preferences (τ_i), while we exogenously impose a level of effort. For both tests, between subjects we induce different ability levels (e).

4 Redistribution versus Effort: Field Evidence

The dependent variables in our empirical model using field 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 show initiative at work. Redistribution preferences (τ_i) are measured using answers to the question whether incomes should be made more equal.[3] Both variables are

[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

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 1 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 show 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.

Following previous work by (Alesina and Fuchs-Schündeln 2007**;** Alesina and Giuliano 2009), we control for the following observed individual-specific characteristics (e_i): 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.

The theoretical model has largely abstracted from the impact of the macroeconomic environment. Yet, in reality, macroeconomic conditions have an impact on the preferences for protection through the social security system and the incentives to work. We use information on top marginal income tax rates as a general measure of the degree of redistribution via the tax system. We use GDP growth as a proxy. High GDP growth can be taken as a proxy for the fact that effort pays. We therefore expect this variable to have a positive effect on effort preferences, and a negative effect on redistribution preferences.

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.

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whether job security is considered important (to measure redistribution preferences). Results are similar and are available upon request.

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

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 higher 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 negatively correlated

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 behind this variable 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 income equality 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.

Table 1 shows the results for single equation models using the willingness to show 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 thus 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 show initiative at work; people who find it acceptable to take bribes and who value leisure more do

less so. Preferences for greater income equality 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 an impact on preferences for redistribution. This would be in line with the finding that (negative) causality is running from redistribution preferences to effort, but not vice versa.

In terms of the explanatory power, 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 show 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] Also, higher growth – which can be taken as a signal that effort pays off – 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 of endogeneity 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

[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.

which we conjecture to be important for "equality", 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 already 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 equality 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 OLS to an IV estimator, the estimated coefficient increases and the standard error decreases, suggesting that the OLS 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 equality is endogenous. Hence, our model suggests that equality has a negative impact on effort, but it is difficult to find instruments which affect one, but not the other.

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 importance of showing 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:

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

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

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

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* x 1)-vector of parameter coefficients $\hat{\Pi}'_1$ and $\hat{\Pi}'_2$. The fitted values $\hat{\tau}_{it} = \hat{\Pi}'_{1,it}\mathbf{X}_{it}$ and $\hat{l}^{**}_{it} = \hat{\Pi}'_{2,it}\mathbf{X}_{it}$ 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.[7]

Step two involves estimating the structural equations of interest:

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

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

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: equality has 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 field 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

[7] In the simultaneous-equation model, growth volatility has no impact on effort. However, in the single-equation model, growth volatility also has a significant impact on effort choices as indicated by significant effects in the relevant first-stage regressions. In other words, growth volatility as well as other variables that could serve as potential instruments for "equality" are also potentially valid instruments for "effort" in single-equation models.

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 a 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. In this sense, changes in the income distribution over time and differences in these distributions across countries can have implications for the level of 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 willingness to show effort 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.
- Finally, the macroeconomic environment affects preferences: Higher macroeconomic volatility *and* higher growth tend to strengthen preferences for redistribution.

5 Redistribution versus Effort: Experimental Evidence

The field data have allowed estimating the relationship between effort (l_i) and tax/redistribution preferences (τ_i) in a world where ability (e_i) is heterogeneous. Yet, our ability to isolate the feedback between the two variables which are endogenously chosen by each individual hinges on the quality of the instruments. Also, individual real-world choices might differ from answers given in an interview. Therefore, 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 (e_i) and to induce effort (l_i), we use a task developed by (Mazar, Amir 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.

In the first phase of the experiment, we measure individual ability (e_i) by asking participants to fill in Table 3a. 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.

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. Participants know they will have to exert the assigned effort at the end of the experiment if they do not want to lose their entire income. 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%. 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. Through randomly determining the difficulty of the task, we induce a handicap (e). Within the framework of the theoretical model, the random choice of table size has the interpretation of an exogenous shock that shifts mean ability e upwards (if size is 2x2) or downwards (if size is 4x4).

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.

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 e_i. By taking the average, for each randomly composed group of 4, we can calculate e. In the second part of the experiment, we exogenously impose effort l_i. Because participants are free to leave the lab once they have completed their tasks, we also manipulate time for leisure x_i. All proceeds from the voted redistribution scheme are distributed equally among the members of the group, which is how we implement government's budget constraint f. In the third part of the experiment, we manipulate the tax rate τ.

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. The first participant left after 1 minute 16 seconds (because this participant only had to solve 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 2a). 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 2b). Graph 2c 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 competing explanations. From each participant, we have 30 effort choices, for 10 different levels of imposed effort, and for three different handicaps. We therefore have panel data. 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.[8] 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. Because the formal model does not work with exogenous ability shocks, we first have run all estimations for the intermediate difficulty level (i.e., the 3x3 tables) only. Results are available from the authors upon request. Because they look very similar to results that use all data, and control for this shock, in the following we report only the latter.

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

[8] 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.

(model 5). We thus fully support **H_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 only predicts a reduction of effort from about 23 to 18 problems, i.e., a reduction by 21% (model 5). Finally, effort preferences react to the opportunity cost in terms of additional time spent in the lab, in the expected direction (model 6).

5.3.2 Explaining Redistribution Choices

When analyzing redistribution choices, as is done in Table 5, we get a somewhat different picture. [9] 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 **H_3**.

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 only changes with a different choice of functional form. In model 7, we estimate a random effects Tobit model, with censoring from below.[10] 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 **H_2**.

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[9] Again, coefficients and p-values look very similar if we only consider choices for the 3x3 problems. 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. Here, too, coefficients and significance levels are very similar. All these additional estimates are available from the authors upon request.

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

6 Concluding Remarks

The global economic and financial crisis that started in 2007 and only recently culminated in the deep crisis of the Euro system will have a significant impact on the economic landscape and future policy discussions. On the one hand, the crisis has shown the fragility of existing insurance systems, 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 market 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 will be how policies can be implemented that do not threaten future economic growth.

An improved understanding of the link between redistribution and effort, and their relationship with ability, has been the purpose of this paper. Our empirical work has been motivated by a theoretical model which posits that policies which increase redistribution have negative implications for effort, and that those exerting high effort are in favor of little redistribution. The model predicts those who have high ability to exert more effort and to be opposed to (more) redistribution. We have tested the implications of this model using field and experimental data, and our research has three main findings.

First, both, in the field 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 redistribution rate financed from this tax are, the more the willingness to exert effort declines.

Second, in the field, 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 statistical model that allows for the possibility of society even paying a premium for high performance.

Third, more importantly even, both in the field and in the lab, we qualify the link between redistribution and effort preferences expected by the theoretical model. If we simultaneously estimate the effect of effort preferences on redistribution preferences, and vice versa, using proper instruments, 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, all 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 theoretical model misses a “solidarity” motive. Experimental participants apparently do see redistribution 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 field and experimental set-ups. Drawing policy lessons from the field data is subject 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, 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 field 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 is at least no opposition, if not positive support even by those with a high contemporaneous preference for effort. Yet, later 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

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8 Data Appendix

8.1 World Value Survey

OECD countries only. Variables "v" refer to most recent waves.

1. Proxy for Effort

"Importance to show 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)

8.2 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

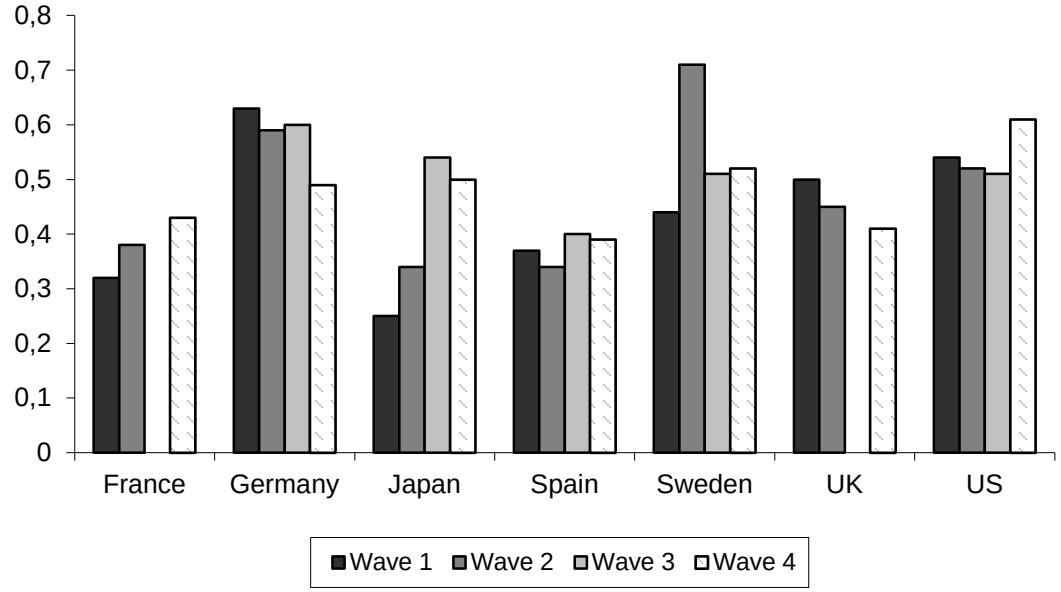
This Table shows the summary statistics for the variables used in the regressions. The number of observations differs from those reported in the following Tables because not all questions have been asked in all countries in all survey waves.

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
Show 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

Graph 1: Preferences for Redistribution and Effort

This table shows the mean responses to the questions "Importance to show 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, and1999-2004. Not all questions have been asked in all countries in each wave.

(a) "Importance to show initiative" (0/1)



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

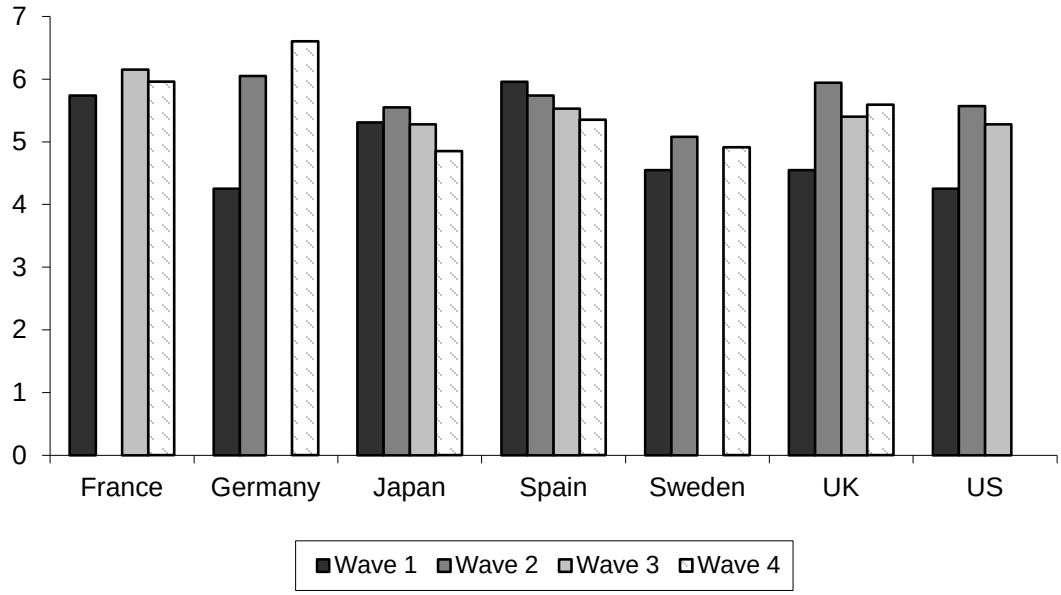


Table 1: Determinants of Effort and Preferences for Redistribution (IV Estimates)

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

	(1) Equality, 2nd stage	(2) Equality, 1st stage		(3) Initiative, 2nd stage	(4) Initiative, 1st stage
Instruments					
Trust (0/1)		0.052**	Neighbors different		-0.197***
		(0.005)			(0.031)
Protestant (0/1)		0.015**	Employment protection legislation		0.803***
		(0.008)			(0.106)
Bribe		-0.009***	Growth volatility		0.226***
		(0.002)			(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 show 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

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

(a) Real Effort Task

4.67	4.81	3.05
5.82	5.06	4.28
6.36	5.19	4.57

(b) Elicitation of Redistribution Preferences

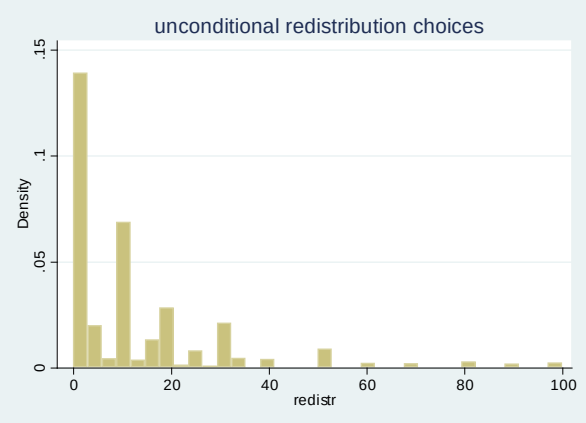
%	30	40	50	60	70	80	90	100	110	120
2x2										
3x3										
4x4										

(c) Elicitation of Effort Preferences

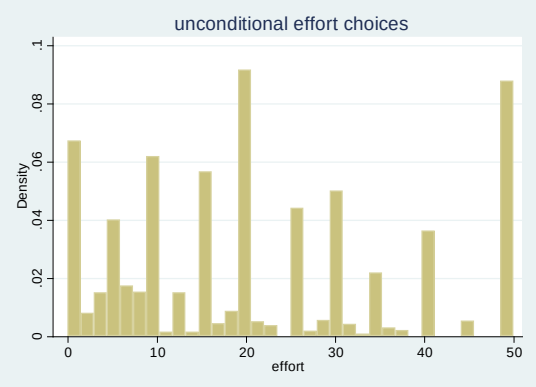
%	0	5	10	15	20	25	30	35	40	45
2x2										
3x3										
4x4										

Graph 2: Descriptive Statistics Lab Experiment

(a) Distribution of Redistribution Choices



(b) Distribution of Effort Choices



(c) Redistribution Preferences Conditional on Effort Preferences

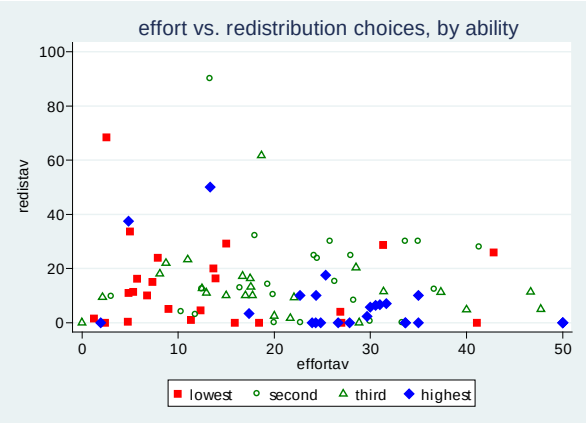


Table 4: Explaining Effort Choices

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	Model 6
Ability	0.442**	0.492**				
	(0.144)	(0.147)				
Mean ability		-0.935				
		(0.637)				
Ability – mean ability			0.492**	0.492**	0.492**	0.345**
			(0.147)	(0.147)	(0.147)	(0.127)
Easy task				9.447***	9.447***	9.447***
				(0.306)	(0.298)	(0.298)
Difficult task				-6.939***	-6.939***	-6.939***
				(0.306)	(0.298)	(0.298)
Imposed redistribution					-10.562***	-10.561***
					(0.846)	(0.846)
Time for leisure						-0.011***
						(0.002)
Constant	11.367**	31.742*	21.549***	20.713***	23.089***	13.168***
	(3.538)	(14.313)	(1.198)	(1.211)	(1.255)	(1.932)
N	2,880	2,880	2,880	2,880	2,880	2,880
p model	.0022	.0028	.0008	<.0001	<.0001	<.0001

Table 5: Explaining Redistribution Choices

The dependent variable measures votes on 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	-0.280					
	(0.185)	(0.190)					
Mean ability		0.074					
		(0.824)					
Ability – mean ability			-0.280	-0.280	-0.280	-0.298	-0.725*
			(0.190)	(0.190)	(0.190)	(0.193)	(0.348)
Easy task				-1.796***	-1.796***	-1.796***	-3.009***
				(0.424)	(0.417)	(0.417)	(0.645)
Difficult task				3.347***	3.347***	3.347***	4.944***
				(0.424)	(0.417)	(0.417)	(0.635)
Imposed effort					5.697***	5.697***	9.344***
					(0.593)	(0.593)	(0.912)
Time for leisure						-0.001	0.002
						(0.003)	(0.007)
Constant	19.066***	17.451	12.713***	12.196***	7.923***	6.736*	4.602
	(4.529)	(18.528)	(1.547)	(1.566)	(1.628)	(2.955)	(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