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WORKING PAPER

Voting for redistribution under desert-sensitive altruism

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Abstract

We endow individuals that differ in skill levels and tastes for working with altruistic preferences for redistribution in a voting model where a unidimensional redistributive parameter is chosen by majority voting in a direct democracy. When altruistic preferences are desert-sensitive, i.e. when there is a reluctance to redistribute from the hard-working to the lazy, we show that lower levels of redistribution emerge in political equilibrium. We provide empirical evidence, based on the ISSP 1992 dataset, that preferences for redistribution are not purely selfish and that desert-sensitive motivations play a significant role. We estimate that preferences for redistribution are significantly more desert-sensitive in the US than in Europe. We believe that differences in desert-sensitive preferences for redistribution help explain the different social contracts that prevail in both continents.

JEL Classification: D31, D63, D64, D72.
Keywords: altruism, voting, redistribution, desert, responsibility, compensation.

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1 Introduction

The United States and continental Western Europe ('Europe' henceforth) show considerable differences in their social contracts. Government expenditures on subsidies and transfers as a percentage of GDP have been consistently lower in the US between 1970 and 1998 and the discrepancy between both continents has ever been increasing. At the same time, the US has a significantly higher pre-tax income inequality; see Alesina et al. (2001) for an extensive discussion.

The coexistence of high (resp. low) pre-tax income inequality and low (resp. high) levels of redistribution constitutes an interesting puzzle for economists. It seems to invalidate the theoretical predictions of Meltzer and Richard's seminal paper (1981) according to which —under realistic assumptions about the distribution of pre-tax income— higher income inequality makes the median voter benefit more from redistribution, leading to higher levels of redistribution in political equilibrium. Ever since, an increasing research has been devoted to identifying under which conditions politico-economic equilibria emerge where a low level of redistribution is chosen by rational agents in economies showing a high level of pre-tax income inequality.

Several groups of papers have triggered off particular attention among scholars. Corneo and Grüner (2000) show that limits to redistribution may arise when economic inequality has an informational value. While pecuniary incentives make the middle class willing to increase the extent of redistribution, a social incentive to avoid a mix with the 'underclass' may push in the opposite direction; see Vigdor (2006) for a related argument. Benabou and Ok (2001) demonstrate how the 'Prospect of Upward Mobility' (the so called POUM effect) induces people with a low income to oppose redistribution, because they believe that they or their offspring will make it up the income ladder. Hence, low levels of redistribution are consistent with high pre-tax income inequalities as soon as the POUM effect is important. However, the upward income mobility argument to explain differences in social contracts between Europe and the United States lacks empirical justification. Empirical conclusions of whether or not upward income mobility is higher in the United States than in Europe over the last 30 years have been very contradictory; we refer to Fields and Ok (1999) for an overview. Piketty (1995) initiated a research track that focuses on the impact of individuals' beliefs on the relative importance of effort and luck in generating income inequalities. This approach receives empirical support in turn. Alesina et al. (2001) demonstrate that beliefs on the determinants of pre-tax income inequalities are strongly correlated with levels of redistribution. They recall that, according to the World Value Survey, 71% of Americans vs. 40% of Europeans agree with the opinion that 'poor people could become rich if they just tried hard enough' and hence believe that effort is the main determinant of pre-tax income.

But through which channels are beliefs on the determinants of pre-tax income inequalities and redistribution levels mutually reinforcing? Benabou and Tirole (2006) start from an evidence widely acknowledged by psychologists that people

need to believe in a just world —where hard work pays back and everyone receives their just desert in the long run— so as to motivate themselves and their children towards exerting effort. Two politico-economic equilibria emerge. A high prevalence of just-world beliefs is consistent with low redistribution which increases the cost of low effort and therefore reinforces the need for just-world beliefs (this stands for the American equilibrium). Conversely, a low prevalence of just-world beliefs is consistent with high redistribution levels that reduce the cost of low effort and therefore makes the need for just beliefs less essential (this stands for the European equilibrium). Alesina and Angeletos (2005) concentrate on ethical motivations where voters' preferences are driven both by self-interest and a concern for fairness. They define this concern for fairness as 'a social preference for reducing the degree of inequality induced by luck and unworthy activities, while rewarding individual talent and effort'. Again, two politico-economic equilibria emerge. In a first (resp. second) equilibrium, redistribution is high (resp. low), which leads to a low (resp. high) labor supply. This in turn induces that a large component of income is due to luck (resp. effort), which ultimately makes high (resp. low) redistribution desirable for people concerned by fairness motivations.

The inclusion of fairness concerns in voters' preferences is a promising track for future research that is backed by strong theoretical and empirical arguments. The concept of 'ethical voting' dates back to the seminal work of Goodin and Roberts (1975) who describe the 'ethical voter' as a rational agent who, contrary to Downs' *homo politicus* (1957), is not only motivated by self-interest but also by ethical concerns (what he considers as fair for the society as a whole) in his political choice.

On the theoretical side, three main arguments can be distinguished. The standard argument states that, if civic duty plays the major role in citizens' decision to go to the poll —see Blais (2000) for strong empirical evidence— then why should people not vote in an ethical way once in the booth. Second, Goodin and Roberts (1975) stress that, since the probability of being pivotal is close to zero, voters may be indifferent between giving in to their self-interest or abiding by their ethical concerns. In both cases, their expected benefit converges to zero. Under such circumstances, following Hume (1739), voters should be able to follow the requirements of Smith's *impartial spectator* (1790) and show benevolence towards his fellow citizens precisely because his own interests are not directly at stake. More precisely, as pivot probabilities decrease, the temptation to vote ethically may become stronger than the temptation to vote egoistically because voting ethically gives individuals an additional 'warm glow' payoff; we refer to Andreoni (2006) and Feddersen et al. (2007) for theoretical and experimental support. A third argument, proposed by Edlin et al. (2006), demonstrates that ethical voting enables to rationally explain why people massively go to the poll (without relying on the standard civic duty argument) since the expected benefit of voting may no longer converge to zero anymore when citizens do not only care about their own benefit but also about the sum of the benefits of all their fellow citizens.

On the empirical side, much evidence of ethical concerns has been given, irrespective of whether one considers Downs' retrospective or spatial theory of voting (1957). Concerning retrospective voting, Fiorina (1978) points out that citizens' decision to vote for the incumbent depends less on the evolution of their personal economic situation during the incumbent's political mandate than on the economic evolution of the country as a whole. Kinder and Kiewet (1981) and Lewis-Beck (1986) show that this assertion holds even when the country's economic evolution and the individual's economic evolution are not correlated, which betrays that ethical concerns are not a way to rationalize self-interest in an ethical manner. We refer to Lewin (1991) for a survey on ethical retrospective voting. Concerning spatial voting, Sears et al. (1980) show that the influence of ideology on citizens' votes is stronger than the impact of their short-term material self-interest. Here again, Hudson and Jones (1994, 2002) confirm that this assertion holds even when 'what is best for the society as a whole' (which drives ideology) and 'what is best for me' (which drives selfishness) are very different.

In this paper, we model altruistic preferences for redistribution in line with results that explain ethical behavior in experimental allocation problems. Charness and Rabin (2002) provide strong experimental justification of 'social welfare' models —where people like to increase the social surplus (which we denote in this paper as a 'utilitarian motive'), caring especially about individuals with low payoffs (which we denote a 'Rawlsian motive')— over 'difference aversion' models (Fehr and Schmidt, 1999), where individuals are motivated to reduce differences between theirs and others' payoffs. Konow (2000) provides evidence that individuals do not only use utility information in the evaluation of different social states but also care about the underlying sources that cause utility differences. Individuals tend to make a clear distinction between utility differences that are due to differences in characteristics within the responsibility of the individual (e.g. effort, preferences, tastes) and utility differences that are due to differences in characteristics beyond the responsibility of the individual (e.g. innate skills, talents, parental background). Individuals dislike these latter differences in general, whereas they are neutral towards the former differences. Konow performs several variations of the dictator game where the dictator decides about the division of joint earnings between an anonymous counterpart and himself. In the treatment where the joint earnings are exogenously given, the sharing rule chosen by dictators endorses the equal split of joint earnings. On the contrary, in the treatment where the joint earnings are proportional to the effort exerted by both individuals during a previous real task phase, dictators refuse to compensate their counterparts for their poor performance. Recently, Fong (2007) analyses donors' behavior in a charity game where beneficiaries are real life welfare recipients. She finds out that donors who yet claim to feel concerned about the well-being of others give significantly less than donors showing a lower degree of altruism as soon as they receive signals that their recipient may be lazy. In this paper, we assume that ethical preferences for redistribution are such that individuals no longer simply include all individuals (utilitarian

motive) or the worst-off individual only (Rawlsian motive) in their altruistic concerns. We allow individuals to exclude others from their altruistic concerns when they feel that these others have performed poorly compared to themselves in terms of responsibility characteristics. We denote such altruistic preferences 'desert-sensitive' altruistic preferences, because this way of modelling ethical preferences for redistribution resembles with Arneson's (1999, 2000) normative 'desert-sensitive' prioritarian theory of distributive justice, which is based on the idea that individuals should obtain the level of well-being that they deserve in view of their responsibility characteristics. Broadly speaking, under desert-sensitive preferences for redistribution, hard-working individuals oppose redistribution from the hard-working to the lazy.

We argue that preferences for redistribution are more desert-sensitive among individuals in the US than among individuals in Europe. We see two apparent explanations (see Alesina et al. (2001) and Alesina and Glaeser (2004) for an extensive discussion). First, the myth of the US being the 'land of opportunity' greatly entrenched its customs. Meanwhile, European perceptions are influenced by the historical (from medieval times till the nineteenth century) division of society into classes, where birth and nobility were the main determinants of wealth and success. Second, the American belief of undeservingness of the poor may reflect racial prejudice against the black minority. Poor white voters might reduce their support for redistribution when they believe that poor black citizens also benefit from redistribution (see Luttmer (2001) for strong empirical evidence). Roemer et al. (2007) find out that marginal income taxes would have been much higher when racial prejudice would have been absent. They believe that racial prejudice is the major underlying factor explaining why in the US, while the past twenty years were characterized by a sharp rise in inequality, the effective marginal income taxes have fallen.

The main contribution of this paper is twofold.

On a theoretical level, we study a simple voting model where a unidimensional redistributive parameter is chosen by majority voting in a direct democracy. We allow for heterogeneities in productivities and preferences for consumption and leisure and incorporate the incentive effects of taxation. We model individuals' altruistic preferences for redistribution as described by social welfare models; for an alternative approach, we refer to Tyran and Sausgruber (2006) who study voting for redistribution in a model where altruistic preferences are based on difference aversion models. We study four different scenarios of altruistic preferences for redistribution: we endow individuals with altruistic preferences that are either driven by a utilitarian motivation or by a Rawlsian motivation and altruistic preferences can be either desert-sensitive or not. We compare the different equilibrium levels of redistribution that emerge when individuals are endowed with these different altruistic preferences for redistribution. We show that in a society where altruistic preferences are desert-sensitive, (i) strictly lower levels of redistribution emerge in political equilibrium compared to a society where altruistic preferences are desert-insensitive and (ii) lower or equal

levels of redistribution emerge in political equilibrium compared to a society where preferences for redistribution are purely egoistic.

On an empirical level, using the ISSP 1992 dataset, we provide evidence that preferences for redistribution are not purely egoistic. We find that desert-sensitive motivations play a significant role in individuals' preferences for redistribution. We estimate that preferences for redistribution are significantly more desert-sensitive among individuals in the US than among individuals in Europe. We therefore believe that differences in desert-sensitivity help explain the different social contracts that prevail between both continents.

The paper is organized as follows. Section 2 presents the model and introduces the different scenarios of altruistic preferences for redistribution. Section 3 compares the different equilibrium levels of redistribution that emerge under these different scenarios. Section 4 deals with desert-sensitivity in practice and justifies desert-sensitive altruistic preferences for redistribution empirically. Section 5 summarizes our major conclusions and highlights different avenues for future research. In Appendix A, we return to the theoretical analysis of Section 3 and study the impact of incomplete information on the equilibrium levels of redistribution when altruistic preferences for redistribution are utilitarian and desert-sensitive. Appendix B provides a detailed descriptive summary and a correlation matrix of the data used in Section 4.

2 The model

2.1 Individual characteristics

To keep our analysis simple, all individuals can only differ in two binary attributes. The first is their productive skill level w: individuals are either '*low-skilled*' or '*high-skilled*', i.e. $w \in W = \{\underline{w}, \overline{w}\}$, with $0 < \underline{w} < \overline{w} \leq 1$. The second is their taste for working e: individuals are either '*lazy*' or '*hard-working*', i.e. $e \in E = \{\underline{e}, \overline{e}\}$, with $0 < \underline{e} < \overline{e} \leq 1$. Hence, every individual belongs to one of four types $(w, e) \in W \times E$. We assume throughout the paper that W and E are fixed and given. We assume that the view of society is such that people believe that differences in w are linked to a genetic endowment and hence fall beyond the responsibility of the individual. On the other hand, people (may) hold individuals responsible for differences in the preference parameter e (cfr. infra).[1] For the sake of simplicity, we assume that w and e are independently distributed. Denote p_{we} the proportion of individuals of type (w, e); $\sum_{(w,e)\in W\times E} p_{we} = 1$.

[1] This 'responsibility cut' (Dworkin, 1981) is common in the theoretical literature on fair redistribution and the empirical literature on individual opinions on distributive justice (e.g. Fleurbaey and Maniquet (2006) and the references cited therein). However, one could argue that individuals should be held responsible for differences in w as they differently invest in human capital and that individuals are not responsible for differences in e which may result from having small children, being old or having bad health. We want to stress that the qualitative results of our model do not change when the responsibility cut is reversed once the definition of desert-sensitive altruism is altered accordingly (cfr. infra).

Table 1 summarizes:

p_{we}	$\underline{e}$	$\overline{e}$	
$\underline{w}$	$\alpha\beta$	$(1-\alpha)\beta$	β
$\overline{w}$	$(1-\beta)\alpha$	$(1-\alpha)(1-\beta)$	$1-\beta$
	α	$1-\alpha$	1

Table 1: proportions of types.

where α and β belong to the open interval between 0 and 1 and denote the proportion of lazy individuals and the proportion of low-skilled individuals respectively. A generic economy is described by $\varepsilon = (\alpha, \beta)$.

2.2 Private preferences for consumption and leisure

The productive skill level defines gross income in the usual multiplicative way: for any type (w, e), given an amount of labor $\ell_{we} \in [0, 1]$, gross income y_{we} equals $w\ell_{we}$.

The government redistributes income through a basic income - flat tax schedule. Denote the constant marginal tax rate $\tau \in [0, 1]$ and the corresponding basic income $B(\tau) = \tau y_a$, where $y_a = \sum_{(w,e)\in W\times E} p_{we} y_{we}$ denotes average gross income. Denote median income by y_{med}. Consumption c_{we} equals $B(\tau) + (1-\tau)\, w\ell_{we}$.

Taking the redistributive policy of the government (i.e. τ and $B(\tau)$) as given, labor supply is determined on the basis of private preferences. For analytical tractability, we discard income effects and assume, for any type (w, e), quasi-linear preferences between c_{we} and ℓ_{we} to take the form:

$$u_e = c_{we} - \frac{1}{2}\frac{1}{e}\ell_{we}^2. \tag{1}$$

Hence, taste for working defines the marginal rate of substitution between consumption and supplied labor.[2]

Maximization of (1) with respect to ℓ yields for an individual of type (w, e):

$$\ell_{we} = (1-\tau)\, we.$$

and thus the following gross income:

$$y_{we} = (1-\tau)\, w^2 e$$

[2] The marginal rates of substitution for two types of individuals with different tastes for working are always a constant multiple of each other. Therefore, their indifference curves satisfy the (Spence-Mirrlees) single crossing property.

and net income (=consumption):

$$c_{we} = B(\tau) + (1-\tau)^2 w^2 e.$$

Private preference satisfaction is measured by the indirect utility function:

$$v_{we} = B(\tau) + \tfrac{1}{2}(1-\tau)^2 w^2 e.$$

Similar to Boadway et al. (2002), we assume that the individuals (and the government) only observe three different income classes —the poor (with $y_{\underline{we}}$), the middle-class (with $y_{\bar{w}\underline{e}} = y_{\underline{w}\bar{e}}$) and the rich (with $y_{\bar{w}\bar{e}}$)— together with their respective proportions $p_{\underline{we}}, p_{\bar{w}\underline{e}} + p_{\underline{w}\bar{e}}$ and $p_{\bar{w}\bar{e}}$. The supports of w and e are known but w, e and ℓ_{we} cannot be observed on an individual basis. As a result, types $(\underline{w}, \underline{e})$ and $(\bar{w}, \bar{e})$ can be inferred from observing $y_{\underline{we}}$ and $y_{\bar{w}\bar{e}}$ respectively, but types $(\bar{w}, \underline{e})$ and $(\underline{w}, \bar{e})$ cannot be distinguished, since $y_{\bar{w}\underline{e}}$ equals $y_{\underline{w}\bar{e}}$.[3] For the moment, we leave the question open whether individuals know that w and e are independently distributed or not. We show in Appendix A that knowing whether w and e are independently distributed or not plays a crucial role in forming beliefs about the separate proportions $p_{\bar{w}\underline{e}}$ and $p_{\underline{w}\bar{e}}$ of the indistinguishable middle types $(\bar{w}, \underline{e})$ and $(\underline{w}, \bar{e})$.

2.3 Altruistic preferences for redistribution

We consider a direct democracy in which the redistributive parameter τ is chosen by simple majority voting. Individuals fully anticipate the disincentive effects of income taxation on labor supply. Individuals' evaluations of alternative redistributive policies are based on additive extended indirect utility functions. We present throughout the paper different specifications of altruism, but the generic form follows the social welfare model of Charness and Rabin (2002).

Denote the vector $\mathbf{v} \equiv \left(v_{\underline{we}}, v_{\bar{w}\underline{e}}, v_{\underline{w}\bar{e}}, v_{\bar{w}\bar{e}}\right)$ the type-profile of indirect utilities. Let $\mathbf{v^T}$ be the transpose of $\mathbf{v}$. Let $\gamma \in [0,1]$ be a parameter (the same for all individuals) that reflects the weight put on the private indirect utility in the social indirect utility function. Consider two (possibly identical) types (w, e) and (w', e'). Denote $\pi_{we,w'e'}$ the weight that an individual of type (w, e) assigns in her social indirect utility function to the private indirect utility of an individual of type (w', e'). For any type (w, e), $\sum_{(w',e')\in W\times E} \pi_{we,w'e'} = 1$. The vector $\boldsymbol{\pi}_{we} \equiv \left(\pi_{we,\underline{we}}, \pi_{we,\bar{w}\underline{e}}, \pi_{we,\underline{w}\bar{e}}, \pi_{we,\bar{w}\bar{e}}\right)$ collects type (w, e)'s weights. Then, for any type (w, e), preference satisfaction for redistribution is given by:

$$V_{we} = \gamma v_{we} + (1-\gamma)\boldsymbol{\pi}_{we}\mathbf{v^T}. \tag{2}$$

We denote preferences for redistribution *altruistic* whenever $\gamma \neq 1$.

[3] That types $(\bar{w}, \underline{e})$ and $(\underline{w}, \bar{e})$ are indistinguishable exemplifies the real life problem for any policy maker that incomes do not reveal personal characteristics.

2.4 Different scenarios of altruism

We discuss different altruistic preferences for redistribution. We assume that we can write $\pi_{we,w'e'}$ as

$$\pi_{we,w'e'} \equiv \frac{\delta_{we,w'e'} p_{w'e'}}{\sum_{(w',e') \in W \times E} \delta_{we,w'e'} p_{w'e'}}$$

where $\delta_{we,w'e'} \in \{0,1\}$ is a dummy variable that represents the type-specific *concern* that individuals of type (w,e) have for individuals of type (w',e').

Whether the concern of one individual for another individual takes the value of 1 or 0 —or, in other words, whether another individual's private indirect utility enters one individual's social indirect utility or not— depends on two factors: 1) whether individuals are *utilitarian altruist* or *Rawlsian altruist* and 2) whether individuals are *desert-sensitive* or not. We clarify both notions. We qualify individuals' altruistic preferences for redistribution *utilitarian altruist* in case individuals do not discriminate on the basis of private indirect utilities and hence *all* other individuals' private indirect utilities are taken up in their own social indirect utility function. We qualify individuals' altruistic preferences for redistribution *Rawlsian altruist* in case individuals do discriminate on the basis of private indirect utilities and *only* individuals with the lowest private indirect utilities are taken up in their own social indirect utility function.[4] In addition, we qualify individuals' altruistic preferences for redistribution *desert-sensitive* when individuals do discriminate on the basis of taste for working and *only* private indirect utilities of individuals with *at least the same* taste for working are taken up in their own social indirect utility function. We qualify individuals' altruistic preferences for redistribution *desert-insensitive* when individuals do not discriminate on the basis of taste for working when taking up other private indirect utilities in their own social indirect utility function (in other words, taste for working is treated, as productive skill, without discrimination).

Putting both notions together, we consider throughout the paper four different altruistic scenarios: desert-insensitive utilitarian altruism (in short: utilitarian altruism (U)), desert-insensitive Rawlsian altruism (in short: Rawlsian altruism (R)), desert-sensitive utilitarian altruism (dsU) and desert-sensitive Rawlsian altruism (dsR). We denote, in addition, the scenario where all preferences for redistribution are egoistic (γ equals 1 for all individuals) by Ego. Hence, the set of all different scenarios considered in this paper is $\Xi = \{Ego, U, R, dsU, dsR\}$.

Generically, let $\boldsymbol{\delta}^i_{we} \equiv \left(\delta_{we,\underline{we}}, \delta_{we,\overline{w}\underline{e}}, \delta_{we,\underline{w}\overline{e}}, \delta_{we,\overline{we}}\right)$ be the vector of concern-parameters of an individual of type (w,e) for a scenario $i \in \Xi \backslash \{Ego\}$.

Our four altruistic scenarios read as follows:

[4] Over the years, Rawls' ideas have been reinterpreted by economists into utility terms (as we do here), although Rawls himself clearly never advocated this. He proposed to measure individual well-being in terms of primary goods rather than in terms of preference satisfaction.

- Utilitarian altruism

Under *utilitarian altruism*, every individual's social indirect utility is a convex combination of her own private indirect utility and the average of the private indirect utilities of all other individuals. Hence, all concern-parameters take the value of 1, or $\boldsymbol{\delta}^{U}_{we} = (1, 1, 1, 1)$ for all $(w, e) \in W \times E$.

- Rawlsian altruism

Under *Rawlsian altruism*, every individual's social indirect utility is a convex combination of her own private indirect utility and the lowest private indirect utility in society. It is easy to check that individuals of type $(\underline{w}, \underline{e})$ have the lowest private indirect utility (cfr. Section 2.2). Hence, $\boldsymbol{\delta}^{R}_{we} = (1, 0, 0, 0)$ for all $(w, e) \in W \times E$.

- Desert-sensitive utilitarian altruism

Under *desert-sensitive utilitarian altruism*, every individual's social indirect utility is a convex combination of her own private indirect utility and the average of the private indirect utilities of all individuals that have at least the same taste for working. Hence, the vector of concern-parameters of lazy individuals does not change compared to the utilitarian altruism scenario. On the other hand, the vector of concern-parameters of hard-working individuals changes since these individuals exclude under this scenario lazy individuals from their social indirect utility function. Hence, we get $\boldsymbol{\delta}^{dsU}_{\underline{w}\underline{e}} = \boldsymbol{\delta}^{dsU}_{\bar{w}\underline{e}} = (1, 1, 1, 1)$ and $\boldsymbol{\delta}^{dsU}_{\underline{w}\bar{e}} = \boldsymbol{\delta}^{dsU}_{\bar{w}\bar{e}} = (0, 0, 1, 1)$.

- Desert-sensitive Rawlsian altruism

Under *desert-sensitive Rawlsian altruism*, every individual's social indirect utility is a convex combination of her own private indirect utility and the lowest private indirect utility of individuals that have at least the same taste for working. Hence, the vector of concern-parameters of lazy individuals does not change compared to the Rawlsian altruism scenario. On the other hand, the vector of concern-parameters of hard-working individuals changes since these individuals under this scenario (i) exclude lazy low-skilled individuals from their social indirect utility function and (ii) take up hard-working low-skilled individuals instead. Hence, we get $\boldsymbol{\delta}^{dsR}_{\underline{w}\underline{e}} = \boldsymbol{\delta}^{dsR}_{\bar{w}\underline{e}} = (1, 0, 0, 0)$ and $\boldsymbol{\delta}^{dsR}_{\underline{w}\bar{e}} = \boldsymbol{\delta}^{dsR}_{\bar{w}\bar{e}} = (0, 0, 1, 0)$.

3 Political equilibrium

Under simplifying assumptions, we show in this section that the amount of redistribution in political equilibrium is higher under the Rawlsian altruism scenario than under the egoistic scenario and higher under the egoistic scenario than under the utilitarian altruism scenario. Furthermore, we show that the introduction of desert-sensitivity in (utilitarian or Rawlsian) altruistic preferences for

redistribution decreases the amount of redistribution in the political equilibrium when the median voter is of the hard-working low-skilled type.

We only focus the analysis on economies where (i) neither the poor, nor the rich comprise more than one half of the total population (i.e. $p_{\underline{w}\underline{e}} < 1/2$ and $p_{\bar{w}\bar{e}} < 1/2$) and (ii) median income is strictly lower than average income. The first assumption ensures that median voter power goes to the middle-class, while the second assumption rules out corner solutions in the calculations of the preferred tax rates of the middle-class.[5] Denote $\mathcal{E}$ the set of all economies that satisfy both assumptions.

3.1 Preferred tax rates

Denote $\tau_{we}^{i,\varepsilon}$ the preferred tax rate of an individual of type (w,e) under scenario $i \in \Xi$ in economy $\varepsilon \in \mathcal{E}$. The preferred tax rates follow from maximization of (2) with respect to τ, using the appropriate vector of concern parameters for each type (w,e) in each scenario. It is easy to check that (i) for all types, for each scenario and for all economies in $\mathcal{E}$ preferences for redistribution are single peaked over the τ-dimension, (ii) for each scenario the preferred tax rates of individuals of type $(\underline{w},\underline{e})$ are strictly larger than the preferred tax rates of individuals of type $(\bar{w},\underline{e})$, i.e. $\tau_{\underline{w}\underline{e}}^{i,\varepsilon} > \tau_{\bar{w}\underline{e}}^{i,\varepsilon}$ for all $i \in \Xi$ and all $\varepsilon \in \mathcal{E}$ and (iii) for each scenario the preferred tax rates of individuals of type $(\bar{w},\bar{e})$ are strictly lower than the preferred tax rates of individuals of type $(\underline{w},\bar{e})$, i.e. $\tau_{\underline{w}\bar{e}}^{i,\varepsilon} > \tau_{\bar{w}\bar{e}}^{i,\varepsilon}$ for all $i \in \Xi$ and for all $\varepsilon \in \mathcal{E}$. Table 2 presents for each scenario and for all economies in $\mathcal{E}$ the preferred tax rates of the middle types $(\bar{w},\underline{e})$ and $(\underline{w},\bar{e})$.

$\tau_{we}^{i,\varepsilon}$	$\overline{w}\underline{e}$	$\underline{w}\overline{e}$
Ego	$\frac{y_a - y_{med}}{2y_a - y_{med}}$	$\frac{y_a - y_{med}}{2y_a - y_{med}}$
U	$\frac{y_a - \gamma y_{med} - (1-\gamma)y_a}{2y_a - \gamma y_{med} - (1-\gamma)y_a}$	$\frac{y_a - \gamma y_{med} - (1-\gamma)y_a}{2y_a - \gamma y_{med} - (1-\gamma)y_a}$
R	$\frac{y_a - \gamma y_{med} - (1-\gamma)y_{\underline{w}\underline{e}}}{2y_a - \gamma y_{med} - (1-\gamma)y_{\underline{w}\underline{e}}}$	$\frac{y_a - \gamma y_{med} - (1-\gamma)y_{\underline{w}\underline{e}}}{2y_a - \gamma y_{med} - (1-\gamma)y_{\underline{w}\underline{e}}}$
dsU	$\frac{y_a - \gamma y_{med} - (1-\gamma)y_a}{2y_a - \gamma y_{med} - (1-\gamma)y_a}$	$\max\left[0, \frac{y_a - \gamma y_{med} - \frac{(1-\gamma)}{p^b_{\underline{w}\bar{e}} + (1-\alpha)(1-\beta)}\left(p^b_{\underline{w}\bar{e}} y_{med} + (1-\alpha)(1-\beta)y_{\overline{w}\overline{e}}\right)}{2y_a - \gamma y_{med} - \frac{(1-\gamma)}{p^b_{\underline{w}\bar{e}} + (1-\alpha)(1-\beta)}\left(p^b_{\underline{w}\bar{e}} y_{med} + (1-\alpha)(1-\beta)y_{\overline{w}\overline{e}}\right)}\right]$
dsR	$\frac{y_a - \gamma y_{med} - (1-\gamma)y_{\underline{w}\underline{e}}}{2y_a - \gamma y_{med} - (1-\gamma)y_{\underline{w}\underline{e}}}$	$\frac{y_a - y_{med}}{2y_a - y_{med}}$

Table 2: Preferred tax rates of middle types $(\bar{w},\underline{e})$ and $(\underline{w},\bar{e})$.

[5] Besides, we recall that it is a stylized fact of real-life income distributions that $y_{med} < y_a$.

In Table 2, $p^b_{\underline{w}\overline{e}}$ denotes the beliefs of individuals of type $(\underline{w},\overline{e})$ about the proportion of individuals of type $(\underline{w},\overline{e})$ in the population. Indeed, in the desert-sensitive utilitarian scenario, individuals of type $(\underline{w},\overline{e})$ take up in their social utility function both individuals of their own type $(\underline{w},\overline{e})$ and individuals of type $(\bar{w},\overline{e})$. While they observe the latter's proportion $p_{\bar{w}\overline{e}}$, they only observe $p_{\bar{w}\underline{e}} + p_{\underline{w}\overline{e}}$ and hence have to make an 'estimate' of the former's proper proportion $p_{\underline{w}\overline{e}}$. We return to the exact formation of $p^b_{\underline{w}\overline{e}}$ in Appendix A, where we study the impact of differences between beliefs $p^b_{\underline{w}\overline{e}}$ and actual proportions $p_{\underline{w}\overline{e}}$ on the preferred tax rate of individuals of type $(\underline{w},\overline{e})$ in the desert-sensitive utilitarian scenario. From the way we defined in section 2.4 the concern parameters of the different types in the different scenarios, it is a matter of course that (i) the preferred tax rates of the middle types $(\bar{w},\underline{e})$ and $(\underline{w},\bar{e})$ coincide in the egoistic scenario, the utilitarian altruism scenario and the Rawlsian altruism scenario, (ii) the preferred tax rates of individuals of type $(\bar{w},\underline{e})$ do not change between desert-sensitive and desert-insensitive scenarios, i.e. $\tau^{U,\varepsilon}_{\overline{w}\underline{e}} = \tau^{dsU,\varepsilon}_{\overline{w}\underline{e}}$ and $\tau^{R,\varepsilon}_{\overline{w}\underline{e}} = \tau^{dsR,\varepsilon}_{\overline{w}\underline{e}}$and (iii) the preferred tax rates of individuals of type $(\underline{w},\overline{e})$ are the same in the egoistic scenario and the desert-sensitive Rawlsian altruism scenario, i.e. $\tau^{Ego,\varepsilon}_{\underline{w}\overline{e}} = \tau^{dsR,\varepsilon}_{\underline{w}\overline{e}}$.[6]

3.2 Ranking Condorcet winner tax rates

Denote $\tilde{\tau}^{i,\varepsilon}$ the Condorcet winner tax rate under scenario $i \in \Xi$ in economy $\varepsilon \in \mathcal{E}$. Remember that we assumed that $p_{\underline{w}\underline{e}} < 1/2$ and $p_{\bar{w}\bar{e}} < 1/2$ for all economies in $\mathcal{E}$. Let $\mathcal{E}' = \{\varepsilon \in \mathcal{E} : p_{\underline{w}\underline{e}} + p_{\overline{w}\underline{e}} \leq 1/2\}$ be the proper subset of $\mathcal{E}$ that comprises all economies where the proportion of lazy individuals does not exceed 1/2. Let $\mathcal{E}'' = \{\varepsilon \in \mathcal{E} : p_{\underline{w}\underline{e}} + p_{\overline{w}\underline{e}} > 1/2\}$ be the proper subset of $\mathcal{E}$ that comprises all economies where the proportion of lazy individuals exceeds 1/2. Remark that $\mathcal{E}'$ and $\mathcal{E}''$ partition $\mathcal{E}$. The following lemma states that, for all scenarios considered, the preferred tax rates of types $(\underline{w},\bar{e})$ and $(\bar{w},\underline{e})$ of table 2 are also the Condorcet winner tax rates for all economies in $\mathcal{E}'$ and $\mathcal{E}''$ respectively.

Lemma (identification Condorcet winner tax rate): $\forall i \in \Xi$:

$\forall \varepsilon \in \mathcal{E}', \tilde{\tau}^{i,\varepsilon} = \tau^{i,\varepsilon}_{\underline{w}\overline{e}}$
$\forall \varepsilon \in \mathcal{E}'', \tilde{\tau}^{i,\varepsilon} = \tau^{i,\varepsilon}_{\overline{w}\underline{e}}$.

Proof: To ensure that the median voter has type $(\underline{w},\bar{e})$ for all $\varepsilon \in \mathcal{E}'$ and that the median voter has type $(\bar{w},\underline{e})$ for all $\varepsilon \in \mathcal{E}''$, we need to show that $\tau^{i,\varepsilon}_{\overline{w}\underline{e}} \geq \tau^{i,\varepsilon}_{\underline{w}\overline{e}}$ for all $i \in \Xi$ and for all $\varepsilon \in \mathcal{E}$. We already mentioned that $\tau^{i,\varepsilon}_{\overline{w}\underline{e}} = \tau^{i,\varepsilon}_{\underline{w}\overline{e}}$ for all $i \in \{Ego, U, R\}$ and for all $\varepsilon \in \mathcal{E}$. When noting that $y_{med} > y_{\underline{w}\underline{e}}$, it is easily seen that $\tau^{dsR,\varepsilon}_{\overline{w}\underline{e}} > \tau^{dsR,\varepsilon}_{\underline{w}\overline{e}}$ for all $\varepsilon \in \mathcal{E}$. It remains to show that

[6] Note that the preferred tax rate of the middle types in the egoistic scenario coincides with the preferred tax rate of the middle types in a scenario where the middle types take up each other's private utilities into their social utility function, i.e. $\boldsymbol{\delta}_{\bar{w}\underline{e}} = \boldsymbol{\delta}_{\underline{w}\bar{e}} = (0,1,1,0)$.

$\tau^{dsU,\varepsilon}_{\overline{w}\underline{e}} \geq \tau^{dsU,\varepsilon}_{\underline{w}\overline{e}}$ for all $\varepsilon \in \mathcal{E}$ when $\tau^{dsU,\varepsilon}_{\underline{w}\overline{e}} > 0$. This boils down to showing that $y_a \leq \frac{p^b_{\underline{w}\overline{e}} y_{med} + (1-\alpha)(1-\beta) y_{\overline{w}\overline{e}}}{p^b_{\underline{w}\overline{e}} + (1-\alpha)(1-\beta)} = RHS$. Since $p^b_{\underline{w}\overline{e}}$ cannot lie outside the interval $[0, 1 - p_{\underline{w}\underline{e}} - p_{\overline{w}\overline{e}}]$ (see also Appendix A), $p^b_{\underline{w}\overline{e}} + (1-\alpha)(1-\beta) < 1$. Hence, it can easily be seen that $y_a < RHS$ when noting that the weight given to $y_{\overline{w}\overline{e}}$ in RHS is greater than the weight $(1-\alpha)(1-\beta)$ given to $y_{\overline{w}\overline{e}}$ in y_a and when noting that $y_{\underline{w}\underline{e}}$ receives no weight in RHS, whereas $y_{\underline{w}\underline{e}}$ receives weight $\alpha\beta$ in y_a. ■

From the lemma and table 2, we can infer that the desert-sensitive Condorcet winner tax rates are different from the desert-insensitive Condorcet winner tax rates in economies belonging to $\mathcal{E}'$ while desert-sensitivity does not change Condorcet winner tax rates in economies belonging to $\mathcal{E}''$.

The main result of this section is the following proposition that provides a complete ranking for the Condorcet winner tax rates over the different scenarios for different sets of economies. The proposition holds for all $p^b_{\underline{w}\overline{e}} \in [0, 1 - p_{\underline{w}\underline{e}} - p_{\overline{w}\overline{e}}]$ and for all $\gamma \in (0,1)$.[7]

Proposition (ranking Condorcet winner tax rates):

$$\forall \varepsilon \in \mathcal{E}', 0 \leq \tilde{\tau}^{dsU,\varepsilon} < \tilde{\tau}^{U,\varepsilon} < \tilde{\tau}^{Ego,\varepsilon} = \tilde{\tau}^{dsR,\varepsilon} < \tilde{\tau}^{R,\varepsilon}.$$

$$\forall \varepsilon \in \mathcal{E}'', 0 < \tilde{\tau}^{dsU,\varepsilon} = \tilde{\tau}^{U,\varepsilon} < \tilde{\tau}^{Ego,\varepsilon} < \tilde{\tau}^{dsR,\varepsilon} = \tilde{\tau}^{R,\varepsilon}.$$

Proof: The proof that $\tilde{\tau}^{U,\varepsilon} < \tilde{\tau}^{Ego,\varepsilon} < \tilde{\tau}^{R,\varepsilon}$ for all $\varepsilon \in \mathcal{E}$ follows straightforwardly since we assume that $y_{\underline{w}\underline{e}} < y_{\overline{w}\underline{e}} = y_{\underline{w}\overline{e}} = y_{med} < y_a$ for all $\varepsilon \in \mathcal{E}$. Note that $\tilde{\tau}^{U,\varepsilon} > 0$ for all $\varepsilon \in \mathcal{E}$ when $\gamma > 0$. The proof that $\tilde{\tau}^{dsU,\varepsilon} < \tilde{\tau}^{U,\varepsilon}$ for all $\varepsilon \in \mathcal{E}'$ follows from (i) noting that $\tau^{U,\varepsilon}_{\underline{w}\overline{e}} = \tau^{dsU,\varepsilon}_{\overline{w}\underline{e}}$ for all $\varepsilon \in \mathcal{E}$, (ii) the proof of the lemma where we show that $\tau^{dsU,\varepsilon}_{\underline{w}\overline{e}} < \tau^{dsU,\varepsilon}_{\overline{w}\underline{e}}$ for all $\varepsilon \in \mathcal{E}$ and (iii) the lemma itself. The proof that $\tilde{\tau}^{dsR,\varepsilon} < \tilde{\tau}^{R,\varepsilon}$ for all $\varepsilon \in \mathcal{E}'$ follows from noting that $\tilde{\tau}^{dsR,\varepsilon} = \tilde{\tau}^{Ego,\varepsilon}$ for all $\varepsilon \in \mathcal{E}'$ and that $\tilde{\tau}^{Ego,\varepsilon} < \tilde{\tau}^{R,\varepsilon}$ for all $\varepsilon \in \mathcal{E}$. ■

Let us start comparing the Condorcet winner tax rates in the egoistic scenario, the utilitarian altruism scenario and the Rawlsian altruism scenario. Remember that for these scenarios, the Condorcet winner tax rates coincide for all economies in $\mathcal{E}$. The Condorcet winner tax rate is the highest under the Rawlsian altruism scenario and the lowest under the utilitarian altruism scenario for all economies in $\mathcal{E}$. The intuition is that under the Rawlsian altruism scenario, the median voter middle type individuals (only) take up the private indirect utilities of type $(\underline{w}, \underline{e})$ individuals in their social indirect utility function. These type $(\underline{w}, \underline{e})$ individuals egoistically prefer a higher tax rate than the tax rate egoistically preferred by the middle type individuals. As a result, the Condorcet winner tax rate under the Rawlsian altruism scenario is also higher. Given our quasi-linear preferences defined in (1), the disincentive effect of taxation

[7] If $\gamma = 0$ (i.e. individuals put zero weight on their private indirect utility in their social indirect utility function), then $\tilde{\tau}^{dsU,\varepsilon} = \tilde{\tau}^{U,\varepsilon} = 0$ for all $\varepsilon \in \mathcal{E}$. If $\gamma = 1$ (i.e. preferences for redistribution are not altruistic), then $\tilde{\tau}^{dsU,\varepsilon} = \tilde{\tau}^{U,\varepsilon} = \tilde{\tau}^{dsR,\varepsilon} = \tilde{\tau}^{R,\varepsilon} = \tilde{\tau}^{Ego,\varepsilon}$ for all $\varepsilon \in \mathcal{E}$.

is minimized —and therefore the total sum of utilities maximized— under a tax rate equal to zero. As a result, the Condorcet winner tax rate under the utilitarian altruism scenario is lower than the tax rate egoistically preferred by the middle type individuals. Note however that the Condorcet winner tax rate under the utilitarian altruism scenario does not equal zero as long as individuals do not put zero weight on their private indirect utility in their social indirect utility function (cfr. footnote 7). The introduction of desert-sensitivity in altruistic preferences for redistribution decreases the amount of redistribution in the political equilibrium when the median voter is a hard-working low-skilled individual. This result holds both when all individuals are utilitarian altruist as when all individuals are Rawlsian altruist. The intuition is that hard-working low-skilled individuals essentially drop the private indirect utilities of type $(\underline{w}, \underline{e})$ individuals, who have the highest egoistically preferred tax rate, from their social indirect utility function under desert-sensitive scenarios.[8] This results in lower Condorcet winner tax rates compared to desert-insensitive scenarios.

3.3 Testable hypotheses

How can our stylized model help explain the differences between the American and the European social contract? Our theoretical results present several possible explanations. Let us highlight some of them.

One possibility is that, although individuals in the US and in Europe (EU) have the same altruistic concerns (in the sense that they are all either desert-sensitive utilitarian altruists or desert-sensitive Rawlsian altruists), the median voter of both economies is of a different type (in the sense that desert-sensitivity lowers the Condorcet winner tax rate in the US but not in Europe). Indeed, from our proposition, it follows that: if $US \in \mathcal{E}'$ and $EU \in \mathcal{E}''$, then $\tilde{\tau}^{dsU,US} < \tilde{\tau}^{dsU,EU}$ and $\tilde{\tau}^{dsR,US} < \tilde{\tau}^{dsR,EU}$. Obviously, this controversial explanation is difficult to confirm empirically as it is hard to imagine that personal characteristics such as skills and tastes for working are distributed significantly differently in the US than in Europe.

In our opinion, a more promising route is to assume identical median voters (whose preferred desert-sensitive tax rates are lower than her preferred desert-insensitive tax rates) in both economies and to focus on differences in altruistic concerns between Americans and Europeans. We explicitly formulate three testable hypotheses.

Hypothesis 1 states that both continents share the same (utilitarian or Rawlsian) altruistic concerns but that Americans are desert-sensitive while Europeans are desert-insensitive. Indeed, from our proposition, it follows that: if US and $EU \in \mathcal{E}'$, then $\tilde{\tau}^{dsU,US} < \tilde{\tau}^{U,EU}$ and $\tilde{\tau}^{dsR,US} < \tilde{\tau}^{R,EU}$.

[8] Obviously, in the scenario where the lazy high-skilled individuals mimic the concern-parameters of the hard-working low-skilled individuals in the desert-sensitive scenarios, the result that $\tilde{\tau}^{dsU,\varepsilon} < \tilde{\tau}^{U,\varepsilon}$ and $\tilde{\tau}^{dsR,\varepsilon} < \tilde{\tau}^{R,\varepsilon}$ holds for all economies in $\mathcal{E}$.

Hypothesis 2 states that Americans and Europeans are both desert-insensitive but that Americans assign a lower weight to their private indirect utilities and hence a higher weight to their utilitarian altruistic concerns in their social indirect utility function. Indeed, since $\frac{\partial \tilde{\tau}^{U,\varepsilon}}{\partial \gamma} > 0$ for all $\varepsilon \in \mathcal{E}$, it follows that: if $\gamma_{US} < \gamma_{EU}$, then $\tilde{\tau}^{U,US} < \tilde{\tau}^{U,EU}$ (this result holds for US and $EU \in \mathcal{E}$).[9]

Hypothesis 3 states that Americans and Europeans are both desert-sensitive but that Americans assign a lower weight to their private indirect utilities and hence a higher weight to their desert-sensitive utilitarian altruistic concerns in their social indirect utility function. Indeed, since $\frac{\partial \tilde{\tau}^{dsU,\varepsilon}}{\partial \gamma} > 0$ for all $\varepsilon \in \mathcal{E}$, it follows that: if $\gamma_{US} < \gamma_{EU}$, then $\tilde{\tau}^{dsU,US} < \tilde{\tau}^{dsU,EU}$ (this result holds for US and $EU \in \mathcal{E}$).[10]

An empirical test of these hypotheses is the topic of the next section.

4 Desert-sensitive altruism in practice

In this section we demonstrate that from the three hypotheses stated above, we especially find empirical support for hypothesis 3. In other words, we show that (i) preferences for redistribution are not purely egoistic, (ii) desert-sensitive motivations play a role in the altruistic concerns of both Americans and Europeans, (iii) differences in desert-sensitivity hold between both continents: Americans seem to be more desert-sensitive than Europeans, inducing lower support for redistribution in the US than in Europe.

4.1 Data

The empirical source used to obtain individual data on attitudes toward political redistribution is the International Social Survey Programme (ISSP), *Social Inequality II Module* (1992). It reveals opinions on social inequality of representative samples of ten Western democracies which are obtained through a simple or multiple stage randomization method. We retain the US and the four European countries where the respondents were submitted to the full set of questions composing the ISSP survey: (West-)Germany, Great Britain, Italy and Norway[11]. Except for Italy where it was conducted through face to face interviews, the questionnaire was mailed back by the respondents after self-completion. The average response rate is 58%, ranging from 50% in (West-)Germany to 84% in

[9] Hypothesis 2 has to be reformulated for Rawlsian altruistic concerns: since $\frac{\partial \tilde{\tau}^{R,\varepsilon}}{\partial \gamma} < 0$ for all $\varepsilon \in \mathcal{E}$, it follows that: if $\gamma_{EU} < \gamma_{US}$, then $\tilde{\tau}^{R,US} < \tilde{\tau}^{R,EU}$.

[10] Note that this hypothesis cannot be reformulated for desert-sensitive Rawlsian altruistic concerns, because if US and $EU \in \mathcal{E}'$, then $\tilde{\tau}^{dsR,\varepsilon} = \tilde{\tau}^{Ego,\varepsilon}$ for all $\varepsilon \in \mathcal{E}'$.

[11] Note that these countries are representative of the three types of welfare states in which modern developed capitalist nations cluster. Following the typology established by Esping-Andersen (1990), Great Britain stands for the liberal type, Norway for the socio-democratic type, and (West-)Germany and Italy for the continental and Mediterranean versions of the conservative type.

Norway. Our empirical estimates are based on a minimum of 4,007 observations (our 'sample' henceforth) depending on our econometric specification. These observations are split up as follows across our countries of interest: 1,198 for (West-)Germany, 467 for Great Britain, 554 for Italy, 1,073 for Norway and 715 for US.

Answers to the survey question V57 constitute the empirical dependent variable that we use to recover the individual preferences for political redistribution. More precisely, survey question V57 asks individuals whether they agree with the following statement: 'It is the responsibility of the government to reduce the differences in income between people with high incomes and those with low incomes'. Respondents choose 'strongly agree', 'agree', 'neither agree nor disagree', 'disagree' or 'strongly disagree'. We categorize our explanatory variables in four groups. First, the variable 'self-interest' captures the self-interest incentive of individuals to support redistribution. It measures subjectively how much individuals themselves gain from a reduction in income inequality based on the survey question V84. This question asks individuals how they believe their income would be affected if 'incomes became more equal'. Respondents choose whether their income 'would definitely go up', 'would probably go up', 'would stay the same', 'would probably go down' or 'would definitely go down'. Second, the variable 'poum' tries to capture the 'prospect of upward mobility' introduced by Benabou and Ok (2001). Expectations about future mobility are instrumented by looking at the individual's history of mobility, based on the difference between the respondent's current income and standard of living and those of her father provided by the survey question V75. This question is as follows: 'Compared with your father when he was about your age, are you better or worse off in your income and standard of living generally?'. Respondents choose 'much better off', 'better off', 'about equal', 'worse off' or 'much worse off'. Third, the variable 'hard work' is derived from individuals' opinions on how strongly hard work, a characteristic within individuals' responsibility, influences the income generating process. The 'hard work' variable is built on the survey question V9: 'For getting ahead in life, how important is hard work?'. Respondents choose 'essential', 'very important', 'fairly important', 'not very important' or 'not important at all'. We consider this variable as key in identifying whether individuals are desert-sensitive or not. Different beliefs on the relative importance of responsibility characteristics versus non-responsibility characteristics in determining incomes lead to different demands for redistribution. We consider the 'hard work' variable as a ratio between both beliefs, meaning that a low value of the 'hard work' variable is associated with a strong (resp. weak) belief in the importance of non-responsibility (resp. responsibility) characteristics while a high value of the 'hard work' variable is associated with a strong (resp. weak) belief in the importance of responsibility (resp. non-responsibility) characteristics. In this setting, if individuals are desert-sensitive, a low value of the 'hard work' variable should be related to a relatively higher support for redistribution while a high value of the 'hard work' variable should be related to a relatively weaker support to redistribution. Fourth, we derive a set of socio-

demographic variables reporting individuals' income, employment status, level of education, age, sex and whether they are married or not.

Table 5 in Appendix B reports the frequencies in the sample of the various answers to each of the questions mentioned above. It is worthwhile noting that in Table 5 about 50% of respondents claim to expect a pecuniary improvement out of a reduction of inequality. However, more than 60% of respondents think that inequality should be reduced by the government. Raw data thus suggest that there is more than self-interest behind individuals' support for redistribution. We investigate this issue further in the following section dedicated to our empirical estimates.

4.2 Estimation

We consider the following empirical model:

$$R_i^* = \mathbf{X}_i\beta + \epsilon_i$$

where R_i^* is a latent variable. What we observe is R_i (the answer to question V57), equal to 1 for individual i if $R_i^* > 0$ (the individual answered 'strongly agree', 'agree' or 'neither agree nor disagree') and 0 otherwise. $\mathbf{X}_i$ is a vector of explanatory variables. Building on the previous discussion, we specify this vector as:

$$\mathbf{X}_i = (s_i, p_i, h_i, \mathbf{Y}_i),$$

where s_i, p_i, and h_i are the 'self-interest' variable, the 'poum' variable and the 'hard work' variable respectively which all range from 1 to 5 and $\mathbf{Y}_i$ is a set of standard socio-demographic variables. In order to test for differences between both continents, the 'poum' variable and the 'hard work' variable are interacted with a dummy ('US') that takes the value of 1 when individuals live in the US.

We estimate our empirical model as a logit model[12]. Table 3 presents our logit estimates. Standard errors are clustered at the country level and we control for country fixed effects. Regression 1 concentrates on the influence of 'self-interest', 'poum' and socio-demographic variables on the respondents' support for redistribution. This regression is intended to represent the most common explanations of individuals' support for redistribution presented in the literature. Regression 2 analyzes the impact of adding the 'hard work' variable and represents our contribution of viewing individuals as being (desert-sensitive) altruists rather than egoists.

<insert Table 3 about here>

Two important conclusions can be drawn from Table 3.

[12] Note that constructing the dependent variable as a variable ranging from 1 to 5 and estimating an ordered logit model yields similar results as estimating a binary logit model. The same holds true when estimating a binary or an ordered probit model. Estimation results are available upon request.

First, although the self-interest variable has strongly significant explanatory power in both regressions, it is not the only driving force behind individuals' support for redistribution. The strongly significant negative coefficient of the 'hard work' variable in regression 2 betrays that, besides the self-interest motive, individuals are desert-sensitive altruists. This means that a weak belief in the importance of hard work to get ahead in life is related to a relatively higher support for redistribution while a strong belief in the importance of hard work to get ahead in life is related to a relatively lower support for redistribution. In other words, there is a reluctance for redistribution from the hard-working to the lazy which supports the idea that individuals exclude the lazy from their altruistic concerns. Note that this finding is in line with previous empirical research on the determinants of individuals' preferences for redistribution; besides Alesina and Angeletos (2005), see Fong (2001), Corneo and Grüner (2002), and Alesina and La Ferrara (2005) for more details. We would like to mention that this belief is equally shared by both individuals who gain or lose from redistribution as the overall correlation between the self-interest variable and the hard work variable is not significant (see Table 6 in the Appendix). In other words, people who dislike redistribution because of self-interest do not systematically rationalize their egoism by saying that anyone can get ahead in life if they work hard. This result suggests to depart from modelling individuals' preferences for redistribution as solely egoistic as it indicates that altruistic concerns do truly exist.

Second, preferences for redistribution are significantly more desert-sensitive among individuals in the US than among individuals in Europe. This is indicated by the significantly negative coefficient of the interaction variable hard work*US. In other words, our regression results suggest that, even in the hypothetical case of equal beliefs on the importance of hard work on individual outcomes in both continents, the demand for redistribution would be significantly lower among Americans than among Europeans. More precisely, based on our logit estimates, we computed the elasticity, denoted e_{R_i/x_i^j}, of the dependent variable R_i with respect to x_i^j, the jth explanatory variable in $\mathbf{X}_i$. Formally, a logit model implies that $e_{R_i/x_i^j} = \frac{x_i^j \beta_j}{1+exp(\mathbf{X_i}\beta)}$. The elasticity e_{R_i/x_i^j} indicates the variation in percentage of the probability that $R_i = 1$ induced by a 1% increase in the value of the explanatory variable x_i^j. Table 4 reports the elasticities of the dependent variable with respect to each explanatory variable when the explanatory variables take their mean value.

<insert Table 4 about here>

Table 4 shows that a 1% increase in the average belief on the importance of hard work among Europeans decreases their ability to support redistribution by 0.12%. As for the United States, a 1% increase in the average belief on the importance of hard work decreases the support of Americans for redistribution by 0.71%. In other words, the negative impact of the 'hard work' variable on the willingness to redistribute is almost 6 times higher among Americans than

among Europeans. We believe that this original finding, which supplements the conclusions of Alesina and Angeletos (2005) among others, can help explain the two different politico-economic equilibria of both continents. Note that although the coefficient of the 'poum' variable is negative and significant at a 10% level, we do not find any significant statistical effect of the 'poum*US' interaction variable. Note also that, while the coefficient of the 'US' variable is negative and statistically significant in regression 1, it is no longer significant in regression 2. This suggests that the difference between desert-sensitive altruism across both continents is a crucial one.

Concerning the socio-demographic variables, the significant positive sign of the coefficient of the 'income_2' variable and the significant negative sign of the coefficient of the 'income_5' variable confirm the impact of self-interest, as objectively measured, on individuals' support for redistribution. Inactive people appear significantly less supportive for redistribution than employed individuals. As stressed by Linos and West (2003), literature in sociology hardly concludes about the influence of education on attitudes towards redistribution. On the one hand, higher education induces higher status and greater economic security, therefore decreasing support for redistribution. On the other hand, higher education is also supposed to increase socialization in democratic values, therefore enhancing support for a more egalitarian distribution of income. Our results show that higher education has a strongly significant negative effect on the demand for redistribution. People above 45 are significantly less likely to support redistribution. Gender also matters with men being significantly less supportive towards redistribution than women. This is a common empirical finding that is related to various theories (see Waerness (1987) for a survey). Some highlight that women are socialized in a way that make them more concerned about others' well-being. Others emphasize that women are more likely to be in precarious positions in the labour market, therefore inducing a stronger demand for state benefits.

5 Conclusion

We endow individuals that differ in skill levels and tastes for working with preferences for redistribution that are not purely egoistic. In our model, individuals care about others, but possibly only as long as these others have at least the same entitlement to income generated by factors that lie within their personal responsibility. We denote such a selective concern desert-sensitive altruism. In a voting model where a unidimensional redistributive parameter is chosen by majority voting in a direct democracy, we demonstrate how desert-sensitive preferences for redistribution can induce lower levels of redistribution in the political equilibrium. We justify desert-sensitive preferences empirically. Using a representative sample that contains respondents of both the US and Europe, we provide evidence that preferences for redistribution are not purely egoistic. We find that desert-sensitive motivations play a significant role in individuals' preferences for redistribution. We estimate that preferences for redistribution are

significantly more desert-sensitive among individuals in the US than among individuals in Europe. We think that differences in desert-sensitivity help explain the different social contracts that prevail between both continents.

We believe that our analysis can be extended in a number of promising ways. We highlight five possible avenues for future research. First, while recently an increasing number of theoretical papers depart from modelling individuals' preferences for redistribution as purely egoistic, an extensive empirical validation for altruistic preferences for redistribution in general and for desert-sensitive altruistic preferences for redistribution in particular needs to be developed. Such an analysis should not only be limited to the study of participants behavior in an experimental setting, nor be solely based on the use of questionnaire data, but focus more directly on actual voting behavior in real world elections, if possible. Second, where we endowed all individuals with the same altruistic concern in our analysis, a straightforward extension would be to study the equilibrium outcomes resulting from the prevalence of different altruistic concerns among the population; we refer to Galasso (2003) for a first characterization of politico-economic equilibria when purely selfish voters coexist with Rawlsian altruistic voters and to Cappelen et al. (2005) for an experimental study of pluralism in fairness ideals. Third, another possible extension of our model would be to introduce dynamics, study the endogenous formation of (desert-sensitive) altruistic preferences and analyze the (different) steady-state(s) resulting from this process; see Cervellati et al. (2006) for a first attempt. Fourth, we believe that by endowing individuals with altruistic preferences for redistribution, the qualitative results of positive voting models come closer to the recommendations of the normative optimal fair income tax literature; we refer to Schokkaert et al. (2004) for the derivation of optimal linear tax rates under a desert-sensitive social planner. In fact, the (hypothetical) benevolent social planner of normative analysis is being replaced by ethically inspired median voters in our analysis. Finally (and well aware of the technical difficulties it imposes), the development of models in which individuals with (desert-sensitive) altruistic preferences vote over non-linear income tax schedules would obviously be an improvement; see Kranich (2001) for an analysis with altruistic preferences over quadratic income tax schedules. It would for example enable to study whether (desert-sensitive) altruistic individuals are in favor of welfare programmes that subsidize the poor.

Appendix A: impact of incomplete information

We focus on the desert-sensitive utilitarian scenario for all economies in $\mathcal{E}'$, as only here (possibly wrong) beliefs about the proportion of hard-working low-skilled individuals influence the amount of redistribution in the political equilibrium. We take the Condorcet winner tax rate $\tilde{\tau}^{dsU,\varepsilon}$ under the (correct) belief that $p^b_{\underline{w}\overline{e}} = (1-\alpha)\beta$ as a benchmark. Denote this tax rate $\tilde{\tau}^{dsU,\varepsilon}_{benchmark}$. We assume that, for all individuals, γ is such that $\tilde{\tau}^{dsU,\varepsilon}_{benchmark} > 0$. From the proposition in Section 3, we know that for all economies in $\mathcal{E}'$, $\tilde{\tau}^{dsU,\varepsilon}$ is the

lowest Condorcet winner tax rate of the five scenarios considered. We now ask the question in which economies wrong beliefs ($p^b_{\underline{w}\bar{e}} \neq (1-\alpha)\beta$) lead to a $\tilde{\tau}^{dsU,\varepsilon}$ that is even smaller than $\tilde{\tau}^{dsU,\varepsilon}_{benchmark}$. In other words, we try to identify how wrong beliefs can further increase the difference between the Condorcet winner tax rate in the desert-sensitive utilitarian scenario and the Condorcet winner tax rates in the other scenarios. The necessary condition to have that $\tilde{\tau}^{dsU,\varepsilon} < \tilde{\tau}^{dsU,\varepsilon}_{benchmark}$ is that individuals of type $(\underline{w},\bar{e})$ underestimate the true proportion of individuals of their own type, i.e. $p^b_{\underline{w}\bar{e}} < (1-\alpha)\beta$. The intuition is clear: this underestimation leads individuals of type $(\underline{w},\bar{e})$ to an underestimation in their social indirect utility function of the proportion of their own type $(\underline{w},\bar{e})$ relative to the proportion of individuals of type $(\bar{w},\bar{e})$. As individuals of type $(\bar{w},\bar{e})$ egoistically prefer a lower tax rate than individuals of type $(\underline{w},\bar{e})$, the underestimation of the proportion of the latter type leads to a lower preferred tax rate of individuals of type $(\underline{w},\bar{e})$ in the desert-sensitive utilitarian altruism scenario.

In order to study the exact formation of beliefs, it is important to distinguish between the case where individuals *know* that w and e are independently distributed and the case where individuals *do not know* that w and e are independently distributed.

Individuals know that w and e are independently distributed

When individuals know that w and e are independently distributed (i.e. individuals know that $p_{\bar{w}\underline{e}} + p_{\underline{w}\bar{e}} = (1-\beta)\alpha + (1-\alpha)\beta$), beliefs can only take two different values, namely $p^b_{\underline{w}\bar{e}} = (1-\alpha)\beta$ (which is correct) or $p^b_{\underline{w}\bar{e}} = (1-\beta)\alpha$ (which is wrong). Let $\widehat{\mathcal{E}'} = \{\varepsilon \in \mathcal{E}' : \alpha < \beta\}$ be a proper subset of $\mathcal{E}'$ that comprises all economies in $\mathcal{E}'$ where there are more low-skilled individuals than lazy individuals. The following proposition states that exactly for those economies wrong beliefs lead to even lower levels of redistribution in the political equilibrium. This stems from the fact that in these economies $(1-\beta)\alpha < (1-\alpha)\beta$, which leads to an underestimation of the proportion of individuals of type $(\underline{w},\bar{e})$ and as a result to a smaller Condorcet winner tax rate (cfr. supra).

Proposition A1 (impact of imperfect information): When individuals know that w and e are independently distributed and $p^b_{\underline{w}\bar{e}} \neq (1-\alpha)\beta$:

$\forall \varepsilon \in \widehat{\mathcal{E}'} : \tilde{\tau}^{dsU,\varepsilon} < \tilde{\tau}^{dsU,\varepsilon}_{benchmark}$.

Proof: The proof follows from a direct comparison between $\tilde{\tau}^{dsU,\varepsilon}$ when $p^b_{\underline{w}\bar{e}} = (1-\alpha)\beta$ and $\tilde{\tau}^{dsU,\varepsilon}$ when $p^b_{\underline{w}\bar{e}} = (1-\beta)\alpha$. The latter is smaller than the former when $\alpha < \beta$, which is the case for all economies in $\widehat{\mathcal{E}'}$. ■

Individuals do not know that w and e are independently distributed

When individuals do not know that w and e are independently distributed, beliefs can be situated anywhere in the closed interval between zero and $1-p_{\underline{w}\underline{e}}-p_{\overline{w}\overline{e}}$, i.e. $p^b_{\underline{w}\bar{e}} \in [0, \alpha+\beta-2\alpha\beta]$. Let $\widehat{\widehat{\mathcal{E}'}} = \{\varepsilon \in \widehat{\mathcal{E}'} : \beta > 1/2\}$ be a proper subset of

$\widehat{\mathcal{E}'}$ that comprises all economies in $\widehat{\mathcal{E}'}$ where more than one half of the population is low-skilled. The following proposition summarizes sufficient (not necessary) conditions to have $\tilde{\tau}^{dsU,\varepsilon} < \tilde{\tau}^{dsU,\varepsilon}_{benchmark}$. The most general result (which holds for all economies in $\mathcal{E}'$) states that, in order to obtain $\tilde{\tau}^{dsU,\varepsilon} < \tilde{\tau}^{dsU,\varepsilon}_{benchmark}$, it is sufficient that individuals of type $(\underline{w}, \bar{e})$ believe that the majority of low-skilled individuals are lazy or that individuals of type $(\underline{w}, \bar{e})$ believe that there are more lazy individuals than hard-working individuals in society. Moreover, for all economies in $\widehat{\mathcal{E}'}$, it is sufficient that individuals of type $(\underline{w}, \bar{e})$ believe that most of the middle type individuals are lazy. Further, for all economies in $\widehat{\widehat{\mathcal{E}'}}$, it is sufficient that individuals of type $(\underline{w}, \bar{e})$ believe that the majority of hard-working individuals are also high skilled or that individuals of type $(\underline{w}, \bar{e})$ believe that there are more high-skilled individuals than low-skilled individuals in society. In all of these cases, these beliefs lead to an underestimation of the proportion of individuals of type $(\underline{w}, \bar{e})$ and as a result to a smaller Condorcet winner tax rate (cfr. supra).

Proposition A2 (impact of imperfect information): When individuals do not know that w and e are independently distributed, any of the following beliefs are sufficient to have $\tilde{\tau}^{dsU,\varepsilon} < \tilde{\tau}^{dsU,\varepsilon}_{benchmark}$:

$$\forall \varepsilon \in \mathcal{E}' : p^b_{\underline{w}\bar{e}} < p_{\underline{w}\underline{e}},\ p^b_{\underline{w}\bar{e}} < p_{\underline{w}\underline{e}} + p^b_{\overline{w}\underline{e}} - p_{\overline{w}\overline{e}}$$
$$\forall \varepsilon \in \widehat{\mathcal{E}'} : p^b_{\underline{w}\bar{e}} < p^b_{\overline{w}\underline{e}}$$
$$\forall \varepsilon \in \widehat{\widehat{\mathcal{E}'}} : p^b_{\underline{w}\bar{e}} < p_{\overline{w}\overline{e}},\ p^b_{\underline{w}\bar{e}} < p^b_{\overline{w}\underline{e}} + p_{\overline{w}\overline{e}} - p_{\underline{w}\underline{e}}.$$

Proof: To prove that $p^b_{\underline{w}\bar{e}} < p_{\underline{w}\underline{e}}$ is sufficient, note that $p_{\underline{w}\underline{e}} = \alpha\beta$ is smaller than $(1-\alpha)\beta$ when $\alpha < \frac{1}{2}$, which is the case for all economies in $\mathcal{E}'$. To prove that $p^b_{\underline{w}\bar{e}} < p_{\underline{w}\underline{e}} + p^b_{\overline{w}\underline{e}} - p_{\overline{w}\overline{e}}$ is sufficient, note that this amounts to $p^b_{\underline{w}\bar{e}} < \alpha + \beta - \alpha\beta - \frac{1}{2}$, since $p^b_{\overline{w}\underline{e}} = \alpha + \beta - 2\alpha\beta - p^b_{\underline{w}\bar{e}}$. Then $\alpha + \beta - \alpha\beta - \frac{1}{2}$ is smaller than $(1-\alpha)\beta$ when $\alpha < \frac{1}{2}$, which is the case for all economies in $\mathcal{E}'$. To prove that $p^b_{\underline{w}\bar{e}} < p^b_{\overline{w}\underline{e}}$ is sufficient, note that this amounts to $p^b_{\underline{w}\bar{e}} < \frac{\alpha+\beta-2\alpha\beta}{2}$ and that $\frac{\alpha+\beta-2\alpha\beta}{2}$ is smaller than $(1-\alpha)\beta$ when $\alpha < \beta$, which is the case for all economies in $\widehat{\mathcal{E}'}$. To prove that $p^b_{\underline{w}\bar{e}} < p_{\overline{w}\overline{e}}$ is sufficient, note that $p_{\overline{w}\overline{e}} = (1-\alpha)(1-\beta)$ is smaller than $(1-\alpha)\beta$ when $\beta > \frac{1}{2}$, which is the case for all economies in $\widehat{\widehat{\mathcal{E}'}}$. To prove that $p^b_{\underline{w}\bar{e}} < p^b_{\overline{w}\underline{e}} + p_{\overline{w}\overline{e}} - p_{\underline{w}\underline{e}}$ is sufficient, note that this amounts to $p^b_{\underline{w}\bar{e}} < \frac{1}{2} - \alpha\beta$ and that $\frac{1}{2} - \alpha\beta$ is smaller than $(1-\alpha)\beta$ when $\beta > \frac{1}{2}$, which is the case for all economies in $\widehat{\widehat{\mathcal{E}'}}$. ■

Appendix B: descriptive summary and correlation matrix

Table 5 provides a detailed descriptive summary of the data used in the logit estimation presented in Section 4. It reports the exact questions used to define the variables and indicates for each variable the proportion of answers given.

<insert Table 5 about here>

Table 6 presents the correlation matrix.

<insert Table 6 about here>

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	SUPPORT FOR REDISTRIBUTION	
SELF-INTEREST	0.308***	0.315***
	(0.032)	(0.031)
POUM	-0.060*	-0.060*
	(0.036)	(0.037)
POUM * US	-0.052	0.045
	(0.035)	(0.036)
HARD WORK		-0.180***
		(0.045)
HARD WORK * US		-0.196***
		(0.040)
INCOME_2	0.261**	0.257**
	(0.126)	(0.130)
INCOME_3	-0.062	-0.046
	(0.091)	(0.087)
INCOME_4	-0.081	-0.048
	(0.170)	(0.172)
INCOME_5	-0.667***	-0.615***
	(0.088)	(0.086)
UNEMPLOYED	0.183	0.158
	(0.194)	(0.189)
OTHERS NOT IN LABOUR FORCE	-0.193***	-0.171***
	(0.034)	(0.045)
EDUCATION_2	-0.680***	-0.645***
	(0.051)	(0.055)
EDUCATION_3	-1.014***	-0.983***
	(0.093)	(0.107)
EDUCATION_4	-1.441***	-1.412***
	(0.073)	(0.052)
AGE_2	0.083	0.063
	(0.060)	(0.075)
AGE_3	-0.077	-0.100
	(0.095)	(0.096)
AGE_4	-0.249***	-0.263**
	(0.123)	(0.118)
AGE_5	-0.194***	-0.218***
	(0.051)	(0.072)
AGE_6	-0.325***	-0.354***
	(0.110)	(0.120)
MALE	-0.164***	-0.189***
	(0.066)	(0.064)
MARRIED	-0.036	-0.022
	(0.111)	(0.107)
GREAT BRITAIN	0.130***	0.216***
	(0.042)	(0.035)
NORWAY	0.176***	0.211***
	(0.055)	(0.045)
ITALY	1.123***	1.111***
	(0.043)	(0.037)
US	-1.186***	-0.212
	(0.148)	(0.264)
Number of observations	4,043	4,007
Log Pseudolikelihood	-1,986.58	-1,958.56
Pseudo R^2	12.08%	12.57%

Standard errors clustered at the country level between parentheses
*** significant at 1% level; ** significant at 5% level; * significant at 10% level

Table 3: Logit estimates

	EUROPE		US	
	MEAN	ELASTICITY %	MEAN	ELASTICITY %
SELF-INTEREST	3.488	0.19***	3.758	0.52***
POUM	3.934	-0.04*	3.523	-0.09*
POUM * US	0	0	3.523	0.07
HARD WORK	3.740	-0.12***	4.266	-0.34***
HARD WORK * US	0	0	4.266	-0.37***
INCOME_2	0.166	0.01**	0.220	0.02**
INCOME_3	0.182	0.00	0.214	0.00
INCOME_4	0.243	0.00	0.162	0.00
INCOME_5	0.243	-0.03***	0.207	-0.06***
UNEMPLOYED	0.030	0.00	0.034	0.00
OTHERS NOT IN LABOUR FORCE	0.265	-0.01***	0.098	-0.01***
EDUCATION_2	0.432	-0.05***	0.105	-0.03***
EDUCATION_3	0.298	-0.05***	0.564	-0.25***
EDUCATION_4	0.166	-0.04***	0.331	-0.21***
AGE_2	0.240	0.00	0.274	0.01
AGE_3	0.224	0.00	0.315	-0.01
AGE_4	0.177	-0.01***	0.145	-0.02***
AGE_5	0.127	0.00***	0.105	-0.01***
AGE_6	0.122	-0.01***	0.049	-0.01***
MALE	0.560	-0.02***	0.466	-0.04***
MARRIED	0.654	0.00	0.582	-0.01
GREAT BRITAIN	0.142	0.01***	0	0
NORWAY	0.326	0.01***	0	0
ITALY	0.168	0.03***	0	0
US	0	0	1	-0.09

*** significant at 1% level; ** significant at 5% level; * significant at 10% level

Table 4: Elasticities

Variable	Question	Answers	Proportion (%) N=4,007
REDISTRIBUTION	'It is the responsibility of the government to reduce the difference in income between people with high incomes and those with low incomes'	=1: strongly disagree =2: disagree =3: neither agree nor disagree =4: agree =5: strongly disagree	=1: 6.6 =2: 18.1 =3: 14.5 =4: 40.2 =5: 20.6
SELF-INTEREST	'If incomes became more equal, some people would get higher incomes and some would get lower incomes. Do you think that your income…'	=1: would definitely go down =2: would probably go down =3: would stay the same =4: would probably go up =5: would definitely go up	=1: 1.4 =2: 7.1 =3: 42.7 =4: 34.1 =5: 14.7
POUM	'Compared to your father when he was about your age, are you better off or worse off in your income and standard of living generally?'	=1: much worse off =2: worse off =3: about equal =4: better off =5: much better off	=1: 2.0 =2: 9.9 =3: 16.0 =4: 44.2 =5: 27.9
HARD WORK	'For getting ahead in life, how important is hard work?'	=1: not important at all =2: not very important =3: fairly important =4: very important =5: essential	=1: 1.3 =2: 5.8 =3: 24.5 =4: 44.8 =5:23.5
INCOME_N		N=1: if belongs to the 1st quintile N=2: if belongs to the 2nd quintile N=3: if belongs to the 3rd quintile N=4: if belongs to the 4th quintile N=5: if belongs to the 5th quintile	=1: 17.1 =2: 17.6 =3: 18.8 =4: 22.9 =5:23.7
EMPLOYED		=1: if employed =0 otherwise	=1: 73.3
UNEMPLOYED		=1: if unemployed =0 otherwise	=1: 3.1
OTHERS NOT IN LABOUR FORCE		=1: if retired, if housewife, if student, if other inactive =0 otherwise	=1: 23.6
EDUCATION_N		N=1: if no qualification or primary school N=2 if secondary school N=3 if high school N=4 if university	=1: 8.6 =2: 37.4 =3: 34.5 =4: 19.6
AGE_N		N=1: if under 24 N=2: if between 25 and 34 N=3: if between 35 and 44 N=4: if between 45 and 54 N=5: if between 55 and 64 N=6: if above 65	=1: 11.0 =2: 24.6 =3: 24.0 =4: 17.2 =5:12.3 =6: 10.9
MALE		=1: if male =0: if female	=1: 54.3
MARRIED		=1: if married or living as married =0 otherwise	=1: 64.1
GERMANY		=1: if Germany =0 otherwise	=1: 29.9
GREAT BRITAIN		=1: if Great Britain =0 otherwise	=1: 11.7
NORWAY		=1: if Norway =0 otherwise	=1: 26.8
ITALY		=1: if Italy =0 otherwise	=1: 13.8
US		=1: if US =0 otherwise	=1: 17.8

Table 5: Descriptive statistics

	Redistribution	Self-interest	POUM	Hard work	Income	Employed	Education	Age	Male	Married
Redistribution	1									
Self-interest	0.14***	1								
POUM	-0.02	-0.12***	1							
Hard work	-0.14***	0.01	-0.01	1						
Income	-0.17***	-0.27***	0.17***	0.08***	1					
Employed	-0.05***	-0.00	0.04***	0.07***	0.35***	1				
Education	-0.22***	-0.13***	-0.03**	0.18***	0.29***	0.21***	1			
Age	-0.03**	-0.09***	0.09***	-0.02	0.09***	-0.35***	-0.24***	1		
Male	-0.07***	-0.11***	0.08***	-0.01	0.40***	0.06***	0.03*	0.02	1	
Married	-0.04**	-0.07***	0.13***	0.05***	0.20***	0.10***	0.02	0.20***	0.09***	1

*** significant at 1% level; ** significant at 5% level; * significant at 10% level

Table 6: Correlation matrix