Voting for redistribution under responsibility-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 responsibility-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 that preferences for redistribution are not purely selfish and that responsibility-sensitive motivations play a significant role. We estimate that preferences for redistribution are significantly more responsibility-sensitive in the US than in Europe. We believe that differences in responsibility-sensitive preferences for redistribution help explain the different social contracts that prevail in both continents.

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Keywords: altruism, voting, redistribution, responsibility, compensation.

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1 Introduction

The United States and continental Western Europe ('Europe' henceforth) show considerable differences in their social contracts despite similar economic and political fundamentals. 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. Two groups of papers have triggered off particular attention among scholars. The first group focuses on the impact of upward income mobility. 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 United States misses 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. The second group of papers focuses on the impact of individuals' beliefs on the relative importance of effort and luck in generating income inequalities, a research track initiated by Piketty (1995). 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 against 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 deserts 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). Reversely, 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 of Alesina and Angeletos (2005) 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 their ethical concerns. In both cases, their expected benefit converges to zero. In other words, voters become comparable to Smith's *impartial spectator* (1790), who, following Hume (1739), is capable of showing benevolence towards his fellow citizens precisely because his own interests are not directly at stake. 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 vote ethically and therefore the social benefit at stake is large. On the empirical side, much evidence of ethical concerns has been given, irrespective of whether one considers Kramer's retrospective (1971) or Downs' prospective (1957) theory of voting. 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 (1986) 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 prospective 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.

However, Alesina and Angeletos (2005) model individuals' ethical preferences for redistribution in a rather ad hoc way. We believe that the literature on opinions about distributive justice should be taken into account when modelling altruistic preferences for redistribution. So far, mainly utilitarian and Rawlsian motives have been incorporated, mostly to explain ethical behavior in experimental allocation problems. 'Social welfare' models assume that people like to increase the social surplus (utilitarian motive), caring especially about individuals with low payoffs (Rawlsian motive). We refer to Charness and Rabin (2002) for a strong experimental justification of social welfare models over for example 'difference aversion' models where individuals are motivated to reduce differences between theirs and others' payoffs. Recently, economists and philosophers have proposed to incorporate notions of responsibility in the formulation of distributive justice; we refer to Fleurbaey (1998) for a survey. In experiments where respondents take the role of an objective social planner, Yaari and Bar-Hillel (1984), Schokkaert and Overlaet (1989) and Schokkaert (1999) provide 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. The consequence for social welfare models is that individuals no longer simply include all individuals (utilitarian motive) or the worst-off individual only (Rawlsian motive) in their altruistic concerns. Individuals now can exclude others from their altruistic concerns when they feel that these others have performed poorly compared to themselves in terms of responsibility characteristics. Following Schokkaert and Devooght (2003), we denote such altruistic preferences 'responsibility-sensitive' altruistic preferences. Support for responsibility-sensitive altruistic preferences is provided by Konow (2000) in experiments where participants' own interests are also at stake. 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. More 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 the context of modelling altruistic preferences for redistribution, responsibility-sensitivity implies that individuals support redistribution as long as those who gain from redistribution have at least the same entitlement to income generated by factors that lie within the personal responsibility. Broadly speaking, under responsibility-sensitive preferences for redistribution, hard-working individuals oppose redistribution from the hard-working to the lazy.

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 responsibility-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 responsibility-sensitive, (i) strictly lower levels of redistribution emerge in political equilibrium compared to a society where altruistic preferences are not responsibility-sensitive 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, we first provide evidence that preferences for redistribution are not purely egoistic. Second, we find that responsibility-sensitive motivations play a significant role in individuals' preferences for redistribution. Third, we estimate that preferences for redistribution are significantly more responsibility-sensitive among individuals in the US than among individuals in Europe. We therefore believe that differences in responsibility-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 responsibility-sensitivity in practice and justifies responsibility-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 responsibility-sensitive. Appendix B provides a detailed descriptive

summary 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 dimensions. The first dimension 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 dimension 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. Crucial for the analysis is our assumption 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). 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); $\sum_{(w,e)\in W\times E} p_{we} = 1$. 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.

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 $w\ell_{we}$. 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 infered 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 $y_{\underline{w}\bar{e}}$.[1] For the moment, we leave the question open whether individuals know that w and e are independently distributed or not. As we show in Appendix A, knowing whether w and e are independently distributed or not plays a

[1] 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.

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 $(\underline{w}, \bar{e})$. 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 $B(\tau) + (1-\tau)\, w\ell_{we}$.

A generic economy is described by $\varepsilon = (\alpha, \beta)$. Throughout the paper, 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. $p_{\underline{we}} < 1/2$ and $p_{\bar{w}\bar{e}} < 1/2$) and (ii) median income is strictly lower than average income. Denote $\mathcal{E}$ the set of all economies that satisfy both assumptions. As will become clear from our analysis in Section 3, 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.[2]

2.2 Private preferences for consumption and leisure

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 concreteness, for any type (w,e), we assume quasi-linear preferences between c_{we} and ℓ_{we} to take the form:[3]

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

Hence, taste for working defines the marginal rate of substitution between consumption and supplied labor.[4]

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:

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

and net income (=consumption):

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

Private preference satisfaction is measured by the indirect utility function:

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

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

[3] For any type (w,e), let $\tilde{u}_{we}$ represent preferences in the consumption-gross income space, i.e. $\tilde{u}_{we}(c_{we}, y_{we}) \equiv u_e\left(c_{we}, \frac{y_{we}}{w}\right)$. The assumption that $y_{\bar{w}\underline{e}} = y_{\underline{w}\bar{e}}$ implies that there exists a continuous and strictly increasing function $\phi : \mathbb{R} \to \mathbb{R}$ such that $\tilde{u}_{\underline{w}\bar{e}} = \phi \circ \tilde{u}_{\bar{w}\underline{e}}$ in $\mathbb{R} \times [0, \underline{w}]$.

[4] 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.

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

$$\mathbf{v} \equiv \begin{pmatrix} v_{\underline{we}} \\ v_{\bar{w}\underline{e}} \\ v_{\underline{w}\bar{e}} \\ v_{\bar{w}\bar{e}} \end{pmatrix}$$

the type-profile of indirect utilities. 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. Let (w,e) and $(w,e)'$ be two (possibly identical) types. Denote $\pi_{we,we'}$ 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), $\sum_{(w,e)' \in W \times E} \pi_{we,we'} = 1$. Let the vector

$$\pi_{we} \equiv \begin{pmatrix} \pi_{we,\underline{we}} \\ \pi_{we,\bar{w}\underline{e}} \\ \pi_{we,\underline{w}\bar{e}} \\ \pi_{we,\bar{w}\bar{e}} \end{pmatrix}$$

collect type (w,e)'s weights and let $\pi_{we}^{\mathbf{T}}$ be the transpose of π_{we}. Then, for any type (w,e), preference satisfaction for redistribution is given by:

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

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

2.4 Different scenarios of altruism

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

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

where $\delta_{we,we'} \in \{0,1\}$ 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 0 or 1 —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 *responsibility-sensitive* or not. We clarify both factors. 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.[5] In addition, we qualify individuals' altruistic preferences for redistribution *responsibility-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 *not responsibility-sensitive* 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 considered —just like productive skill— to be a genetic endowment).

Putting both factors together, we consider throughout the paper four different altruistic scenarios: not responsibility-sensitive utilitarian altruism (in short: utilitarian altruism (U)), not responsibility-sensitive Rawlsian altruism (in short: Rawlsian altruism (R)), responsibility-sensitive utilitarian altruism (rsU) and responsibility-sensitive Rawlsian altruism (rsR). When we, in addition, denote the scenario where all preferences for redistribution are egoistic (γ equals 1 for all individuals) by Ego, the set of all different scenarios considered in this paper is $\Xi = \{Ego, U, R, rsU, rsR\}$. Generically, let δ^i_{we} be the vector of concern-parameters of an individual of type (w, e) for a scenario $i \in \Xi \backslash \{Ego\}$:

$$\delta^i_{we} \equiv \begin{pmatrix} \delta_{we,\underline{we}} \\ \delta_{we,\overline{w}\underline{e}} \\ \delta_{we,\underline{w}\overline{e}} \\ \delta_{we,\overline{we}} \end{pmatrix}.$$

- 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

$$\forall (w, e) \in W \times E : \delta^U_{we} = \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}.$$

[5] 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.

- 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,

$$\forall (w,e) \in W \times E : \delta^R_{we} = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}.$$

- Responsibility-sensitive utilitarian altruism

Under *responsibility-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:

$$\delta^{rsU}_{\underline{w}\underline{e}} = \delta^{rsU}_{\bar{w}\underline{e}} = \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix} \text{ and } \delta^{rsU}_{\underline{w}\bar{e}} = \delta^{rsU}_{\bar{w}\bar{e}} = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 1 \end{pmatrix}.$$

- Responsibility-sensitive Rawlsian altruism

Under *responsibility-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:

$$\delta^{rsR}_{\underline{w}\underline{e}} = \delta^{rsR}_{\bar{w}\underline{e}} = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix} \text{ and } \delta^{rsR}_{\underline{w}\bar{e}} = \delta^{rsR}_{\bar{w}\bar{e}} = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix}.$$

3 Political equilibrium

In this section we show that in political equilibrium the amount of redistribution is (i) higher under the Rawlsian altruism scenario than under the egoistic scenario and (ii) higher under the egoistic scenario than under the utilitarian altruism scenario (proposition 1). The main result of this section is that the introduction of responsibility-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 (proposition 2).

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	$\frac{y_a - \gamma y_{med} - (1-\gamma)y_{\underline{we}}}{2y_a - \gamma y_{med} - (1-\gamma)y_{\underline{we}}}$	$\frac{y_a - \gamma y_{med} - (1-\gamma)y_{\underline{we}}}{2y_a - \gamma y_{med} - (1-\gamma)y_{\underline{we}}}$
rsU	$\frac{y_a - \gamma y_{med} - (1-\gamma)y_a}{2y_a - \gamma y_{med} - (1-\gamma)y_a}$	$\max\left[0, \frac{y_a - \gamma y_{med} - \frac{(1-\gamma)}{p^b_{\underline{w}\overline{e}} + (1-\alpha)(1-\beta)}\left(p^b_{\underline{w}\overline{e}} y_{med} + (1-\alpha)(1-\beta) y_{\overline{we}}\right)}{2y_a - \gamma y_{med} - \frac{(1-\gamma)}{p^b_{\underline{w}\overline{e}} + (1-\alpha)(1-\beta)}\left(p^b_{\underline{w}\overline{e}} y_{med} + (1-\alpha)(1-\beta) y_{\overline{we}}\right)}\right]$
rsR	$\frac{y_a - \gamma y_{med} - (1-\gamma)y_{\underline{we}}}{2y_a - \gamma y_{med} - (1-\gamma)y_{\underline{we}}}$	$\frac{y_a - y_{med}}{2y_a - y_{med}}$

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

where $p^b_{\underline{w}\overline{e}}$ 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 responsibility-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 $p_{\bar{w}\bar{e}}$, they only observe

$p_{\bar{w}\underline{e}}+p_{\underline{w}\bar{e}}$ and hence have to make an 'estimate' of the former's proper proportion $p_{\underline{w}\bar{e}}$. We return to the exact formation of $p^b_{\underline{w}\bar{e}}$ in Appendix A, where we study the impact of incomplete information about the separate proportions $p_{\bar{w}\underline{e}}$ and $p_{\underline{w}\bar{e}}$ on the preferred tax rate of individuals of type $(\underline{w},\overline{e})$ in the responsibility-sensitive utilitarian scenario. Notice that, except for $\tau^{rsU,\varepsilon}_{\underline{w}\bar{e}}$, all tax rates presented in Table 2 are strictly larger than zero for every $\gamma \in [0,1]$, since we assumed that $y_{\overline{w}\underline{e}} = y_{\underline{w}\overline{e}} = y_{med} < y_a$ for all $\varepsilon \in \mathcal{E}$. 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 responsibility-sensitive and non responsibility-sensitive scenarios, i.e. $\tau^{U,\varepsilon}_{\overline{w}\underline{e}} = \tau^{rsU,\varepsilon}_{\overline{w}\underline{e}}$ and $\tau^{R,\varepsilon}_{\overline{w}\underline{e}} = \tau^{rsR,\varepsilon}_{\overline{w}\underline{e}}$and (iii) the preferred tax rates of individuals of type $(\underline{w},\overline{e})$ are the same in the egoistic scenario and the responsibility-sensitive Rawlsian altruism scenario, i.e. $\tau^{Ego,\varepsilon}_{\underline{w}\overline{e}} = \tau^{rsR,\varepsilon}_{\underline{w}\overline{e}}$.

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 $p_{\underline{we}} < 1/2$ and $p_{\bar{w}\bar{e}} < 1/2$ for all economies in $\mathcal{E}$. Let $\mathcal{E}' = \{\varepsilon \in \mathcal{E} : p_{\underline{we}} + p_{\overline{w}\underline{e}} < 1/2\}$ be the proper subset of $\mathcal{E}$ that comprises all economies where the proportion of lazy individuals does not exceed 1/2. Let $\mathcal{E}'' = \{\varepsilon \in \mathcal{E} : p_{\underline{we}} + p_{\overline{w}\underline{e}} > 1/2\}$ 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): $\forall i \in \Xi$:

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

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 $\tau^{i,\varepsilon}_{\overline{w}\underline{e}} \geq \tau^{i,\varepsilon}_{\underline{w}\bar{e}}$ 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 $y_{med} > y_{\underline{we}}$, it is easily seen that $\tau^{rsR,\varepsilon}_{\overline{w}\underline{e}} > \tau^{rsR,\varepsilon}_{\underline{w}\overline{e}}$ for all $\varepsilon \in \mathcal{E}$. It remains to show that $\tau^{rsU,\varepsilon}_{\overline{w}\underline{e}} \geq \tau^{rsU,\varepsilon}_{\underline{w}\overline{e}}$ for all $\varepsilon \in \mathcal{E}$ when $\tau^{rsU,\varepsilon}_{\underline{w}\overline{e}} > 0$. This boils down to showing that $y_a \leq \frac{p^b_{\underline{w}\overline{e}} y_{med} + (1-\alpha)(1-\beta) y_{\overline{we}}}{p^b_{\underline{w}\overline{e}} + (1-\alpha)(1-\beta)} = RHS$. Since $p^b_{\underline{w}\overline{e}}$ cannot lie outside the interval $[0, 1 - p_{\underline{we}} - p_{\bar{w}\bar{e}}]$ (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 $y_{\overline{we}}$ in RHS is greater than the weight $(1-\alpha)(1-\beta)$ given to $y_{\overline{we}}$ in y_a and when noting that $y_{\underline{we}}$ receives no weight in RHS, whereas $y_{\underline{we}}$ receives weight $\alpha\beta$ in y_a. □

We now compare the Condorcet winner tax rates over the different scenarios. We start by 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 $\mathcal{E}$. Proposition 1 states that 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 behind proposition 1 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 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.

Proposition 1 (ranking Condorcet winner tax rates under Ego, U and R):

$\forall \varepsilon \in \mathcal{E}, \tilde{\tau}^{U,\varepsilon} < \tilde{\tau}^{Ego,\varepsilon} < \tilde{\tau}^{R,\varepsilon}$.

Proof: Straightforward, since $y_{\underline{we}} < y_{\overline{w}\underline{e}} = y_{\underline{w}\overline{e}} = y_{med} < y_a$ for all $\varepsilon \in \mathcal{E}$.

The main result of this section is proposition 2 which states that the introduction of responsibility-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. The intuition behind proposition 2 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 responsibility-sensitive scenarios. This results in lower Condorcet winner tax rates compared to non responsibility-sensitive scenarios.

Proposition 2 (ranking Condorcet winner tax rates under rsU and U and under rsR and R):

$\forall \varepsilon \in \mathcal{E}', \tilde{\tau}^{rsU,\varepsilon} < \tilde{\tau}^{U,\varepsilon}$ and $\tilde{\tau}^{rsR,\varepsilon} < \tilde{\tau}^{R,\varepsilon}$.

Proof: The proof that $\tilde{\tau}^{rsU,\varepsilon} < \tilde{\tau}^{U,\varepsilon}$ follows from (i) noting that $\tau^{U,\varepsilon}_{\underline{w}\overline{e}} = \tau^{rsU,\varepsilon}_{\overline{w}\underline{e}}$ for all $\varepsilon \in \mathcal{E}$, (ii) the proof of the lemma where we show that $\tau^{rsU,\varepsilon}_{\underline{w}\overline{e}} < \tau^{rsU,\varepsilon}_{\overline{w}\underline{e}}$ for all $\varepsilon \in \mathcal{E}$ and (iii) the lemma itself. The proof that $\tilde{\tau}^{rsR,\varepsilon} < \tilde{\tau}^{R,\varepsilon}$ follows from proposition 1 when noting that $\tilde{\tau}^{rsR,\varepsilon} = \tilde{\tau}^{Ego,\varepsilon}$ for all $\varepsilon \in \mathcal{E}'$. □

4 Responsibility-sensitive altruism in practice

How can our theoretical results help explain the differences between the American and the European social contract? Can the coexistence of the fact that 71% of Americans against 40% of Europeans consider that 'poor people could

become rich if they just tried hard enough' with responsibility-sensitive preferences for redistribution provide an insight? Is it really the case that Americans are significantly more responsibility-sensitive than Europeans? In this section, we show that differences in responsibility-sensitivity indeed hold between both continents and that responsibility-sensitivity induces lower support for redistribution among Americans. We present estimates for an encompassing model of individual attitudes toward political redistribution. We use the International Social Survey Programme (ISSP) 1992 dataset which contains questionnaire responses that reveal opinions on social inequality. This source provides representative samples of the following countries: Austria, (West-)Germany, Italy, Norway, Sweden and the US. Here, we introduce our different variables shortly and refer to Appendix B for a more detailed descriptive summary of our data. Our dependent variable 'redistribution' ranges from 1 to 4 —which induces us to estimate an ordered logit model— and indicates the support given by individuals to political redistribution. It measures how strongly individuals feel that the government should reduce income inequality. 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 redistribution. Second, the variable 'poum' tries to capture the 'prospect of upward mobility'. 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 his father. Third, the variables 'responsibility' and 'compensation' are derived from individuals' opinions on how strongly characteristics within individuals' responsibility and characteristics beyond individuals' responsibility influence the income generating process respectively. We consider these variables as key in identifying whether individuals are egoistic or altruistic and responsibility-sensitive or not. Fourth, the socio-demographic variables 'income', 'unemployed', 'others not in labour force', 'education', 'age', 'male' and 'married' report individuals' income, employment status, level of education, age, sex and whether they are married or not. In order to test for differences between both continents, all these variables are interacted with a dummy ('dum') that takes the value of 1 when individuals come from the US. Table 3 presents our ordered logit estimates. Regression 1 concentrates on the influence of 'self-interest', 'poum' and sociodemographic variables on the respondent's support for redistribution. This regression is intended to represent the most common explanations of individuals' support for redistribution in the literature. Regression 2 analyses the impact of adding the 'responsibility' and the 'compensation' variables and represents our contribution of viewing individuals as being (reponsibility-sensitive) altruists rather than egoists.

Three important conclusions can be drawn from Table 3. 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 positive coefficient of the compensation variable in regression 2 betrays that, besides the self-interest motive, a strong belief

in the importance of non-responsibility characteristics raises the demand for redistribution.

SUPPORT FOR REDISTRIBUTION		
SELF-INTEREST	0.399***	0.386***
	(0.047)	(0.048)
SELF-INTEREST*DUM	0.114	0.163
	(0.102)	(0.104)
POUM	-0.027	-0.009
	(0.048)	(0.042)
POUM*DUM	-0.085	-0.106
	(0.085)	(0.087)
RESPONSIBILITY		-0.185***
		(0.056)
RESPONSIBILITY*DUM		-0.476***
		(0.160)
COMPENSATION		0.194***
		(0.054)
COMPENSATION*DUM		0.099
		(0.126)
INCOME	-0.140***	-0.127***
	(0.038)	(0.039)
INCOME*DUM	-0.007	0.016
	(0.078)	(0.079)
UNEMPLOYED	0.412*	0.612**
	(0.237)	(0.251)
UNEMPLOYED*DUM	-0.289	-0.442
	(0.484)	(0.495)
OTHERS NOT IN LABOUR FORCE	-0.180	-0.162
	(0.353)	(0.121)
OTHERS NOT IN LABOUR FORCE*DUM	0.353	0.416
	(0.303)	(0.308)
EDUCATION	-0.749***	-0.746***
	(0.255)	(0.264)
EDUCATION*DUM	0.260	0.387
	(0.493)	(0.506)
$EDUCATION^2$	0.066	0.067
	(-0.048)	(0.049)
$EDUCATION^2$*DUM	-0.049	-0.059
	(0.093)	(0.095)
AGE	-0.072	-0.153
	(0.141)	(0.145)
AGE*DUM	0.349	0.353
	(0.325)	(0.332)
AGE^2	0.010	0.018
	(0.020)	(0.020)
AGE^2*DUM	-0.068	-0.066
	(0.047)	(0.048)
MALE	-0.140	-0.182**
	(0.086)	(0.089)
MALE*DUM	0.006	0.012
	(0.188)	(0.191)
MARRIED	0.061	0.102
	(0.087)	(0.089)
MARRIED*DUM	-0.226	-0.236
	(0.189)	(0.193)
DUM	-1.972**	-0.624
	(0.961)	(1.186)
Number of observations	3062	2959
Prob>chi2	0.000	0.000
Pseudo R^2	7.75%	8.37%

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

Table 3: Ordered logit estimates

Remark that this belief does not statistically differ between Europe and the US, since the coefficient of the interaction variable compensation*dum is not

statistically significant. It is also notable 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 compensation variable is close to zero (-0.001). This result suggests to depart from modelling individuals' preferences for redistribution as solely egoistic as it indicates that altruistic concerns do exist.

Second, there is clear indication of responsibility-sensitivity in individuals' attitudes towards redistribution. The strongly significant negative coefficient of the responsibility variable indicates that, besides the self-interest motive, there is a reluctance for redistribution from the hard-working to the lazy. This 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; see Fong (2001), Corneo and Grüner (2002), and Alesina and La Ferrara (2005) for more details. Third, preferences for redistribution are significantly more responsibility-sensitive among individuals in the US than among individuals in Europe. This is indicated by the significantly negative coefficient of the interaction variable responsibility*dum. In other words, we find empirical confirmation that responsibility-sensitivity holds between both continents and that differences in responsibility-sensitivity result in different demands for redistribution. This can help explain the two different politico-economic equilibria of both continents. Note that we do not find any significant statistical effect of the 'poum' variable in both regressions. Note also that, while the coefficient of the 'dum' variable is negative and statistically significant in regression 1, it is no longer significant in regression 2. This suggests that the difference between responsibility-sensitivity across both continents is a crucial one. This claim is further supported by the fact that no other interaction variable shows a significant coefficient. Concerning the socio-demographic variables, the strongly significant negative sign of the coefficient of the 'income' variable confirms the impact of self-interest, as objectively measured, in individuals' support to redistribution. Unemployed individuals appear significantly more supportive to redistribution than employed people which illustrates the insider-outsider cleavage highlighted by the welfare-state literature. 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 to a more egalitarian distribution of income. Our results show that education has a significant negative effect on the demand for redistribution. The positive sign of the coefficient of the squared 'education' variable suggests that this negative effect becomes weaker after a certain education level, although this coefficient is not significant. 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. 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. We do not find any statistical significant effect of the 'age' and of the 'married' variables.

5 Conclusion

Following Alesina and Angeletos (2005), we endow individuals that differ in skill levels and tastes for working with preferences for redistribution that are not purely egoistic. However, we rely on opinions on distributive justice in the exact formulation of these preferences. 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 responsibility-sensitive altruism. In a voting model where a unidimensional redistributive parameter is chosen by majority voting in a direct democracy, we demonstrate how responsibility-sensitive preferences for redistribution can induce lower levels of redistribution in the political equilibrium. We justify responsibility-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 responsibility-sensitive motivations play a significant role in individuals' preferences for redistribution. We estimate that preferences for redistribution are significantly more responsibility-sensitive among individuals in the US than among individuals in Europe. We think that differences in responsibility-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 responsibility-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 (responsibility-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 responsibility-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 (responsibility-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 (responsibility-sensitive) altruistic individuals are in favor of welfare programmes that subsidize the poor.

Appendix A: impact of incomplete information

We focus on the responsibility-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 $\tilde{\tau}^{rsU,\varepsilon}$ under the (correct) belief that $p^b_{\underline{w}\bar{e}} = (1-\alpha)\beta$ as a benchmark. Denote this tax rate $\tilde{\tau}^{rsU,\varepsilon}_{benchmark}$. We assume that, for all individuals, γ is such that $\tilde{\tau}^{rsU,\varepsilon}_{benchmark} > 0$. From propositions 1 and 2 in Section 3, we know that for all economies in $\mathcal{E}'$, $\tilde{\tau}^{rsU,\varepsilon}$ 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 $\tilde{\tau}^{rsU,\varepsilon}$ that is even smaller than $\tilde{\tau}^{rsU,\varepsilon}_{benchmark}$. In other words, we try to identify how imperfect information can further increase the difference between the Condorcet winner tax rate in the responsibility-sensitive utilitarian scenario and the Condorcet winner tax rates in the other scenarios. The necessary condition to have that $\tilde{\tau}^{rsU,\varepsilon} < \tilde{\tau}^{rsU,\varepsilon}_{benchmark}$ 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 $(\underline{w}, \bar{e})$ (cfr. the proof of the lemma in Section 3), 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 responsibility-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 $p^b_{\underline{w}\bar{e}} \neq (1-\alpha)\beta$:

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

Proof: The proof follows from a direct comparison between $\tilde{\tau}^{rsU,\varepsilon}$ when $p^b_{\underline{w}\overline{e}} = (1-\alpha)\beta$ and $\tilde{\tau}^{rsU,\varepsilon}$ when $p^b_{\underline{w}\overline{e}} = (1-\beta)\alpha$. 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 $1-p_{\underline{we}}-p_{\overline{we}}$, i.e. $p^b_{\underline{w}\overline{e}} \in [0, \alpha+\beta-2\alpha\beta]$. 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 $\tilde{\tau}^{rsU,\varepsilon} < \tilde{\tau}^{rsU,\varepsilon}_{benchmark}$. The most general result (which holds for all economies in $\mathcal{E}'$) states that, in order to obtain $\tilde{\tau}^{rsU,\varepsilon} < \tilde{\tau}^{rsU,\varepsilon}_{benchmark}$, 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 $\tilde{\tau}^{rsU,\varepsilon} < \tilde{\tau}^{rsU,\varepsilon}_{benchmark}$:

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

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

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 $\widehat{\widehat{\mathcal{E}}}'$.$\square$

Appendix B: descriptive summary

Table 4 provides a detailed descriptive summary of the data used in the ordered 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.

Variable	Question	Coding	Proportion (%) N=2959
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: agree =4: strongly agree	=1: 8.1 =2: 21.5 =3: 47.2 =4: 23.1
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: 1.6 =2: 7.4 =3: 42.2 =4: 33.9 =5: 14.9
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: 2.2 =2: 9.7 =3: 16.3 =4: 44 =5: 27.7
	'For getting ahead in life, how important is…'		
AMBITION	'…having ambition?'	=1: not important at all =2: not very important =3: fairly important =4: very important =5: essential	=1: 1.4 =2: 4.2 =3: 19.7 =4: 44.7 =5: 29.9
HARD WORK	'…hard work?'	the same as for AMBITION	=1: 1.5 =2: 6.8 =3: 25.8 =4: 43.8 =5:22.1
NATURAL ABILITY	'…natural ability?'	the same as for AMBITION	=1: 1.1 =2: 6.7 =3: 36.9 =4: 42.1 =5:13.3
FAMILY BACKGROUND	'…coming from a wealthy family?'	the same as for AMBITION	=1: 15.3 =2: 33.2 =3: 31.4 =4: 15.0 =5: 5.1
INCOME		=1: if belongs to the 1st quintile =2: if belongs to the 2nd quintile =3: if belongs to the 3rd quintile =4: if belongs to the 4th quintile =5: if belongs to the 5th quintile	=1: 17.5 =2: 17.6 =3: 18.3 =4: 22.6 =5:24.0
UNEMPLOYED		=1: if unemployed =0 otherwise	=1: 2.9
OTHERS NOT IN LABOUR FORCE		=1: if retired, if housewife, if student, if other inactive =0 otherwise	=1: 26.3
EDUCATION		=1: if no qualification or primary school =2 if secondary school =3 if high school =4 if university	=1: 9.4 =2: 36.9 =3: 36.4 =4: 17.2
AGE		=1: if under 24 =2: if between 25 and 34 =3: if between 35 and 44 =4: if between 45 and 54 =5: if between 55 and 64 =6: if above 65	=1: 11.2 =2: 24.7 =3: 22.9 =4: 16.6 =5:12.5 =6: 12.2
MALE		=1: if male =0: if female	=1: 54.3
MARRIED		=1: if married or living as married =0 otherwise	=1: 63.6
DUM		=1: if US =0: if Europe	=1: 19.1

Table 4: Descriptive statistics

The variable responsibility is computed as an arithmetic average of the variable ambition and the variable hard work. Similarly, the variable compensation is computed as an arithmetic average of the variable natural ability and the variable family background. It is worthwhile to mention the relatively low correlation between the variable ambition and the variable hard work of 0.329 and the relatively low correlation between the variable natural ability and the variable family background of 0.209. Taking up either the variable ambition or the variable hard work instead of the variable responsibility does not change the qualitative conclusions; it only decreases the overall explanatory power of the model. The same holds true for taking up the variable natural ability or the variable family background instead of the variable compensation. Constructing the dependent variable as a dummy and estimating a binary logit model yields similar results as estimating an ordered logit model. The same holds true when estimating an ordered or a binary probit model.[6]

[6]Estimation results are available upon request.

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