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# Work Values, Endogenous Sentiments and Redistribution*

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**Abstract**

We examine the interactions between individual behavior, sentiments and the social contract in a model of rational voting over redistribution. Agents have moral "work values". Individuals' self-esteem and social consideration of others are endogenously determined comparing behaviors to moral standards. Attitudes toward redistribution depend on self-interest and social preferences. We characterize the politico-economic equilibria in which sentiments, labor supply and redistribution are determined simultaneously. The equilibria feature different degrees of "social cohesion" and redistribution depending on pre-tax income inequality. In clustered equilibria the poor are held partly responsible for their low income since they work less than the moral standard and hence redistribution is low. The paper proposes a novel explanation for the emergence of different sentiments and social contracts across countries. The predictions appear broadly in line with well-documented differences between the United States and Europe.

Keywords: Social Contract, Endogenous Sentiments, Voting over Taxes, Moral Work Values, Redistribution, Income Inequality, Politico-Economic Equilibria.

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# 1 Introduction

In this paper we explore the interplay between work ethics, sentiments and social policy. We present a model where agents have standards of behavior relative to which they judge the actions of others, increasing their regard for those who exceed the standard and decreasing it for those who fall short. Similarly, according to social psychologists, agents' self-esteem is affected by their own deviations from moral standards in much the same way.[1] As agents' *sentiments* change, so, too, will their behavior. Moreover, this is likely to affect their view of the benefits of social programs and the worthiness of participants. The converse is true as well: social policies or institutions – the *social contract* – generally affect behavior and this, in turn, affects sentiments, as described above. Therefore, sentiments, behavior and social institutions must be determined jointly.

To study this interaction, we extend the model by Meltzer and Richard (1981) of rational voting over redistributive taxes to include endogenous sentiments. In their model, agents supply labor in return for competitive wages, and earnings are subject to a purely redistributive proportional tax. The tax structure is determined by majority rule and reflects the preferences of the median voter. Agents are assumed to be purely egoistic and the median income is below the mean. Under these circumstances, if labor supply were inelastic, the resulting tax policy would be fully confiscatory. However, since labor supply is endogenous and agents foresee the disincentive effects of taxation, they will temper their demands for redistribution and adopt a more moderate tax structure. An important implication of the model is that higher income inequality necessarily leads to greater equilibrium redistribution.

In contrast, we assume that agents are altruistic and that sentiments are determined endogenously. We assume agents evaluate their own performance and that of others relative to the work standard, increasing their regard for those who exceed the standard and decreasing it for those who fall short.[2] As a benchmark we take the mean labor supply to be the moral standard. Formally, we consider a continuum of agents who differ in their productivities. For simplicity, we assume there are only two types of individuals, skilled and unskilled, with the latter comprising more than half of the population. Agents have private preferences over consumption and leisure and social preferences that take into consideration the welfare of others. In addition, private preferences depend on self-esteem which is

[1] The impact on self-esteem and self-worth derives from the emotions of guilt and pride, which are referred to as *self-regulative emotions* by social psychologists because they induce reparative or self-correcting behavior. This is discussed below in Sections 2 and 3.

[2] The importance of work values is demonstrated by the fact that within the OECD approximately 60% of respondents to the World Values Survey (2004) either "strongly agree" or "agree" with the statement, "work is a duty towards society," (question C039) with little variation across countries.

subject to the moral calculus mentioned above, namely, the more one works relative to the social standard of behavior, the greater the perception of oneself as industrious and the greater the sense in which leisure is "well deserved." The social component of the utility function consists of a weighted average of the (private) well-being of others, where the weights depend on their industriousness.

The endogenous variables in our model – labor supply, sentiments and taxes – are determined as follows. First, given their sentiments and the tax schedule, agents make labor supply decisions. Since there is a continuum of individuals, the labor supply decision has no impact on others and is therefore made on the basis of private preferences. Next, having determined their labor supplies, we assume agents evaluate such behavior relative to the moral standard and modify their sentiments accordingly. Finally, given their sentiments, individuals vote over redistribution, anticipating the labor supply effects of taxation. Since the tax policy has an economy-wide effect, such voting decisions are made on the basis of social preferences. The unskilled agents being in the majority, the median tax policy will be that preferred by an unskilled worker.

A *politico-economic equilibrium* consists of a vector of labor supplies, sentiments and tax policy such that each is optimal given the other components and all such variables are compatible. There are two types of politico-economic equilibria in our model. In a *cohesive* equilibrium all individuals conform to the moral standards. In these equilibria all agents receive equal social consideration. The chosen tax rate might be high relative to the second type of equilibrium. In contrast, in a *clustered* equilibrium, society is divided into two groups or clusters. One consists of the most productive individuals who work above the mean, while the other consists of the least productive individuals who work below the mean.[3] In a clustered equilibrium the chosen tax rate might be lower than in a cohesive society. Conditional on the strength of work values, whether an economy becomes cohesive or clustered crucially depends on the degree of inequality of pre-tax income or skill level. If inequality is below a critical level, then cohesion results, whereas higher inequality leads to social clustering.

The theory provides several implications concerning the relationship between labor supply, inequality, redistribution and individual attitudes. First, the distinguishing feature of cohesive equilibria is that all agents adhere to the moral norm. Hence, for low levels of inequality (associated with cohesive equilibria) we observe little or no dispersion in labor supply, while for high levels of inequality there is a widening gap between the labor hours of skilled and unskilled workers. Second, the model offers a plausible explanation of how inequality and redistribution might be inversely related in spite of the fact that the poor constitute a majority. In a cohesive equilibrium, all agents contribute the same

[3] If there were more than two skill levels, then there could be a third cluster in equilibrium, where those in the middle group would conform to the standard.

level of effort and hence differences in income are solely attributable to the exogenous inequality in productivities. As such, those with low skill are seen to be poor *through no fault of their own.* In this case higher income inequality leads to support for greater redistribution. Such a positive relationship holds for moderately higher levels of inequality as well. But when productivities are sufficiently different that clustering occurs, this may lead to large differences in labor supply. In this case the poor are seen to be at least partly responsible for their low income and support for redistribution declines. It follows that we might observe one (cohesive) society with low pre-tax earnings inequality choosing to redistribute more than another (clustered) society with greater inequality. Moreover, such divergent attitudes toward the poor are endogenously determined.

The model proposed here affords a novel explanation for the emergence of different sentiments and social contracts. In particular, it yields predictions which are in line with the following four well-documented differences between the United States and Europe.[4] First, in the US there is considerably greater inequality (in both pre-tax income and the distribution of skills) than in continental Europe.[5] Second, despite having less inequality, European countries engage in significantly more fiscal redistribution.[6] Third, the distribution of work hours is substantially more disperse in the US.[7] Finally, compared to Europeans, a much larger proportion of Americans tend to view poverty as resulting from laziness.[8] These stylized facts, which either conflict with or lie beyond the scope of existing theories, are reconciled and rationalized by the predictions of our model.

The paper is organized as follows. Section 2 discusses the related literature. Section 3 describes

[4]See Alesina and Glaeser (2004) and Alesina, Glaeser, and Sacerdote (2001) for an extensive discussion of the differences between the US and continental Europe.

[5]For instance, in the early nineties the average before-tax Gini coefficient for European countries was 29.1 versus 38.5 for the United States (Deininger and Squire, 1996). By 2000 the gap was 36.0 versus 43.6, respectively and the earning ratio of the nineteenth and tenth percentile were 2.45 in EU and 4.58 in US (Kenworthy and Pontusson, 2005). High school graduates in the US enjoy a skill premium that is about 50 percent larger than in Europe (see Acemoglu, 2003).

[6]Using OECD data, the share of welfare transfers over GDP in 2007 was 12.7 in the US and 19.6 percent in Europe, and the share of total government spending for the same year (excluding interest payments) was 36 percent and 45 percent, respectively.

[7]ILO data for 2000 document that average hours of work are 43.3 for the USA, 40.8 for Germany, 36.9 for France, and 37.6 for The Netherlands. These longer hours in the USA are also differently distributed over the working population. On average, 65 percent of European workers work the mode number of hours versus 30 percent of US workers. Kuhn and Lozano (2005) show that, unlike Europe, the highest paid 20 percent of US workers in 2002 were twice as likely to work long hours than the bottom 20 percent. Also, they find that this phenomenon cannot be attributed to unionization. This is consistent with the data for the USA from the Current Population Survey for 2008. The weekly work time of workers with at most a high school degree is 42 hours, while workers with more education work 43.3, and the sample average is 42.8 hours. Note that even the low skilled US workers work much longer hours that the average of the European continental countries. These shorter hours in Europe do not seem to result from market regulations or unionization. Bell and Freeman (2001) find that European workers would prefer to work less rather than more while the opposite is true for Americans.

[8]For instance, about 60 percent of Americans versus an average of 20 percent of Europeans believe that laziness is the main source of poverty (question E131 of World Values Survey, 2004). These figures are unchanged if we restrict attention to the attitude of low skilled workers toward the poor. This is noteworthy since the unskilled constitute the majority of the voting population in our model.

the basic set up, characterizes optimal labor supply and discusses the determination of sentiments. In Section 4 we examine *socioeconomic equilibria*, where the tax structure is taken as given. Section 5 studies preferences over redistribution and characterizes *politico-economic equilibria* in which taxes, sentiments and labor supply are determined jointly. In Section 6 we specify functional forms which allow us to analytically characterize the different equilibria and to study explicitly the relationship between inequality, social cohesion and redistribution. All analytical derivations and proofs are relegated to the Appendix.

# 2 Related Literature

This paper is related to several literatures. First, it contributes to the literature on endogenous preferences, both private and social. The latter has been the subject of a number of recent papers attempting to explain reciprocal behavior. Generally, such papers, including Rabin (1993), Levine (1998), Fehr and Schmidt (1999), Bolton and Ockenfels (2000), and Falk and Fischbacher (2006), have focused on the interaction among pairs of players where each player attempts to infer the motive of its partner and then modifies its social preferences accordingly, giving greater weight to partners who are believed to be benevolent and less weight to those who are selfish or malevolent.[9] In contrast, we consider the interaction among large groups (classes) of agents – hence, no single player is directly affected by any other – and we evaluate behavior relative to a social norm, with no attempt to infer motives.

Second, we propose a theory of the interaction between moral norms and individual behavior.[10] For the particular case of norms pertaining to work, seminal contributions by Moffit (1983) and Besley and Coate (1992) consider the case in which there is stigma associated with living on welfare. Lindbeck, Nyberg, and Weibull (1999) have extended this analysis to include voting over welfare benefits. There, individuals can choose between working full-time or being unemployed and receiving a subsidy. Agents bear a "psychic cost" from deviating from the norm and being stigmatized. However, the magnitude of this effect depends on the prevalence of such behavior – more common behavior is stigmatized less. Hence, the observed behavior of others influences the perceived cost of deviating from the norm

[9]Note that a significant impediment to extending these theories to include more than two players is the difficulty in imputing motives to a single player when the outcome depends on the behavior of all players.

[10]Elster (1989) distinguishes rational action in pursuit of future rewards from norm driven behavior. He discusses the scope of such norms to affect economic behavior – including work norms – and he considers several arguments for their existence. Some studies attempt to explain the emergence and/or persistence of different ethics or social norms. Lindbeck et al. (2006) study how parents seek to instill work norms in their children which are sustained by guilt. Tabellini (2007) studies the adoption and transmission of values of generalized morality. In contrast, the present paper investigates the economic and political consequences of such norms, taking their existence as given.

and thereby affecting the decision to do so. Similarly, in our model, the violation of work norms entails psychological costs. Following the literature in social psychology on self-regulatory emotions, individuals experience guilt or pride when their behavior respectively falls short or exceeds their own moral standards. These emotions serve a self-regulatory function: the feeling of guilt for violating the standard increases moral pressure and induces an individual to undertake reparatory actions. As a result, moral values and economic incentives jointly determine individual behavior. Our model departs from the work of Lindbeck, Nyberg, and Weibull (1999) in two essential ways. First, we focus on the intensity of work effort, which here varies continuously, versus the binary choice of working full-time or living on welfare. This also implies that in our set up moral and economic incentives are non-separable and jointly influence behavior.[11,12] Second, it is crucial in our model that moral judgements befall on others as well as oneself. It is the contrast between the morally appropriate behavior and observed behavior that influences esteem.[13] This allows us to study how inequality and moral values shape the social consideration of the different groups and, accordingly, preferences for redistribution and the social contract.

Third, the paper contributes to the theoretical analysis of rational voting over redistribution. The seminal contribution of Meltzer and Richard (1981) is extended to include endogenous social preferences. When voting on redistribution in support of the poor, agents choose the level of redistribution that maximizes the sum of their egoistic utility and a (generalized utilitarian) social welfare function. Our modelling is in line with recent empirical evidence suggesting the importance of other-regarding preferences in explaining support for redistribution to the poor and on the role of moral work values. Luttmer (2001) provides evidence that attitudes toward redistribution are driven by both self-interest

[11] In particular, Lindbeck et al (1999) consider agents faced with such discrete choices. There, the moral component of the utility function is additively separable thus ruling out any influence on the substitution of labor for consumption. In their paper, "welfare stigma" entails a lump-sum psychological cost. A large body of research documents interactions between economic and non-economic incentives. Deci et al (1999) have shown definitively that tangible rewards undermine intrinsic motivation. Kehr (2004) finds that this is the case unless the extrinsic motivation does not deactivate task enjoyment. Falk and Fehr (2002, p. 713) make the point that "the convention to take the disutility of effort as exogenously given induces economists to disregard potential determinants of the (dis) utility of effort."

[12] See also Bowles and Hwang (2008) for a mechanism design approach studying the role of separability of ethical and economic incentives.

[13] Several important contributions, most notably by Bénabou (2002) and Bénabou and Tirole (2002 and 2003), have investigated the related, but different, concepts of self-confidence, self-awareness and self-motivation. These papers entail incomplete information of the motives of other agents and analyze alternative incentive schemes and signaling mechanisms. Thus, agents' motives do not change, but their knowledge of such motives does: observed behavior provides information with which to update beliefs. In contrast, in our model motives or sentiments do change. That is, observed behavior directly affects sentiments as well as determining the social standard. Finally, Brekke, Kverndokk, and Nyborg (2003) and Akerlof and Kranton (2004) also consider cases in which agents derive utility from conforming with a social norm or belonging to a group. The former considers a similar question of voluntary contributions to a public good, and the latter investigates group identification and identity. Both focus on self-image rather than passing moral judgement on others.

and interpersonal preferences and finds that support for welfare spending decreases with the recipiency rate in the community. The evidence by Fong (2001), Corneo and Grüner (2002) and Alesina and La Ferrara (2005) show that individuals who believe in the role of hard work support less redistribution. Fong (2007) finds that unconditional giving increases significantly to recipients who appeared industrious as compared to those who appeared lazy.[14] For the interested reader, Alesina and Giuliano (2009) provides a comprehensive survey including new and recent evidence on individual preferences for redistribution. To the best of our knowledge no theoretical analysis has studied the link between social preferences, moral work values and equilibrium redistribution in a unified framework.[15] Some papers consider the issue of voting and redistributive taxation when agents have an ethical point of view but without the additional element of moral values. Snyder and Kramer (1988) and Alesina and Angeletos (2005) study the choice of redistribution when individuals care about fairness. Kranich (2001) provides a theory of voting over redistribution with endogenous labor supply, but when (altruistic) social preferences are given. There, agents vote iteratively on the basis of the current distribution of income rather than fully anticipating the effect of taxes. Shayo (2009) studies the relationship between endogenous group identification and redistribution in a model in which group status is affected by wealth. He shows that demand for redistribution on the part of the poor is lower in equilibria in which the poor identify more strongly with their nation than with their socioeconomic class. The results in our paper allow us to qualify the standard median voter hypothesis predicting a positive and monotonic relationship between inequality and redistribution which, as is now well recognized, fails to hold in practice. Perotti (1996) reports the lack of any significant linear correlation while some authors, like De Mello and Tiongson (2006), find evidence of a significant non-monotonic relationship in the OECD countries.[16] In line with these findings, our results suggest a possible non-monotonic relationship between inequality and social attitudes toward redistribution. The social consideration of each group is related to the labor supply of its members. As a result, there is less support for progressive redistribution when the poor are considered (partially) responsible for their low income due to their low effort.

[14] In their field experiment, Fong and Luttmer (2009) manipulated respondents' perceptions of the income, race and deservingness of Katrina victims. They find that subjective support for government spending to help the victims is significantly affected by deservingness manipulations.

[15] The role of work values on voting behavior has been recognized for some time in other social sciences (see Kinder and Sears (1988)) although no formal theory has been proposed.

[16] Rodriguez (1999) also fails to find evidence within US states. Milanovic (2000), despite finding a negative correlation between inequality and redistribution, finds no evidence that the median voter receives income gains from fiscal redistribution. See also Bénabou (1996 and 2000) for extensive surveys of the evidence. Non median voter theories of redistribution include Roemer (1998) which argues that the redistributive issue may be less salient than others, e.g. religion, and Rodriguez (2004) which shows that if political influence is exerted by lobbying or campaign contributions, then larger inequality may lead to low redistribution.

Finally, the paper contributes to the debate on the cause and interpretation of the observed differences between the "social contracts" of the United States and continental Europe. There have been some attempts to explain such differences on the basis of capital market imperfections, the role of luck versus effort in determining future income, and real or perceived differences in income mobility. Bénabou (2000) shows that in the presence of capital market imperfections there is a trade-off between the efficiency gains from greater redistribution and the efficiency losses from increased tax distortions. In his model, there are multiple equilibria each associated with a different social contract.[17] Hassler, Rodriguez Mora, Storesletten and Zilibotti (2003) present a dynamic voting model in which individuals' expectations about redistribution and investment in education can be mutually supportive in equilibrium, thereby affecting the correlation between effort and income. Thus, if agents expect high taxes, they will be less likely to invest in education, which will reduce their future earnings and increase the likelihood they will support greater redistribution. Conversely, if they anticipate that taxes will be low, they will increase educational expenditure and thus earnings and will be less likely to support redistribution. Bénabou and Ok (2001) present a model in which the (egoistic) poor face upward mobility prospects, and they characterize conditions under which the poor would rationally vote for a moderate level of redistribution. Piketty (1995) investigates the role of beliefs concerning the relative importance of luck and effort in income production and shows that they can be self-fulfilling. Similarly, in a model in which individuals have preferences for fairness and vote over taxes, Alesina and Angeletos (2005) show that there may be multiple, self-supporting equilibria in which a society that believes that inequality is (unfairly) due to luck will vote for more redistribution which will reduce the returns to effort and increase the role of luck. This mechanism therefore requires a larger social mobility in the US compared to Europe in equilibrium. Bénabou and Tirole (2005) explore the cognitive hypothesis that individuals may censor evidence on social mobility that conflicts with their perception of reality, and they study the implications for redistributive politics. The resultant overly optimistic beliefs tend to moderate support for redistribution. As in the model proposed here, the last papers provide a rationale for the observation that redistribution in the US is lower than in Europe despite the larger income inequality. In these papers the explanation crucially rely on the differences in real (or in the perceived) degree of social mobility.[18] In our paper, in turn, the emergence of different

[17]See Bénabou (1996) for an excellent and comprehensive survey of the literature on the different channels through which capital market imperfections create inefficiencies in unequal societies.

[18]The evidence about the actual differential in social mobility in US and EU is highly debated, however. For example the data reported in the OECD report on economic policy growth 2010 (chapter, 5) put into question the commonly held view that social mobility is larger in the US than in Europe and actually suggest that US has a low social mobility (similar to France or Italy) while the nordic countries are more mobile. The report is available at http://www.oecd.org/dataoecd/17/42/44566315.pdf. Concerning the empirical evidence, Fong (2006) finds that moral

social contracts is not related to different real or perceived level of social mobility but only on to the different spread in labor supply in the economy. Finally, a novel contribution of the paper, other than offering a further explanation for the emergence of different social contracts, is that sentiments are determined endogenously as are the distinct perceptions of the *cause* of poverty and attitudes toward the poor. Because the poor are held responsible for their low income in a clustered equilibrium, they are perceived as being lazy and support for redistribution is low. Conversely, in a cohesive equilibrium all agents supply the same quantity of labor. Hence, the unskilled have lower earnings for reasons beyond their control, or due to luck. In this case there is support for greater redistribution. The ultimate determinant of which type of equilibrium will prevail is the degree of pre-tax inequality.

# 3 The Model

## 3.1 Set Up

There are two commodities, consumption $c$ and labor $L$, and a continuum of agents on $[0, 1]$. Individuals are of one of two types, skilled or unskilled, distinguished by their productivities/wages, $\beta_s$ and $\beta_u$, respectively, where $\beta_u < \beta_s$. Average productivity is denoted $\beta$ while $\boldsymbol{\beta} \equiv (\beta_u, \beta_s)$ is the vector of productivities. Let $\pi$ denote the proportion of individuals of type $s$. We assume $\pi < \frac{1}{2}$, reflecting the fact that a majority of agents are unskilled. The amount of *effective labor* supplied by an individual with productivity $\beta_i$ is $\beta_i L_i$, for $i = u, s$. We assume output depends linearly on effective labor so that $Y = (1 - \pi)\beta_u L_u + \pi\beta_s L_s$. Labor income is subject to a purely redistributive linear income tax described by the pair $(\tau, T)$, where $\tau \in [0, 1]$ is the constant marginal tax rate and $T$ is a budget-balanced uniform per capita transfer. $y_i = \beta_i L_i$ is the pre-tax income of individual $i$ and $y$ is average income. Individual after-tax disposable income is $(1 - \tau)\beta_i L_i + T$, which we assume is entirely consumed.

The overall welfare evaluation of an individual of type $i$, which we denote $V_i$, is composed of the sum of two components, private utility, $v_i$, and social utility, $w_i$. The latter captures the effect of $i$'s social concern for others and is studied in detail below. Hence, we have

$$V_i = v_i + w_i.$$

*Private utility.* Focusing first on $v_i$, we assume, as in Lindbeck et al. (1999), that private utility

worthiness is a more robust predictor of attitudes toward redistribution than prospective social mobility.

depends on consumption, $c_i$, and leisure, $l_i \in [0, \overline{L}]$ ($L_i = \overline{L} - l_i$), as well as on the variable $\varphi_i$, which is related to self-esteem. While $\varphi_i$ will be determined endogenously through social interaction, for now we take it as given. We denote $\boldsymbol{\varphi} \equiv (\varphi_u, \varphi_s)$ with $\varphi_i \in [\underline{\varphi}, \overline{\varphi}]$.[19] Thus, we write

$$v_i = v(c_i, l_i, \varphi_i).$$

We assume $v$ is strictly increasing and concave, that consumption and leisure are both normal goods, and that $v_{cl} \geq 0$. We also assume initially that $v$ satisfies the standard Inada conditions.[20] Self-esteem $\varphi_i$ influences the relative enjoyment of consumption and leisure, i.e., their marginal rate of substitution, according to

$$\frac{d}{d\varphi_i}\left(\frac{v_l}{v_c}\right) > 0. \tag{1}$$

As discussed below, self-esteem evolves depending on the comparison between actual behavior and what is taken to be appropriate behavior based on the moral standards. Condition (1) therefore implies that the more one works, the greater the sense of satisfaction at "working hard" and hence the feeling that additional leisure is "well deserved."

*Social utility.* Turning to the social or altruistic component of the utility, we assume $w_i$ consists of a weighted sum of the private utilities of the other agents. The social component of overall utility is given by

$$w_i = \sigma_{i,u} v_u + \sigma_{i,s} v_s$$

where $\sigma_{i,j} \in [0, 1]$ is the weight that agent $i$ allocates to the group of agents of type $j$.

### 3.2 Labor Supply

The choice variables in our model are labor supply, $L_i$, and the voting decision or preferred marginal tax rate, $\tau_i$. ($T$ will be determined by balancing the public budget and sentiments will be determined endogenously as a result of the labor supply decisions.) In this section, however, we focus on the labor supply decision only, taking the tax policy (and sentiments) as given.

Since there is a continuum of agents, each individual is negligible with respect to the entire economy. Therefore, their choice of labor supply cannot have a direct effect on the well-being of other agents.

[19] Since agents differ only in their productivities, all agents of the same type will behave in the same fashion in equilibrium. Hence, in our behavior-based theory of endogenous sentiments, we assume all such agents of the same type have the same self-esteem and regard for others.

[20] We assume the Inada conditions ($\lim_{c\to 0} v_c = \infty$, $\lim_{c\to\infty} v_c = 0$, $\lim_{l\to 0} v_l = \infty$, and $\lim_{l\to \bar{L}} v_l = 0$) are satisfied in order simplify the exposition by insuring interior solutions. However, we relax this assumption in the second part of the paper where we illustrate the working of the model by means of a quasi-linear utility specification.

Consequently, in determining individual labor supply, only the private component of utility matters. (The social component will play a role in voting over taxes.) Thus, individual $i$ chooses its labor supply to maximize its private utility subject to the individual budget constraint that is, $i$ solves

$$\max_{L_i} v\left(c_i, \overline{L} - L_i, \varphi_i\right)$$
$$\text{s.t.} \begin{cases} c_i = (1-\tau)\,\beta_i L_i + T \\ L_i \leq \overline{L} \end{cases}$$

Since $v$ is concave and satisfies the Inada conditions, it follows that the labor supply function is implicitly defined by the first order condition,

$$\frac{v_l\left((1-\tau)\beta_i L_i + T, \overline{L} - L_i, \varphi_i\right)}{v_c\left((1-\tau)\beta_i L_i + T, \overline{L} - L_i, \varphi_i\right)} = (1-\tau)\,\beta_i. \tag{2}$$

Expression (2) implicitly defines the optimal labor supply as a function of the relevant parameters:

$$L_i = \lambda((1-\tau)\,\beta_i, \varphi_i, T). \tag{3}$$

Next, we evaluate the comparative statics of labor supply. Totally differentiating with respect to $L_i$ and $\beta_i$ in (2) and assuming that the elasticity of the marginal utility of consumption with respect to labor is low enough insures that labor supply increases with the wage,[21]

$$\frac{dL_i}{d\beta_i} > 0 \tag{4}$$

Note that the marginal rate of substitution between consumption and labor depends on $\varphi_i$, thereby affecting the labor supply decision. From (1) together with the first order condition (2) we have

$$\frac{dL_i}{d\varphi_i} < 0. \tag{5}$$

Hence, the marginal effect of an increase in $\varphi_i$ is to reduce labor supply. As discussed in greater detail below, low self-esteem $\varphi_i$ brought on by the perception of oneself as lazy induces guilt which increases the moral pressure to work. From (4) and (5), the labor supply function characterized in (3) thus has the property that both higher economic rewards (net wage) and increased moral pressure (low

[21]See the Appendix. The restriction on the elasticity of marginal utility of consumption is unnecessary in the second part of the paper where we consider quasi-linear utility.

self-esteem) increase labor effort.

Having determined agents' labor supplies, we turn now to the issue of how their behavior affects their self-esteem as well as their consideration of others.

### 3.3 Work Norms, Self-Regulatory Emotions and Behavior

A vast literature in social psychology studies the role of moral values as determinants of individual behavior and of social interactions. Rokeach (1973) defines values as general and enduring standards that help us "to evaluate and judge, to heap praise and fix blame on ourselves and others." Particularly important for the economic domain are moral values concerning work and industriousness. As Lukes (1973) notes, "work values" are crucial in western culture which "... celebrates the virtues of hard work and sacrifice. It equates idleness with sin."

There is ample evidence that deviations from social norms or behavioral standards affect both self-esteem and the consideration of others. Individuals who fail to meet standards loose stature while individuals exceeding them gain. Similarly, individuals' self-esteem depends on the comparison between their own behavior and that of others. Agents who fail to perform according to socially accepted norms experience guilt while those whose behavior exceeds expectations experience pride. A large and established body of evidence documents the self-regulatory role of these emotions. As Tangney (2002) describes, "When we violate important standards, we are inclined to experience negative self-conscious emotions, such as shame, guilt, and embarrassment. When we meet or exceed standards, we are inclined to experience pride and attendant increases in self-esteem. Thus, guilt decreases self-worth and pride increases it."[22] In addition, the self-regulative role of moral values has been investigated in experimental settings, where participants who experience guilt are much more likely to comply with moral standards.[23,24]

Note that moral values constitute only one of the relevant psychological factors that influence work effort. Research in social psychology has documented a number of important determinants.[25]

[22]For detailed surveys of the literature in social psychology relating social and self consideration to moral standards we refer the reader to Tangney (2002), Tangney and Dearing, (2002) and Crocker and Park (2003).

[23]See e.g. Freedman et al. (1967), and Tangney (1995, 2002).

[24]In addition to the established evidence in experimental psychology, an increasing number of neurobiological studies document the key role of social self-conscious emotions for moral judgment and behavior (see Greene et al. (2001), Koenigs et al. (2007) and references therein). Koenigs et al. (2007) discuss previous findings and provide evidence based on functional magnetic resonance imaging and experiments. They find that patients with focal bilateral damage to the ventromedial prefrontal cortex (the brain region necessary for the generation of social emotions) produce an abnormal response to moral dilemmas. The findings support the necessary role of social emotions for moral behavior.

[25]Most of these studies concern work inside organizations rather than in society at large. For example, Latham and Pinder (2005), in their recent survey of theories and empirical evidence, document the importance of job characteristics and design and perceived fairness on the job or task enjoyment, along with values and self-regulation. These results

While we do not wish to dismiss the importance of other factors, here we concentrate on moral values and moral emotions in order to identify their implications. Similarly, following Rosenberg (1965), psychologists treat self-evaluation as multidimensional, comprising notions of perceived worth both in relation to moral standards and in relation to competence in task performance. In particular, the literature distinguishes between self-esteem, which is affected by self-conscious emotions such as guilt and pride, and self-confidence, which concerns beliefs about one's ability to perform. Here, too, we abstract from issues of doubt concerning competence and restrict our attention to moral values.[26]

Our modeling of the role of work values is in keeping with the literature on moral values and self-regulative emotions. We assume agents have standards of appropriate behavior and that they judge their own behavior and that of others relative to the standard. Those who work more than the standard are considered industrious and those who work less are considered lazy. This affects the social consideration they are afforded by other agents. In addition, those whose labor supply exceeds the norm experience pride and those who work less experience guilt. Such changes in sentiments affect the both the labor supply decision as well as attitudes toward redistribution. In the case of the former, the "reparative action" brought on by guilt is to increase one's labor supply.

To capture this feedback loop between sentiments and behavior, we envision a discrete time adjustment process in which labor supply decisions are made on the basis of current sentiments (as described in the previous section) and sentiments change in response to the labor supply decisions.[27] Regarding the consideration of others, we assume social concern is initially distributed in proportion to population. Then, as agents' labor supply exceeds or falls short of the social norm, social sentiments are adjusted according to[28]

$$\sigma_{i,j}(t) = \frac{\pi L_j(t-1)}{L_{i,j}^M(t-1)}, \tag{6}$$

are closely related to the literature on intrinsic and extrinsic motivation (Deci (1971)). In economics this issue was first discussed by Kreps (1997) and Frey (1997). Frey and Jegen (2001) survey the theory and evidence on the role of non-economic motivation. See also Gneezy and Rustichini (2001), Falk and Fehr (2002), and Murdoch (2002).

[26] Changes in self-esteem and self-confidence also tend to affect behavior differently. While a reduction in self-confidence (e.g., a decrease in one's perceived competence in a task) tends to decrease effort, a reduction in self-esteem (e.g. due to guilt from having failed to meet a standard) tends to increase it. Recently, both concepts have been incorporated into economic models. Most prominently, Lindbeck et al. (1999, 2006) study the role of self-regulatory emotions and moral standards, while the cited works by Bénabou and Tirole study the role of self-confidence in environments with uncertainty and asymmetric information.

[27] In spite of the fact that we formally introduce time, the model is essentially static. Our goal is simply to characterize the fix points of the adjustment process for self-esteem and social consideration. Describing these effects in terms of a discrete time adjustment process clarifies the information agents have available at the moment of making their labor supply and voting decisions.

[28] The assumption that social consideration is allocated in proportion to labor supply is made for simplicity. One could alternatively assume that *deviations* from an initial distribution are allocated in proportion to labor supply. This would allow for an initial bias in favor of the poor when their low earnings occur through no fault of their own. Also, one could rescale the allocation of social esteem to reflect the findings in Luttmer (2001) that individual support for redistribution is larger if it helps members of the same group. All qualitative results would be unchanged.

where $L_j(t-1)$ is actual labor supply of individual $j$ at time $t-1$ while $L^M_{i,j}(t-1)$ represents the moral standard by which individual $i$ judges $j$'s behavior. Formulation (6) simply means that the social concern of agent $i$ for agent $j$ changes depending on $j$'s past behavior relative to $i$'s moral standard.

Similarly, the deviation in one's own labor supply from the moral standard affects one's self-esteem according to

$$L_i(t-1) \gtreqless L^M_i(t-1) \Longrightarrow \varphi_i(t) \gtreqless \varphi_i(t-1), \tag{7}$$

where $L^M_i(t-1)$ is the moral standard to which $i$ holds himself.

In the following, we consider the benchmark where the moral standard is the average labor supply in the community:

$$L^M_i(t) = L^M_{i,j}(t) = L(t)$$

which implies that individuals judge themselves and others in comparison to $L(t)$. Notice that this benchmark ethical rule does not take personal circumstances into account when passing judgement on others.[29]

## 4 Socioeconomic Stationary Equilibria

Thus far we have explained how labor supply is determined in response to the prevailing sentiments and how sentiments vary with labor supply. Next, we analyze the stationary points of this reciprocal process. (We address the determination of the tax policy in the following section.) For given level of redistribution $\tau$ we wish to consider combinations of labor supply, self-esteem and social consideration $(L, \varphi, \sigma)$ such that for each individual $i, j = u, s$: *(a)* labor supply $L_i$ is optimal according to (3) given $\varphi_i$, and *(b)* both $\varphi_i$ and $\sigma_{i,j}$ are stationary given the vector of labor supply $L$ under the adjustment processes (7) and (6), respectively. Condition *(b)* says that both social consideration and self-esteem are consistent with individual performance relative to the moral standard. We refer to such a combination as a *socioeconomic stationary equilibrium*, or SE equilibrium for short.

Notice that from (5) and (7) changes in $\varphi$ provide a countervailing force to the complete polarization of labor supply; those working less than the standard face moral pressure to work more, and vice versa.

[29] Similarly, in their model of taxpayer resentment as a determinant of welfare stigma, Besley and Coate (1992) link the stigma to being a welfare recipient, irrespective of personal characteristics. Also Lindbeck et al (1999) assume that the psychological cost of living on unemployment benefits is not conditional on one's productivity. As discussed below the consideration of personal circumstances does not affect the qualitative results as long as individual behavior is judged in comparison to a social standard.

This is similar to the welfare stigma effect in Lindbeck et al. (1999) where individuals face moral pressure to work and avoid the stigma of welfare, and they receive additional utility when they accede to this moral standard. Here, since self-esteem changes in response to observed relative performance, there is a tendency to converge to an endogenous social norm concerning effort provision. Nevertheless, as we shall see below convergence is not always possible.

To simplify notation in the following we simply denote the share of social consideration allocated to the skill workers by type $i$ as $\sigma_{i,s} = \sigma_i$ (which implies $\sigma_{i,u} = 1 - \sigma_i$). There can be two different types of SE equilibria in which economic behavior and sentiments are mutually compatible. In the first type, everyone conforms to the moral standard and supplies the average number of work hours. No agent will have a reason to modify its sentiments for any other agent or its self-esteem. Furthermore, since in this case all agents supply the same quantity of labor, equilibrium sentiments are such that $\sigma_i = \pi$, for all $i$. Hence, there is no bias or discrimination in the allocation of social consideration; i.e., the share of $i$'s social consideration allocated to the type $s$ agents corresponds to the proportion of type $s$ agents in the population. Because of this feature and the conformity of behavior, we call this type of SE equilibrium *cohesive*. The second type of equilibrium consists of corner solutions of the process of socioeconomic interactions. In such an equilibrium the population is partitioned into two groups or clusters, one set of individuals (type $s$) work above the mean and another set (type $u$) work below. In addition the poor are considered partially responsible for their low income due to their lower labor supply. Sentiments become endogenously polarized: those working below the average will be regarded as lazy and suffer from both low social consideration and low self-esteem. We call such an SE equilibrium *clustered*.

We now characterize the conditions under which either of the two types of SE equilibria exist. Recall that $\beta$ is the average productivity while $\boldsymbol{\beta} \equiv (\beta_u, \beta_s)$ denotes the vector of productivities. For given $\boldsymbol{\beta}$ and $\tau$, a cohesive SE equilibrium consists of a vector $\varphi$ such that it is optimal for both types to supply the same quantity of labor $L$. We start by noting that when $L_i = L$ for all $i$, the per capita transfer is given by $T = \tau\beta L$. Using the optimal labor supply characterized in (3), we can identify the pairs of $\varphi_i$ and $\beta_i$ for which both types would choose to supply $L$. This is given implicitly as the solution to[30]

$$\lambda\left(\left(1-\tau\right)\beta_i, \varphi_i, \tau\beta L\right) - L = 0, \text{ for } i = u, s. \tag{8}$$

[30]Note that while the following expression contains the consistency requirement $T = \tau\beta L$, the first order condition (2), from which $\lambda$ is obtained, precludes consideration of the effect of one's labor supply on aggregate transfers. Therefore, the following expression should be viewed as an accounting relationship that is required to hold at an SE equilibrium rather than as a first order condition.

Next, we investigate the combinations of productivities $\beta_u$ and $\beta_s$ and redistribution, $\tau$, such that there exist $L$ and $\varphi_i \in [\underline{\varphi}, \overline{\varphi}]$ for which (8) is satisfied for both $i = u, s$. From (5) we know that for each individual $i$, there is a maximum labor supply, denoted by $\overline{L}_i(\tau, \beta_i, \beta)$, and a minimum labor supply $\underline{L}_i(\tau, \beta_i, \beta)$ that are compatible with $\varphi_i$ being in $[\underline{\varphi}, \overline{\varphi}]$. These are given implicitly by

$$\underline{L}_i = \lambda\left((1-\tau)\beta_i, \overline{\varphi}, \tau\beta\underline{L}_i\right) \text{ and } \overline{L}_i = \lambda\left((1-\tau)\beta_i, \underline{\varphi}, \tau\beta\overline{L}_i\right).$$

The next proposition establishes that a necessary and sufficient condition for the existence of a cohesive SE equilibrium is that the intervals $[\underline{L}_u, \overline{L}_u]$ and $[\underline{L}_s, \overline{L}_s]$ have a non-empty intersection. Conversely, that the intersection is empty is both necessary and sufficient for there to exist a clustered SE equilibrium.

**Proposition 1.** *For any $(\boldsymbol{\beta}, \tau)$ the following hold:*

*i) A cohesive SE equilibrium exists if and only if $\overline{L}_u(\tau, \beta_u, \beta) \geq \underline{L}_s(\tau, \beta_s, \beta)$. In this case there are generally multiple equilibria. That is, for every $L^o \in [\underline{L}_s(\tau, \beta_s, \beta), \overline{L}_u(\tau, \beta_u, \beta)]$ there exist $\varphi_u, \varphi_s \in [\underline{\varphi}, \overline{\varphi}]$ for which (8) is satisfied at $L_i = L^o$, for $i = u, s$. In all such equilibria $\sigma_i = \pi$ for all $i$.*

*ii) A clustered SE equilibrium exists if and only if $\overline{L}_u(\tau, \beta_u, \beta) < \underline{L}_s(\tau, \beta_s, \beta)$. In this case, the equilibrium is unique and is given by:*

$$L_u = \lambda\left((1-\tau)\beta_u, \underline{\varphi}, T\right) < L_s = \lambda\left((1-\tau)\beta_s, \overline{\varphi}, T\right)$$

*where $\varphi_u = \underline{\varphi}$, $\varphi_s = \overline{\varphi}$ and $\sigma_i = \pi L_j / L$ for all $i$.*

This proposition establishes that one or the other, but not both, of the two types of SE equilibrium will always exist. For any $\boldsymbol{\beta}$ it may be possible to observe multiple cohesive equilibria parameterized by the degree of industriousness and sustained by different degrees of moral pressure to work, while, when it exists, the clustered equilibrium is unique. Whether the equilibria are cohesive or clustered depends crucially on both the degree of inequality in productivity and the level of redistribution $\tau$. If inequality in productivity between the skilled and the unskilled is too large, then the moral pressure to work will be insufficient to overcome the difference in wage payments, and cohesiveness will not be sustainable. On the other hand, redistribution tends to equalize the economic rewards to labor for the two types of workers and hence changes the relative return of moral and economic rewards to effort. These issues are investigated in greater detail in the next section where we consider the endogenous choice of redistributive policy.

Before turning to this, however, we highlight the relative differences of the two types of agents in any stationary equilibrium. In a clustered SE equilibrium the unskilled are poorer and less industrious than the skilled despite facing larger moral motivation to work.[31] Also in any cohesive SE equilibrium in which (8) is satisfied by both types for the same $L$, totally differentiating this expression with respect to $\beta_i$ and $\varphi_i$ and using (4) and (5), we readily obtain that

$$\frac{\partial \varphi_i}{\partial \beta_i} > 0.$$

Hence, in a cohesive equilibrium where all individuals work the same it must be that those who receive lower economic rewards (a low $\beta_i$) feel more moral pressure to work (a lower $\varphi_i$). The opposite is true for the more productive workers for which the larger economic incentives make it easier to fulfill the moral standard.

**Proposition 2.** *In any stationary SE equilibrium the individuals with lower productivity have lower $\varphi$, that is, they face higher moral motivation to work than those with high productivity.*

This result critically depends on the assumption, standard in social-psychology, that the emotions produced by deviations from moral standards have a self-regulatory role. In particular, guilt from failing to meet the work standard decreases self-esteem which increases the moral pressure to work by increasing the *MRS* between consumption and leisure. This self-regulatory role of guilt (and conversely pride) implies that moral values and economic incentives are substitutes. The resulting adjustment process is stable and leads to work in accordance with the standard unless inequality is excessively large.[32]

## 5 Endogenous Redistribution

So far we have taken $\tau$ as given, and we have seen that attitudes and behavior will differ depending upon the type of socioeconomic equilibrium to emerge. We begin this section by considering the opposite: what level of redistribution will be chosen by a group of individuals with given sentiments? We then categorize the effect of taxes in determining the type of SE equilibrium.

[31]Note that this does not imply that the low skilled work less in a clustered equilibrium than in a cohesive equilibrium. Indeed, in Section 6 we discuss the possibility that low skilled in a clustered equilibrium work more than the common amount in a cohesive equilibrium.

[32]For completeness, in the appendix we include a brief discussion of the case where moral and economic incentives are complements. We show that for the case of linear utility the maximum level of inequality for which there exist cohesive equilibria is exactly the same as for the substitute case. Hence, the self-regulative role of moral values is not necessary for the existence of cohesive equilibria. However, in this case such equilibria are unstable and a clustered equilibrium would be likely to occur.

### 5.1 From Sentiments to Taxes

On the majoritarian choice of income tax schedules we follow the approach developed by Romer (1975), Roberts (1977) and Meltzer and Richard (1981). In our case, unskilled workers constitute the majority and hence we shall mainly focus on their preferences over taxes. Given their sentiments, individuals vote over redistribution. When voting, agents are aware of the distortions caused by income taxation on labor supply and anticipate the existence of a public budget constraint. Therefore, from equation (3), for given $\varphi_i$, the optimal labor supply is a function of the tax rate $\tau$ and of the per capita transfers $T$: $L_i(\boldsymbol{\beta}, \boldsymbol{\varphi}, \tau, T)$ for $i = u, s$. Notice, however, that the existence of the public budget allows us to express the per capita transfer as a function of the tax rate. From the public budget constraint all tax revenues are used to finance the lump sum transfers. Given optimal labor supply (3) we have that

$$T = \tau\left[(1-\pi)y_u(\tau, T) + \pi y_s(\tau, T)\right] \equiv \tau y(\tau, T) \tag{9}$$

As in Meltzer and Richard (1981), for any $\tau$ the assumed normality of leisure insures that the right hand side of (9) is a strictly decreasing function of $T$ implying that for any $\tau$ there exists a unique $T$ which balances the public budget. This allows us to express the per capita transfer and the individual indirect private utility as a function of $\tau$ only,

$$\nu_i(\tau) \equiv v_i\left((1-\tau)\, y_i(\tau) + \tau y(\tau), \overline{L} - L_i(\boldsymbol{\beta}, \boldsymbol{\varphi}, \tau)\right),$$

where $y_i(\tau) \equiv \beta_i L_i(\boldsymbol{\beta}, \boldsymbol{\varphi}, \tau)$ and $y(\tau) \equiv [(1-\pi)\, y_u(\tau) + \pi y_s(\tau)]$.

Denote by $V_u(\boldsymbol{\beta}, \boldsymbol{\varphi}, \tau)$, the indirect utility of individual $i = u$. The degree of redistribution preferred by an unskilled worker, denoted $\tau^u$, maximizes the indirect total utility subject to the public budget constraint (9), taking into account the induced change in the optimal labor supplies. Therefore, $\tau^u$ is the solution to the following maximization problem:

$$\tau^u = \arg\max_{\tau\in[0,1]} V_u(\boldsymbol{\beta}, \boldsymbol{\varphi}, \tau) \equiv \arg\max_{\tau\in[0,1]} \left\{\nu_u(\tau) + [(1-\sigma_u)\nu_u(\tau) + \sigma_u \nu_s(\tau)]\right\}.$$

Consider, first, the preferred level of redistribution of an egoistic agent. The problem is identical to that in Meltzer and Richard (1981). Its solution, as given by the following first order condition, would constitute the majoritarian choice since the unskilled comprise a majority of the population:[33]

$$\frac{d\nu_u(\tau)}{d\tau} = \frac{\partial v_u}{\partial c}\left[y - y_u + \tau\frac{dy}{d\tau} + (1-\tau)\beta_u\frac{\partial L_u}{\partial \tau}\right] + \frac{\partial v_u}{\partial L_u}\frac{\partial L_u}{\partial \tau} = 0.$$

Using the first order condition for labor supply (2), this condition simplifies to

$$\frac{d\nu_u}{d\tau} = \frac{\partial v_u}{\partial c}\left[y - y_u + \tau\frac{dy}{d\tau}\right] = 0. \tag{10}$$

Therefore, the preferred tax rate is increasing in inequality (i.e., $y - y_u$). Let us denote by $\tau^e$ the tax rate satisfying the first order condition for an interior optimum in the egoistic case (10).

When individuals have social preferences, their attitude toward redistribution is affected by the relative consideration of the different groups. The marginal effect on total utility of a variation in $\tau$ is given by

$$\begin{aligned}\frac{dV_u(\tau)}{d\tau} = & \frac{\partial v_u}{\partial c}\left[y - y_u + \tau\frac{dy}{d\tau}\right] + \\ & + \left\{(1-\sigma_u)\frac{\partial v_u}{\partial c}\left[y - y_u + \tau\frac{dy}{d\tau}\right] + \sigma_u\frac{\partial v_s}{\partial c}\left[y - y_s + \tau\frac{dy}{d\tau}\right]\right\}.\end{aligned} \tag{11}$$

Notice that

$$\left.\frac{dV_u(\tau)}{d\tau}\right|_{\tau=\tau^e} < 0$$

which implies that when unskilled workers are socially concerned, they will prefer a tax rate smaller than $\tau^e$. An interior solution for the equilibrium tax rate $\tau^u > 0$ is characterized by setting (11) equal to zero and verifying that the indirect utility is locally concave at $\tau = \tau^u$

$$\left.\frac{d^2V_u(\tau)}{d\tau^2}\right|_{\tau=\tau^u} < 0$$

These considerations imply the following,

**Proposition 3.** *For any given allocation of social consideration across groups $\sigma$, and any $(\varphi, \beta)$ such that $y_u < y$, we have that $\tau^u < \tau^e$. That is, the majority rule tax rate is smaller than in the egoistic case. Furthermore, for any interior $\tau^u$ the equilibrium tax is decreasing in $\sigma_u$.*

This proposition implies that the individual demand for redistribution is more moderate than in the egoistic benchmark since agents with social preferences internalize the effect of redistribution on

[33] In the remainder of the section we use the abbreviated notation $L_i$ for $L_i(\boldsymbol{\beta}, \boldsymbol{\varphi}, \tau)$, $y_i$ for $y_i(\tau)$, $y$ for $y(\tau)$ and $V_u(\tau)$ for $V_u(\boldsymbol{\beta}, \boldsymbol{\varphi}, \tau)$ when no ambiguity will result.

the well being of others.[34] A larger $\sigma_u$ implies a reduction of the relative social consideration of the poor, and, accordingly, the demand for redistribution is lower. As discussed in more detail below, this implies that the support for redistributive policies in favor of the poor is lower whenever they are held responsible for the fact that their income is low partly due to their low effort provision.

### 5.2 From Taxes to Sentiments

Individuals vote over the tax policy as described in the previous subsection. But then the new tax policy might induce a change in behavior, and this, in turn, might affect agents' self-esteem and relative consideration for others. In this subsection we begin to investigate the effect of $\tau$ on the type of stationary sentiments to emerge in equilibrium.

From Proposition 1 we know that for any given level of $\tau$ a cohesive equilibrium will emerge only if the unskilled face sufficient moral pressure to work to overcome the adverse incentive effect of taxation. Indeed, if $\tau$ is too large, this may reduce the return to labor to such an extent that moral suasion is insufficient even when the moral pressure to work is maximal. The intuition behind this result hinges on the normality of leisure which implies that, ceteris paribus, the incentive to supply labor diminishes as fiscal transfers become larger and the tax rate higher. In fact for any given vector $\boldsymbol{\varphi}$, the negative effect of taxation on labor supply is stronger for unskilled workers. The logic of the argument is as follows. Consider again (8), which identifies the quantities of labor compatible with a cohesive equilibrium: $\lambda\left((1-\tau)\beta_i, \varphi_i, \tau\beta L\right) - L = 0$ for $i = u, s$. An increase in $\tau$ has two effects. In the first place it reduces the net wage of both types leading to a lower labor supply. In the second place, because of the change in the lump-sum transfer, for any given cohesive labor supply $L$, the consumption of the unskilled increases. In fact in a cohesive equilibrium the consumption of agent $i$ is given by $c_i = \left[(1-\tau)\beta_i + \tau\beta\right] L = [\beta_i + \tau(\beta - \beta_i)]L$. Hence, an individual would consume more than its pre-tax earnings if and only if its productivity is below the mean. The marginal rate of substitution between consumption and leisure increases and hence labor supply is reduced. For the unskilled workers, the two effects go in the same direction and this implies that the labor supply by the unskilled definitively decreases. For any $\beta L$, consumption decreases with $\tau$ for the skilled workers and this tends to increase labor supply. The two effects go in opposite directions so that the net result is ambiguous. This differential effect of taxation on the labor supply of the different types of agents implies that if redistribution is too large, then the economic incentives to the unskilled may be too

[34] Notice also that the level of redistribution preferred by the skilled is always lower than that preferred by the unskilled, but it is (weakly) larger than the egoistic benchmark. Hence, while the rich oppose any taxation in the egoistic benchmark, they may support redistribution in this setting. See the Appendix.

weak. Under these conditions the moral incentives are insufficient to sustain a cohesive equilibrium.

At this level of generality it is not possible to explicitly characterize the link between redistribution and social cohesion. In order to further investigate the relationship between taxation and sentiments, we now restrict attention to the family of preferences given by

$$v(c, l, \varphi) = \frac{c_i^{1-\theta}}{1-\theta} + \frac{1}{2} f(L_i) (1 + \varphi_i)$$

with $\theta \geq 0$ , $f'(.) < 0$ and $f''(.) \leq 0$.

As we shall see, the effect of redistribution on sentiments will critically depend on the relative productivity of the two types of workers, which we denote by

$$\widetilde{\beta} \equiv \frac{\beta_u}{\beta_s} \in [0, 1] \tag{12}$$

In line with the previous discussion on the differential role of redistribution on moral and economic incentives we have the following,

**Proposition 4.** *For any relative productivity $\widetilde{\beta}$, there exists a unique threshold level of redistribution $\tau(\widetilde{\beta}) \in [0, 1]$ such that for any $\tau \leq \tau(\widetilde{\beta})$ only cohesive SE equilibria exist, while for any $\tau > \tau(\widetilde{\beta})$ only clustered SE equilibria exist. Furthermore, the larger the gap in productivities the lower the threshold, i.e., the maximum level of redistribution compatible with the emergence of a cohesive equilibrium: $\partial\tau(\widetilde{\beta})/\partial\widetilde{\beta} > 0$.*

According to this proposition, the choice of redistribution $\tau$ will lead to a cohesive equilibrium if and only if taxation is sufficiently small. The opposite is true for clustered equilibria. Moreover, the maximum level of redistribution compatible with cohesive equilibria, $\tau(\widetilde{\beta})$, depends on the productivity ratio. If $\widetilde{\beta}$ is sufficiently large or sufficiently small, then the choice of taxation will have no influence on the type of equilibrium. If $\widetilde{\beta}$ is large enough, then the difference in wages is small and the economy always settles in a cohesive equilibrium. On the contrary if $\widetilde{\beta}$, then inequality in productivity is large and the economy settles in a clustered equilibrium. We state this result in the following.

**Proposition 5.** *There exist two critical levels of relative skills, $\widetilde{\beta}_0$ and $\widetilde{\beta}_1$ such that $\tau(\widetilde{\beta}_0) = 0$ and $\tau(\widetilde{\beta}_1) = 1$ with $0 \leq \widetilde{\beta}_0 \leq \widetilde{\beta}_1 < 1$. For each $\tau$ there is a threshold level $\overline{\beta}(\tau) \in [\widetilde{\beta}_0, \widetilde{\beta}_1]$ such that for any $\widetilde{\beta} > \overline{\beta}(\tau)$ only cohesive SE equilibria exist while for any $\widetilde{\beta} < \overline{\beta}(\tau)$ only clustered SE equilibria exist. Moreover, $\partial\overline{\beta}(\tau)/\partial\tau > 0$.*

If relative productivity $\widetilde{\beta}$ lies outside the range $[\widetilde{\beta}_0, \widetilde{\beta}_1]$, the type of equilibrium does not depend on actual tax rate.

In summary, Propositions 4 and 5 jointly imply that if inequality is too large, that is, if $\widetilde{\beta} < \widetilde{\beta}_0$, then the equilibrium is always clustered for any $\tau$, since $\tau(\widetilde{\beta}_0) = 0$. On the opposite extreme if inequality is sufficiently low, $\widetilde{\beta} > \widetilde{\beta}_1$, then the equilibrium is always cohesive for any $\tau$, since $\tau(\widetilde{\beta}_1) = 1$. For intermediate levels of inequality, the type of equilibrium crucially depends on redistribution: low taxation produces cohesive equilibria and high taxation clustered equilibria.

# 6 Politico-Economic Equilibria

In the last section we studied how sentiments affect the choice of taxes and how the level of redistribution leads to different equilibrium sentiments. We now focus on the full politico-economic equilibrium of the model (henceforth PE equilibrium) in which sentiments, labor supplies and taxes are each variable and all are required to be mutually compatible. Thus, a PE equilibrium is characterized by a vector of labor supply, sentiments and redistribution $(L, \varphi, \sigma, \tau)$ such that the economy is in socio-economic equilibrium at the tax rate $\tau$ is optimally chosen by the median voter.

## 6.1 Existence and Uniqueness

In order to study the implications of social cohesion more precisely, we now characterize the equilibria for a restricted class of economies which permit an explicit analytical solution. Specifically, we consider the following specific form of the utility function,[35]

$$v(c_i, L_i, \varphi_i) = c_i + \frac{1}{2}\left(1 - \frac{L_i^2}{2}\right)(1 + \varphi_i),$$

with $\varphi_i \in [0, 1]$. In this case, the labor supply is given by,

$$L_i(\beta_i, \varphi_i, \tau) = (1 - \tau)\beta_i \frac{2}{1 + \varphi_i}. \tag{13}$$

As an index of inequality, we use the relative gap between mean and median income,

$$I \equiv \frac{y - y_u}{y}. \tag{14}$$

[35] The linear-quadratic formulation of utility has often been adopted in the literature. See, for example, Piketty (1995) and Alesina and Angeletos (2005).

In this case $I$ is proportional to the Gini index, which is given by $G = (1-\pi) I$ (see Appendix).

We now define $\widetilde{y}_u \equiv [(1-\sigma_u)y_u + \sigma_u y_s]$ as the *moral perception of mean income* where the two incomes are considered by the moral weights $\sigma_u$ and $(1-\sigma_u)$ rather than by the population weights $\pi$ and $(1-\pi)$. This reflects the fact that the former may be biased in assigning greater weight to one group than their population proportion warrants. We take a measure of such bias to be

$$\delta \equiv \frac{(y - \widetilde{y}_u)}{y}.$$

Hence, the morally perceived inequality, $\delta$, is the relative difference between the true mean and the moral perception of mean income. In a cohesive equilibrium $\sigma_u = \pi$, and hence $\delta = 0$. In a clustered equilibrium the poor are considered partially responsible for their low income so that $\sigma_u > \pi$ and we have $y < \widetilde{y}_u$ and hence $\delta < 0$. Because of the linearity of the labor supply functions (13) the bias $\delta$ depends on exogenous parameters only and is independent of $\tau$.

The indirect private utility of an individual of type $i$ is given by

$$v(\tau, T, \beta_i, \varphi_i) = \frac{(1-\tau)^2 \beta_i^2}{(1+\varphi_i)} + T(\tau) + \frac{1}{2}(1+\varphi_i). \tag{15}$$

Let us now turn to the conditions for an interior optimum for redistribution. Using the labor supply functions (13), one can show that the indirect total utility is a quadratic function of $\tau$. Furthermore $V_u(0) > V_u(1)$. Therefore, $\partial V_u(0)/\partial\tau > 0$ is necessary and sufficient for the existence of a unique interior optimum.

**Proposition 6.** *For any* $(\sigma, \beta, \pi)$ *the tax rate* $\tau^u$ *preferred by the median voter is given by*

$$\tau^u = \frac{I+\delta}{2+I+\delta}, \text{ if } \pi > \frac{1}{2}\sigma_u, \tag{16}$$

*and* $\tau^u = 0$ *otherwise.*

Inspection of (16) reveals that, ceteris paribus, the chosen tax is increasing in $I$ and in $\delta$. As mentioned earlier, if agents are not endowed with social preferences, then the problem becomes identical to Meltzer and Richard (1981) and the demand for redistribution is increasing with inequality $I$. With social preferences and given $\delta$, as in Proposition 3, the equilibrium demand for redistribution is more moderate than under pure egoism. As for the role of the bias in individual sentiments, the direction in which $\tau^u$ diverges from the benchmark case is determined by the sign of $\delta$. If $\delta < 0$ the support for redistribution towards the poor is low since they receive relatively low social consideration. In a sense in a clustered equilibrium the poor are held partly responsible for their low income due to their lower effort provision.

We now characterize the PE equilibria. We begin by restating the conditions of Proposition 5. Due to the linearity of the labor supply function (13) the thresholds $\widetilde{\beta}_0$ and $\widetilde{\beta}_1$ coincide. To see this, note that according to (13), the extreme values of $\overline{L}_u(\boldsymbol{\beta})$ and $\underline{L}_s(\boldsymbol{\beta})$ are

$$\begin{aligned}\overline{L}_u(\boldsymbol{\beta},\boldsymbol{\tau}) &= 2(1-\tau)\beta_u \\ \underline{L}_s(\boldsymbol{\beta},\boldsymbol{\tau}) &= (1-\tau)\beta_s.\end{aligned}$$

Hence, an economy is in a cohesive PE equilibrium, i.e., $\overline{L}_u(\boldsymbol{\beta},\boldsymbol{\tau}) \geq \underline{L}_s(\boldsymbol{\beta},\boldsymbol{\tau})$, if and only if

$$\beta_s \leq \frac{L}{(1-\tau)} \leq 2\beta_u. \tag{17}$$

Expression (17) gives the pairs $(\tau, L)$ that are consistent with a cohesive PE equilibrium. From Proposition 5 and using (17) we have that the economy will be in a cohesive (respectively clustered) equilibrium only if

$$\widetilde{\beta} \geq (<) \frac{1}{2}. \tag{18}$$

Denote by $I^*$ and $I^o$ the level of inequality in cohesive and clustered equilibria, respectively. By linearity of the labor supply in $\tau$, (13), the level of inequality is independent from the level of redistribution. Substituting equilibrium labor supply into (14), we obtain

$$I^* = \frac{\pi\left(1-\widetilde{\beta}\right)}{\pi+(1-\pi)\widetilde{\beta}} \text{ if } \widetilde{\beta} \geq \frac{1}{2} \text{ and } I^o = \frac{\pi\left(1-2\widetilde{\beta}^2\right)}{\pi+(1-\pi)2\widetilde{\beta}^2} \text{ if } \widetilde{\beta} < \frac{1}{2}. \tag{19}$$

Therefore, we can examine the characterization of the politico-economic equilibrium separately in the two ranges $\widetilde{\beta} \gtrless 1/2$. We next show that a multiplicity of cohesive equilibria can emerge. In spite of this all are characterized by the same degree of income inequality, which depends only on the exogenous ratio of productivity $\widetilde{\beta}$ and group size $\pi$. We have the following:

**Lemma 1.** *The degree of income inequality in a clustered (cohesive) economy is always larger (smaller) than $\overline{I}$ and*

$$I^*(1/2) = I^o(1/2) = \overline{I} \equiv \frac{\pi}{1+\pi}.$$

Next, we characterize the features of both cohesive and clustered equilibria.

First, in a cohesive equilibrium all individuals contribute equally to total labor supply so that social consideration is unbiased: $\delta = 0$. As established above, for any $\tau^u$ there is a range of labor supplies that can be supported in equilibrium, specifically, those levels given by (17). However, as our next proposition establishes, there is a unique level of redistribution.

**Proposition 7.** *For any $(\boldsymbol{\beta}, \pi)$ such that $I^* \leq \overline{I}$, the PE equilibrium is characterized by a unique level of redistribution given by*

$$\tau^* = \frac{I^*}{2 + I^*}. \tag{20}$$

*and by a level $L = L_u = L_s$ satisfying (17) given $\tau^*$ resulting from (20).*

For any $I < \overline{I}$ there is a multiplicity of cohesive equilibria with a unique level of redistribution $\tau^*$, characterized in (20), and different levels of $L$ satisfying the bounds established in (17). This multiplicity is sustained by different levels of $\varphi_i$. Notice that the range of equilibrium levels of $L$ shrinks as $I$ gets larger, and in the limit, when $I^* = \overline{I}$, the cohesive equilibrium level of $L$ is unique and given by $L = (1 - \pi)\, 2\beta_u + \pi\beta_s$.

Turning now to clustered equilibria the moral bias is given by (see Appendix),

$$\delta^o = -\pi\,(1 - \pi)\,\frac{1 - 2\widetilde{\beta}}{\pi + (1 - \pi)\, 2\widetilde{\beta}}\,\frac{1 - 2\widetilde{\beta}^2}{\pi + (1 - \pi)\, 2\widetilde{\beta}^2}. \tag{21}$$

We know from Proposition 5 that if income inequality is large enough, i.e. $I^o > \overline{I}$, only clustered equilibria exist. In these equilibria both inequality $I$ characterized in (19) and the moral bias (21) do not depend on the tax rate. The equilibrium level of redistribution in clustered equilibria is therefore characterized in,

**Proposition 8.** *For any $(\boldsymbol{\beta}, \pi)$ with $I^o \geq \overline{I}$, there exists a threshold $I_c \in \left(\overline{I}, 1\right)$ such that the unique clustered PE equilibrium tax is given by*

$$\tau^o = \left\{ \begin{array}{ll} \frac{I^o + \delta^o}{2 + I^o + \delta^o} & \text{if} \quad I \in \left[\overline{I}, I_c\right) \end{array} \right. , \tag{22}$$

*where $I^o$ is given in (19) and $\delta^o$ in (21), while $\tau^o = 0$ if $I \in (I_c, 1]$.*[36]

In the clustered equilibrium, differently from a cohesive one, the level of equilibrium redistribution depends on both the level of income inequality $I$ and the moral bias $\delta$.

[36] For clustered equilibria, the condition identifying $I_c$ can be rewritten as $\sigma_u \geq 2\pi$, which at the equilibrium value of $\sigma_u$ (from (6)) is equivalent to $\widetilde{\beta} \leq (1 - 2\pi)\,/4\,(1 - \pi)$. Using this information, one can obtain the unique threshold $I_c$ from (19).

## 6.2 Inequality, Industriousness, Social Cohesion and Redistribution

We now investigate the relationship between income inequality and equilibrium redistribution. In the previous subsection we saw that for low levels of inequality there is generally a continuum of cohesive PE equilibria. But for all such equilibria, inequality is the same and given by $I^*$ in (19), which depends only on the exogenous parameters $\pi$ and relative productivity $\widetilde{\beta}$. For high levels of inequality the economy has a unique clustered PE equilibrium, with the corresponding degree of inequality given by $I^o$ in (19). In this case, too, the clustered PE equilibrium tax $\tau^o$ depends – via $\delta^o$ – on $\pi$ and $\widetilde{\beta}$, as well as on $I^o$. In the following exercise, we hold the groups size, $\pi$, constant and classify different economies/levels of inequality by variations in relative productivity $\widetilde{\beta}$.

We have the following,

**Lemma 2.** *For $I \leq \overline{I}$, $\delta = 0$, and for $I > \overline{I}$, $\delta < 0$ with $\partial\delta/\partial I < 0$.*

Lemma 2 characterizes the bias $\delta$ for economies with different inequality. While in any cohesive equilibrium $\delta = 0$, in clustered equilibria there is a bias against those perceived as lazy. Furthermore, the bias is increasing with inequality since it is associated to larger differences in labor supply between the unskilled and the skilled.

Finally we characterize the equilibrium level of redistribution as a function of inequality. The following Proposition establishes the relationship between inequality and equilibrium redistribution in both cohesive and clustered economies. The observation that the bias $\delta$ is increasing in inequality implies that the equilibrium level of redistribution may be non-monotonic.

**Proposition 9.** *For any $\pi$ the following hold:*

*(i) For any $I \leq \overline{I}$, the economy is in a cohesive PE equilibrium and the level of redistribution $\tau^*$ is strictly increasing in inequality.*

*(ii) For any $I \geq \overline{I}$, the economy is in a clustered PE equilibrium and the level of redistribution $\tau^o$ is a non-monotonic function of inequality: there exists a level of inequality $I^s > \overline{I}$ at which $\tau^o$ is maximal. Furthermore, for any $I \geq I_c > \overline{I}$, $\tau^o = 0$.*

Figure 1 illustrates these findings.

Proposition 9 states that in cohesive economies, higher inequality is always associated with higher taxation. But as inequality increases beyond the threshold and the economy becomes clustered, eventually the equilibrium tax rate declines. Hence, the model predicts a non-monotonic relationship

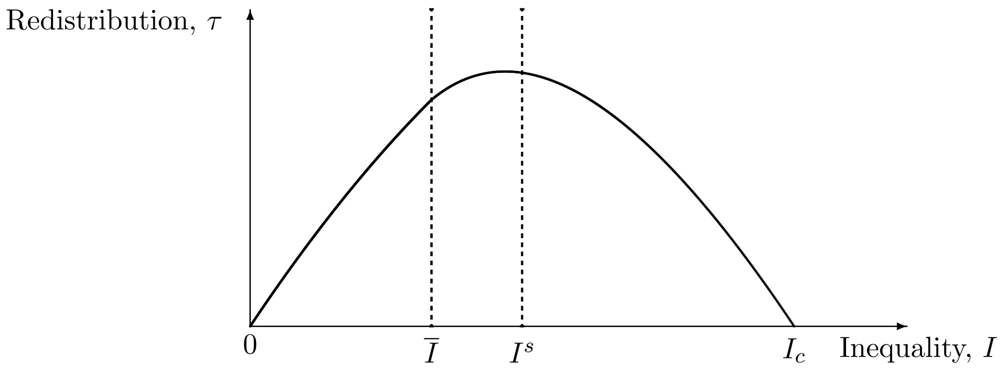


Figure 1: Inequality, Social Clustering and Redistribution

between inequality and redistribution.[37] The intuition behind this result is as follows. Individual utility combines an egoistic component and a social component. Consider, first, the case of an economy with a low inequality settling in a cohesive equilibrium. As in the standard non-altruistic utility benchmark, the egoistic component would lead to an increase in taxation in response to higher inequality. As for the social component, because of the absence of any bias in a cohesive equilibrium, it would mimic the choice of taxation by a utilitarian social planner. Hence, when we take the two components together, an increase in inequality would unambiguously lead to an increase in taxation. In clustered economies, the low skilled individuals work below average and, as a result, their low income is partially attributable to their low effort. As a result the support for redistribution in favor of the poor is reduced since they are held partly accountable for their low income. The strength of the bias in social sentiments depends on the level of skill inequality and labor supply dispersion. From Lemma 2, the higher the inequality, the larger is the gap in the two labor supplies, and hence the stronger the bias and the lower the support for redistribution stemming from the social component of utility. In this case, the egoistic and the social component of the utility work in opposite directions. For values of inequality slightly above $\overline{I}$ the degree of social clustering and the associated bias in sentiments are small. Under these conditions the positive effect dominates and an increase in inequality leads to an increase in redistribution. However, for a sufficiently high degree of inequality, the increase in the gap of labor supplies and the associated bias eventually dominates and the support for redistribution diminishes.

Before concluding it is useful to highlight that the determination of the type of equilibrium in terms of social cohesion and the bias $\delta$ crucially depends on relative labor supply which, in turn, depends

[37] For illustrative purposes we have expressed the relationship between redistribution and the inequality index $I$. Since the Gini index is given by $G = (1 - \pi) I$, the non-monotonic relationship described in Proposition 9 holds also once expressed in terms of Gini coefficients as proved in the Appendix.

on relative productivity $\widetilde{\beta}$, and not absolute labor supply. When comparing across equilibria with different levels of inequality (interpreted as different economies), it is possible to observe, for instance, a larger bias against the poor in more industrious economies, i.e. those with higher average labor supply, than in economies with lower average labor supply and lower dispersion of hours of work. The reason for this is that the moral judgment which befalls workers is relative to the economy-specific moral standard which, here, is the endogenously determined average labor supply. Thus, for instance, the low skilled workers in a clustered equilibrium may work more than the low skilled in a cohesive one but still be considered lazy if their labor supply *relative to the skilled workers in their own economy* is lower than the relative labor supply in the cohesive economy. Accordingly, the level of redistribution in their favor may be lower.[38] When applied to the case of the US and Europe, this discussion clarifies that it may be that the poor in the US are perceived to be lazy because these workers are held to a more industrious economy-specific work standard.[39]

## 7 Concluding Remarks

There is increasing awareness that moral values play a crucial role in determining individual behavior, social interactions and individual views on social policies. In this paper, we have presented a model in which agents have moral standards of behavior relative to which they judge the work effort of others as well as their own. By affecting the social consideration of others and self-esteem, such moral calculus influences both voting and labor supply decisions. To examine this issue, we have generalized the seminal work of Meltzer and Richard (1981) to include rational voting over redistribution when agents have endogenously determined private and social preferences. The proposed framework allows us to analytically characterize the equilibria and the role of inequality.

We find that two types of politico-economic equilibria might emerge. In a cohesive equilibrium, all agents conform to the standard of behavior and income inequality is based solely on exogenous

[38]For example consider two economies, which we denote $A$ and $E$. Suppose $\pi = .3$, $\underline{\varphi} = 0$, and $\overline{\varphi} = 1$ in each. Also assume $\beta_u^A = \beta_u^E = 1$ and $\beta_s^E = 1.96, \beta_s^A = 5.8$. These numbers are for illustration but are not too far from the earning ratios of 2.45 in EU and 4.58 in US cited in footnote 5 in the Introduction. Given these productivities we have $\tilde{\beta}^A = 0.17 < \frac{1}{2}, \tilde{\beta}^E = 0.51 > \frac{1}{2}$. Hence, $A$ is clustered and $E$ is cohesive. There is a continuum of cohesive equilibria in $E$ with a minimum common labor supply $L^E = 0.9$ and a maximum labor supply $L^E = 1.8$. The clustered equilibrium is unique with $L_u^A = 1.9$ and $L_s^A = 5.6$. The equilibrium levels of redistribution are $\tau^o = 0.05$ and $\tau^* = 0.1$ in the clustered and cohesive equilibria, respectively. Hence the unskilled workers in the clustered equilibrium work more than the (most industrious) unskilled workers in the cohesive ones. This configuration is sustained by a lower level of redistribution. This simple example is just an illustration that the relative productivity is what matters in the determination of social clustering.

[39]The stylized evidence concerning labor supply in the US and the continental Europe suggest that this might be indeed the case. In fact, as briefly discussed above, the US displays both larger average labor supply and larger dispersion in labor hours than continental Europe.

differences in skill levels. As a result, voters are relatively supportive of redistribution since the unskilled are perceived to be poor through no fault of their own since they behave in line with the moral standards prevailing in their community. In this case, the self-regulatory emotions of guilt or pride provide the moral inducement to comply with the endogenously determined work standard. Such an equilibrium is possible if the disparity in skills, or, equivalently, pre-tax income inequality, is not too large. However, if productivity differences are sufficiently large and such emotions fail to provide the necessary incentives, then a clustered equilibrium will occur in which agents choose to supply different quantities of labor. In this case, the poor are seen to be at least partially responsible for their low income and the support for redistributive taxation diminishes. The type of equilibrium to emerge depends crucially on the degree of pre-tax inequality.

The model affords several predictions on the relationship between labor supply, income inequality, redistributive taxes and attitudes toward the poor. First, it predicts a possibly non-monotonic relationship between inequality and the level of taxation. Thus, it is possible that a clustered equilibrium could involve higher inequality and lower taxes than a cohesive equilibrium. It also predicts the endogenous emergence of work norms. We should expect little dispersion in work hours when productivity differences are small. As societies become more unequal, however, labor supply becomes increasingly dispersed. The different equilibria lead to, and are sustained by, quite different views of the cause of poverty and attitudes toward the poor. The model yields predictions that appear broadly consistent with salient differences between observed social contracts in the US and continental Europe.

The benchmark moral rule we consider represents a strict work ethic which takes into consideration only the number of hours worked and abstracts entirely from personal characteristics such as individual productivities. This implies that labor supply is interpreted as a signal of individual "industriousness" rather than as a reflection of economic opportunities. One argument in favor of such an ethical rule is that labor hours are observable yet the motives underlying such decisions often are not. Nevertheless, it is important to notice that the predictions of the model depend on the assumed moral rule. For instance, considering the opposite extreme where moral standards are fully adjusted for individual differences in wages would imply that the required labor supply of each agent fully discounts his market productivity and no social clustering could be observed in equilibrium. For intermediate work ethics, individuals would be judged on the basis of their labor supply with a partial, but not full, correction that accounts for wage differences. This suggests that the stricter the work ethic the more likely it is to observe social clustering. The predictions of the model about the different social contracts would therefore be reinforced if, for instance, the US has a stricter work ethic than Europe. Exploring the implications of alternative ethical rules for the social contract as well as studying the emergence and persistence of moral standards and the formation of beliefs are important tasks for future research.

Finally, the paper can be seen as part of a larger effort to explore the interaction between moral values, sentiments, behavior and social policy. Clearly, the composition of society, that is, the attitudes and sentiments of its members, shapes the institutional environment. But the converse is true as well: institutions affect behavior, and this, in turn, affects the sentiments of the constituents. Full consideration of this reciprocal effect requires that social policy, individual behavior and sentiments be determined jointly. This seems particularly true in considering such morally relevant conduct as honesty and cooperation which are likely to influence individual behavior, preferences over policies and the perception of others. While we have restricted our attention to the specific role of work norms and fiscal redistribution, this behavior-based approach to the study of moral sentiments might be applicable in other policy areas as well.

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# 8 Appendix.

**Optimal Labor Supply and Comparative Statics.** Substituting for $c_i$ and differentiating private utility $v$ with respect to $L_i$, we obtain

$$\frac{\partial v}{\partial L_i} = v_c\left((1-\tau)\beta_i L_i + T, l_i, \varphi_i\right)(1-\tau)\,\beta_i - v_l\left((1-\tau)\beta_i L_i + T, l_i, \varphi_i\right). \tag{23}$$

Differentiating again, we have

$$\frac{\partial^2 v}{\partial L_i^2} = v_{cc}\,(.)\,(1-\tau)^2\,\beta_i^2 - 2v_{cl}\,(.)\,(1-\tau)\,\beta_i + v_{ll}\,(.) \equiv D < 0.$$

By setting (23) equal to zero we get (2). Totally differentiating with respect to $L_i$ and $\beta_i$ in (2), we have

$$\frac{dL_i}{d\beta_i} = -\frac{1}{D}\,(1-\tau)\left\{v_{cc}(.)\,(1-\tau)\,\beta_i L_i + v_c(.) - v_{cl}(.)L_i\right\}, \tag{24}$$

where $-1/D > 0$. Let us denote by $\varepsilon_{v_c,L}$ the elasticity of the marginal utility of consumption with respect to labor, that is,

$$\varepsilon_{v_c,L} = \left[v_{cc}(.)\,(1-\tau)\,\beta_i - v_{cl}(.)\right]L_i/v_c(.).$$

Then (24) can be written as

$$\frac{dL_i}{d\beta_i} = -\frac{1}{D}(1-\tau)(\varepsilon_{v_c,L}+1)v_c(.). \tag{25}$$

If $|\varepsilon_{v_c,L}| < 1$ than $dL_i/d\beta_i > 0$.

To determine the effect of $\varphi_i$ on the labor supply decision, first differentiate (2) to obtain,

$$\frac{dL_i}{d\varphi_i} = -\frac{1}{D}[v_{c\varphi}(.)\,(1-\tau)\,\beta_i - v_{l\varphi}(.)]. \tag{26}$$

Notice that differentiating and using the first order condition for optimal labor supply (2), we can rewrite (1) as

$$\begin{aligned}\frac{\partial}{\partial\varphi_i}\left(\frac{v_l}{v_c}\right) &= \left[\frac{1}{v_c}\left(v_{l\varphi} - v_{c\varphi}\,(1-\tau)\,\beta_i\right)\right] = \\ &= \left(\frac{v_l}{v_c}\varphi_i\right)\left(\frac{v_{l\varphi}}{\varphi_i v_l} - \frac{v_{c\varphi}}{\varphi_i v_c}\right) = \left(\frac{v_l}{v_c}\varphi_i\right)(\varepsilon_{v_l,\varphi} - \varepsilon_{v_c,\varphi}).\end{aligned}$$

Hence, condition (1) is equivalent to assuming the elasticity of the marginal utility of leisure with respect to self-esteem is larger than the elasticity of the marginal utility of consumption, $[\varepsilon_{v_l,\varphi} - \varepsilon_{v_c,\varphi}] > 0$.

**Proof of Proposition 1.** Given that labor supply is monotonically increasing in individual productivity $\beta_i$ from (25), we know that $\underline{L}_u(\tau,\beta_u,\beta) < \underline{L}_s(\tau,\beta_s,\beta)$ and $\overline{L}_u(\tau,\beta_u,\beta) < \overline{L}_s(\tau,\beta_s,\beta)$.

It is necessary and sufficient for the existence of a cohesive equilibrium that $\overline{L}_u(\tau,\beta_u,\beta) \geq \underline{L}_s(\tau,\beta_s,\beta)$, i.e., that there is some $L$ that satisfies (2) for both $u$ and $s$ at $T = \tau\beta L$ and that every such $L$ is a cohesive SE equilibrium labor supply in which $(\varphi_u, \varphi_s)$ solves (8) for $i = u, s$. We next show that under these conditions clustered equilibria cannot emerge. Suppose $\overline{L}_u(\tau,\beta_u,\beta) \geq \underline{L}_s(\tau,\beta_s,\beta)$ and, to the contrary, suppose there is also a clustered equilibrium in which $L = (L_u, L_s)$, $L_u \neq L_s$. First, if $L_u < L_s$, since this is stationary, it must be that $\varphi_u = \underline{\varphi}$ and $\varphi_s = \overline{\varphi}$. But then $L_u = \overline{L}_u(\tau,\beta_u,\beta)$ and $L_s = \underline{L}_s(\tau,\beta_s,\beta)$, which contradicts $\overline{L}_u(\tau,\beta_u,\beta) > \underline{L}_s(\tau,\beta_s,\beta)$. Alternatively, if $L_u > L_s$, then in this case stationary implies $\varphi_u = \overline{\varphi}$ and $\varphi_s = \underline{\varphi}$. Hence, $L_u = \underline{L}_u(\tau, \beta_u, \beta)$ and $L_s = \overline{L}_s(\tau, \beta_s, \beta)$. Therefore, $\underline{L}_u(\tau, \beta_u, \beta) > \overline{L}_s(\tau, \beta_s, \beta)$. Since $\overline{L}_s(\tau, \beta_s, \beta) > \overline{L}_u(\tau, \beta_u, \beta)$, as shown above, this implies $\underline{L}_u(\tau, \beta_u, \beta) > \overline{L}_u(\tau, \beta_u, \beta)$, which is also a contradiction. It remains to be shown that $\overline{L}_u(\tau, \beta_u, \beta) < \underline{L}_s(\tau, \beta_s, \beta)$ is sufficient for the existence of a clustered equilibrium. However, if $\overline{L}_u(\tau, \beta_u, \beta) < \underline{L}_s(\tau, \beta_s, \beta)$ and $\varphi_u = \underline{\varphi}$ and $\varphi_s = \overline{\varphi}$, then the conditions of the definition of a clustered SE equilibrium are clearly satisfied.

**Proof of Proposition 3.** Rearrange (11) to get

$$\frac{\partial v_u}{\partial c}\left(2 - \sigma_u)\right)\left[y - y_u + \tau\frac{dy}{d\tau}\right] = -\sigma_u \frac{\partial v_s}{\partial c}\left[y - y_s + \tau\frac{dy}{d\tau}\right]. \tag{27}$$

Since $\frac{dy}{d\tau} < 0$ and $y_s > y$, the RHS is positive. Hence, the LHS must be positive as well which implies

$$y - y_u + \tau\frac{dy}{d\tau} > 0. \tag{28}$$

If that is the case, then from (10) $\frac{d\nu_u}{d\tau} > 0$ at $\tau^u$ . Hence $\tau^u < \tau^e$, or the level of redistribution preferred by the poor is smaller than in the egoistic case.

As for the effect of $\sigma_u$ on $\tau^u$, implicit differentiation yields

$$\begin{aligned} sign\frac{\partial\tau^u}{\partial\sigma_u} &= sign\left(-\frac{\partial^2 V_u/\partial\tau\partial\sigma_u}{\partial^2 V_u/\partial\tau^2}\right) = \\ &= sign\left\{-\frac{\partial v_u}{\partial c}\left[y - y_u + \tau\frac{dy}{d\tau}\right] + \frac{\partial v_s}{\partial c}\left[y - y_s + \tau\frac{dy}{d\tau}\right]\right\} < 0. \end{aligned}$$

From (11) and (28) and noting that by second order condition of a maximum $\partial^2 V_u/\partial\tau^2\big|_{\tau^u} < 0$ we have that

$$\frac{\partial\tau^u}{\partial\sigma_u} < 0.$$

Finally, as for the preferences of the skilled workers we have that

$$\frac{dV_s(\tau)}{d\tau} = (1 - \sigma_s)\frac{\partial v_u}{\partial c}\left[y - y_u + \tau\frac{dy}{d\tau}\right] + \frac{\partial v_s}{\partial c}(1 + \sigma_s)\left[y - y_s + \tau\frac{dy}{d\tau}\right]. \tag{29}$$

Since $\left[y - y_s + \tau\frac{dy}{d\tau}\right] < 0$, a purely egoistic skilled worker would optimally choose $\tau = 0$ (from the analogue of (10) for $s$). In an interior solution of (29)

$$\frac{\partial v_s}{\partial c}(1 + \sigma_s)\left[y - y_s + \tau\frac{dy}{d\tau}\right] = -(1 - \sigma_s)\frac{\partial v_u}{\partial c}\left[y - y_u + \tau\frac{dy}{d\tau}\right]. \tag{30}$$

As above, this implies $\left[y - y_u + \tau\frac{dy}{d\tau}\right] > 0$ at the solution $\tau^s$ . Hence $0 \leq \tau^s < \tau^e$ as well. Next we show that $\tau^u > \tau^s$ even in the case in which $\tau^s > 0$, that is, when (30) holds with equality. Now, we compare the coefficients of the positive expression $\frac{\partial v_u}{\partial c}\left[y - y_u + \tau\frac{dy}{d\tau}\right]$ in (30) and (27). Evaluating

$$\left.\frac{dV_s(\tau)}{d\tau}\right|_{\tau=\tau^u} = \frac{\partial v_s}{\partial c}\left[y - y_s + \tau\frac{dy}{d\tau}\right] - \frac{\partial v_u}{\partial c}\left[y - y_u + \tau\frac{dy}{d\tau}\right] + \left.\frac{dV_u(\tau)}{d\tau}\right|_{\tau=\tau^u} < 0$$

since $\left.\frac{dV_u(\tau)}{d\tau}\right|_{\tau=\tau^u} = 0$. Hence, $\tau^u > \tau^s \geq 0$.

**Proof of Proposition 4 and Proposition 5.** The first order condition for labor supply can be expressed as

$$[(1-\tau)\beta_i L_i + T]^{-\theta}(1-\tau)\beta_i = -\frac{1}{2}f'(L_i)(1+\varphi_i).$$

In a cohesive SE equilibrium where $L_i = L$ for all $i$, and $T = \tau\beta L$, this can be written as

$$-f'(L)L^{\theta} = \frac{2}{1+\varphi_i}[(1-\tau)\beta_i + \tau\beta]^{-\theta}(1-\tau)\beta_i,$$

where the LHS is strictly increasing in $L$ while the RHS is independent of $L$. From this expression, we have that the necessary and sufficient condition stated in Proposition 1 holds if and only if

$$\frac{1}{1+\underline{\varphi}}[(1-\tau)\beta_u + \tau\beta]^{-\theta}\beta_u \geq \frac{1}{1+\overline{\varphi}}[(1-\tau)\beta_s + \tau\beta]^{-\theta}\beta_s.$$

Rearranging the last expression, we have that a cohesive SE equilibrium exists if and only if

$$\left(\frac{\beta_u}{\beta_s}\right)^{1/\theta} \geq \left(\frac{1+\underline{\varphi}}{1+\overline{\varphi}}\right)^{1/\theta}\left[\frac{(1-\tau)\beta_u + \tau\beta}{(1-\tau)\beta_s + \tau\beta}\right]. \tag{31}$$

After some manipulation, (31) can be rewritten as

$$\begin{aligned}\left(\frac{1+\overline{\varphi}}{1+\underline{\varphi}}\right)^{1/\theta}\left(\widetilde{\beta}\right)^{1/\theta} &\geq \left[\frac{\widetilde{\beta}(1-\tau) + \tau\left((1-\pi)\widetilde{\beta}+\pi\right)}{(1-\tau)+\tau\left((1-\pi)\widetilde{\beta}+\pi\right)}\right] = \\ &= \frac{\widetilde{\beta}(1-\tau) + \tau\left((1-\pi)\widetilde{\beta}+\pi\right) \pm (1-\tau)}{(1-\tau)+\tau\left((1-\pi)\widetilde{\beta}+\pi\right)} = \\ &= 1 - \frac{(1-\tau)}{(1-\tau)+\tau\left((1-\pi)\widetilde{\beta}+\pi\right)},\end{aligned} \tag{32}$$

which can be written as

$$H\left(\widetilde{\beta}\right) \equiv \left(\widetilde{\beta}\right)^{1/\theta} \geq \left(\frac{1+\underline{\varphi}}{1+\overline{\varphi}}\right)^{1/\theta}\left\{1 - \frac{\left(1-\widetilde{\beta}\right)}{1+(\tau/(1-\tau))\left((1-\pi)\widetilde{\beta}+\pi\right)}\right\} \equiv G\left(\widetilde{\beta},\tau\right)\left(\frac{1+\underline{\varphi}}{1+\overline{\varphi}}\right)^{1/\theta}. \tag{33}$$

Consider the RHS and the LHS of (33) in the space $\widetilde{\beta} \in [0,1]$. First, $H(.)$ is strictly increasing and either strictly concave for $\theta > 1$, strictly convex for $\theta < 1$, or linear for $\theta = 1$. Also, $H(0) = 0$ and $H(1) = 1$.

Notice that $G\left(\widetilde{\beta},\tau\right)$ is strictly increasing in $\tau$ with $G\left(\widetilde{\beta},0\right) = \widetilde{\beta}$ and $G\left(\widetilde{\beta},1\right) = 1$. In particular denote by $\widetilde{\beta}_1$ the level of relative productivity such that (33) is satisfied with equality for $\tau = 1$. This is given by

$$\widetilde{\beta}_1 = \frac{1+\underline{\varphi}}{1+\overline{\varphi}} < 1. \tag{34}$$

Also, denote by $\widetilde{\beta}_0 \in [0,1]$ the relative productivity at which (33) is satisfied with equality for $\tau = 0$, which is given by[40]

$$\widetilde{\beta}_0 = \left(\frac{1+\varphi}{1+\overline{\overline{\varphi}}}\right)^{\frac{1}{1-\theta}} < 1 \text{ for any } \theta < 1 \text{ and } \widetilde{\beta}_0 = 0 \text{ for any } \theta \geq 1.$$

Clearly, for $\theta \geq 1$, $\widetilde{\beta}_1 > \widetilde{\beta}_0$. But also for $\theta < 1$, since $\frac{1+\varphi}{1+\overline{\overline{\varphi}}} < 1$ and $\frac{1}{1-\theta} > 1$, $\widetilde{\beta}_1 > \widetilde{\beta}_0$. Therefore, we have an upper bound $\widetilde{\beta}_1$ (that is, a lower bound for inequality) such that for any $\widetilde{\beta} \geq \widetilde{\beta}_1$ only cohesive SE equilibria exist and a lower bound $\widetilde{\beta}_0$ such that for any $\widetilde{\beta} < \widetilde{\beta}_0$ only clustered SE equilibria exist. This proves Proposition 5.

Proposition 4 is proved by noting that by the monotonicity of $G\left(\widetilde{\beta}, \tau\right)$ in $\tau$ and the Intermediate Value Theorem, for any $\widetilde{\beta}' \in \left[\widetilde{\beta}_0, \widetilde{\beta}_1\right]$ there always exists a unique interior $\overline{\tau}\left(\widetilde{\beta}'\right)$ such that if $\tau > \overline{\tau}\left(\widetilde{\beta}'\right)$, then only clustered equilibria are possible, while if $\tau \leq \overline{\tau}\left(\widetilde{\beta}'\right)$, only cohesive equilibria exist. Also the larger $\widetilde{\beta}'$ the larger the required $\tau$ necessary to make the functions $H\left(\widetilde{\beta}\right)$ and $G\left(\widetilde{\beta}, \tau\right)\left(\frac{1+\varphi}{1+\overline{\overline{\varphi}}}\right)^{1/\theta}$ cross exactly at $\widetilde{\beta}'$.

**Proof of Proposition 6.** Using (13) we can express the indirect utility of individual $i$ as

$$\begin{aligned} V_i(\tau) &= \frac{1+\varphi_i}{2} + \left[(1-\sigma_u)\frac{1+\varphi_u}{2} + \sigma_u\frac{1+\varphi_s}{2}\right] + (1-\tau)^2\left\{\frac{\beta_i^2}{1+\varphi_i} + \left[(1-\sigma_u)\frac{\beta_u^2}{1+\varphi_u} + \sigma_u\frac{\beta_s^2}{1+\varphi_s}\right]\right\} \\ &\quad + (1-\tau)\tau 4\left[(1-\pi)\frac{\beta_u^2}{1+\varphi_u} + \pi\frac{\beta_s^2}{1+\varphi_s}\right]. \end{aligned}$$

which is a quadratic function in $\tau$. Differentiating and evaluating at $\tau = 0$, we have the condition

$$V_u'(0) = \left(\frac{\beta_s^2}{1+\varphi_s} - \frac{\beta_u^2}{1+\varphi_u}\right)((\pi - \sigma_u) + \pi)$$

Using the labor supply functions (13), we have that $\left(\frac{\beta_s^2}{1+\varphi_s} - \frac{\beta_u^2}{1+\varphi_u}\right) > 0$ in any stationary equilibrium. This implies that there can be a unique interior optimum. Using (13), we obtain the following expressions for the effects of $\tau$ on labor, gross earnings and transfers, respectively:

$$\frac{dL_i}{d\tau} = -\frac{L_i}{1-\tau}, \; \frac{dy_i}{d\tau} = -\frac{y_i}{1-\tau} \text{ and } \frac{dT}{d\tau} = \frac{1-2\tau}{1-\tau}y.$$

Differentiating the egoistic (indirect) utility $v_i$ (15) with respect to $\tau$, we obtain

$$\frac{dv_i}{d\tau} = y - y_i - \frac{\tau}{1-\tau}y.$$

Then differentiating the total indirect utility with respect to $\tau$, we get the first order condition

$$\frac{dV_u}{d\tau} = 2\frac{1-2\tau}{1-\tau}y - y_u - \widetilde{y}^u = 0. \tag{35}$$

which, after rearranging, yields (16).

[40] One solution is always $\widetilde{\beta}_0 = 0$ while the second solution is in the range $[0, 1]$ only if $\theta \leq 1$.

**Inequality in Cohesive and Clustered Equilibria. Proof of Lemma 1** Substituting the equilibrium labor supply in cohesive and clustered equilibria into (14), we obtain (19). In order to compare income inequality across the two types of equilibria, consider economy $A$ with $\widetilde{\beta}_A$ which is clustered ($\widetilde{\beta}_A < \frac{1}{2}$) and economy $B$ with $\widetilde{\beta}_B$ which is cohesive ($\widetilde{\beta}_B \geq \frac{1}{2}$). Observe that $I^o$ in (19) is strictly decreasing in $\widetilde{\beta}$. Also, note that $\widetilde{\beta}_A < 1/2 < \widetilde{\beta}_B$ implies $2\widetilde{\beta}_A^2 < 1/2 < \widetilde{\beta}_B$. The Lemma is proved by evaluating (19) at $\widetilde{\beta} = 1/2$.

**Proof of Lemma 2.** The range of inequality $I$ for which the economy is in a cohesive/clustered SE equilibrium is characterized in Propositions 7 and 8. From (6) and (13), in any clustered equilibrium the bias in social sentiments is given by

$$\sigma_u = \frac{\pi\beta_u}{(1-\pi)\,2\beta_u + \pi\beta_s}. \tag{36}$$

In this case the magnitude of the distributive bias $\delta$ is given by

$$\delta = \frac{(y - \widetilde{y}_u)}{y} = \frac{(1-\pi)\,2\beta_u^2 + \pi\beta_s^2 - (1-\sigma_u)2\beta_u^2 - \sigma_u\beta_s^2}{(1-\pi)\,2\beta_u^2 + \pi\beta_s^2}. \tag{37}$$

Using (36) and rearranging, we can express the numerator of (37) as

$$\begin{aligned}(1-\pi)\,2\beta_u^2 + \pi\beta_s^2 - 2\beta_u^2 + \frac{\pi\beta_s}{(1-\pi)\,2\beta_u + \pi\beta_s}\left(2\beta_u^2 - \beta_s^2\right) &= \\ \pi\left(\beta_s^2 - 2\beta_u^2\right)\left(1 - \frac{\beta_s}{(1-\pi)\,2\beta_u + \pi\beta_s}\right) &= -\frac{\pi\,(1-\pi)\left(\beta_s^2 - 2\beta_u^2\right)(\beta_s - 2\beta_u)}{(1-\pi)\,2\beta_u + \pi\beta_s}.\end{aligned}$$

Therefore,

$$\delta(I) = -\pi\,(1-\pi)\,\frac{1-2\widetilde{\beta}}{\left(\pi + (1-\pi)\,2\widetilde{\beta}\right)}\frac{1-2\widetilde{\beta}^2}{\left(\pi + (1-\pi)\,2\widetilde{\beta}^2\right)} < 0 \text{ for } \widetilde{\beta} < \frac{1}{2}.$$

Computing the level of income inequality one gets

$$I = \frac{\pi\left(1-2\widetilde{\beta}^2\right)}{\left(\pi + (1-\pi)\,2\widetilde{\beta}^2\right)}, \tag{38}$$

which implies

$$\delta = -\,(1-\pi)\,I\,\frac{1-2\widetilde{\beta}}{\left(\pi + (1-\pi)\,2\widetilde{\beta}\right)} < 0.$$

From (38) we have

$$\frac{\partial I}{\partial \widetilde{\beta}} = -\frac{4\pi\widetilde{\beta}}{\left(\pi + (1-\pi)\,2\widetilde{\beta}^2\right)^2} < 0. \tag{39}$$

The bias in social sentiments is increasing in $I$ since

$$\begin{aligned}\frac{\partial\delta}{\partial I} &= -(1-\pi)\frac{1-2\widetilde{\beta}}{\left(\pi+(1-\pi)\,2\widetilde{\beta}\right)}+I\frac{\partial}{\partial\widetilde{\beta}}\left(-(1-\pi)\frac{1-2\widetilde{\beta}}{\left(\pi+(1-\pi)\,2\widetilde{\beta}\right)}\right)\frac{\partial\widetilde{\beta}}{\partial I}= \\ &= \frac{\delta}{I}+2I\,(1-\pi)\,\frac{\partial\widetilde{\beta}}{\partial I}<0,\end{aligned} \tag{40}$$

which proves the statement.

**Proof of Proposition 9.** *(i)* It is immediate from (20), that $\partial\tau^*/\partial I^*>0$.

*(ii)* From Lemma 2, in clustered equilibrium $\delta(I)<0$ and $\frac{\partial\delta}{\partial I}<0$. And from Proposition 8 the equilibrium level of redistribution is $\tau(I)=\frac{\delta+I}{2+\delta+I}$. Therefore,

$$\frac{\partial\tau^o}{\partial I}=\frac{1}{(2+\delta+I)^2}\left(1+\frac{\partial\delta}{\partial I}\right)\gtrless 0\Longleftrightarrow 1\gtrless\left|\frac{\partial\delta}{\partial I}\right|.$$

Recall that $I=\overline{I}=\frac{\pi}{1+\pi}\Leftrightarrow\widetilde{\beta}=1/2$, and $\delta(\overline{I})=0$. Then from (39) evaluated at $\widetilde{\beta}=1/2$ we obtain

$$\left.\frac{\partial\widetilde{\beta}}{\partial I}\right|_{I=\overline{I}}=-\frac{(1+\pi)^2}{8\pi}.$$

Hence, from (40) we have $\frac{\partial\tau^o}{\partial I}\big|_{I=\overline{I}}=\frac{1}{(2+\overline{I})^2}\left(\frac{3-\pi^2}{4}\right)>0$. Notice also that from Proposition 8, there exists a level of inequality $I'>\overline{I}$ such that $\tau^o=0$. Hence, by continuity of $\tau^o(I)$ and by Intermediate Value Theorem there exists a level $I^s$ for which $\tau^o$ is maximal.

**Redistribution as a function of the Gini Index.** From Proposition 9 we know that redistribution is maximal for some $I>\overline{I}$ and the maximum value it is implicitly characterized by maximizing (16). Denote the preferred level of redistribution as function of inequality as $\tau=\phi(I)$. Differentiating, we have

$$d\tau=\phi'(I)dI. \tag{41}$$

Computing the Gini index for disposable income, we get $G=(1-\tau)(1-\pi)I$. By totally differentiating we have

$$dI=\frac{1}{(1-\tau)(1-\pi)}dG+\frac{G}{(1-\tau)^2(1-\pi)}d\tau.$$

Substituting and rearranging,

$$d\tau\left[1-\frac{\phi'(I)G}{(1-\tau)^2(1-\pi)}\right]=dG\frac{\phi'(I)}{(1-\tau)(1-\pi)}.$$

Therefore,

$$\frac{d\tau}{dG}=\frac{\phi'(I)(1-\tau)}{(1-\tau)^2(1-\pi)-\phi'(I)G}=0\Leftrightarrow\phi'(I)=0, \tag{42}$$

which implies that the change in redistribution as a function of the Gini index co-moves with the change in pre-tax income inequality $I$.

**Self-esteem and labor supply.** Following the literature in social psychology, we have considered the case in which the emotions produced by deviations from moral standards have a self-regulatory role. The self-regulative role of moral values on labor supply, and in particular equation (1), is key for the stability of cohesive equilibria. To see this suppose for a moment that moral and economic incentives were complements, i.e. that the *MRS* between consumption and leisure were to *decrease* with $\varphi$. Failure to meet the standard would lower the moral pressure to work and this would result in negative rather than positive effect on labor supply. In spite of inverting the effects of guilt on labor supply, cohesive equilibria would still be possible for low levels of inequality and otherwise equilibria would be clustered. The difference is that now cohesive equilibria are unstable: those working less than the mean would tend to reduce their labor supply in response to moral pressure and those working more would tend to increase theirs. Hence, clustered equilibrium is an absorbing state.

Formally, instead of (1), assume

$$\frac{d}{d\varphi_i}\left(\frac{v_l}{v_c}\right) < 0. \tag{43}$$

For example, in the case of linear-quadratic utility as in Section 6, we might assume

$$v(c_i, L_i, \varphi_i) = c_i + 2\left(1 - \frac{L_i^2}{2}\right)\frac{1}{1+\varphi_i} \tag{44}$$

In that case the optimal labor supply would be

$$L_i\left(\beta_i, \varphi_i, \tau\right) = (1-\tau)\,\beta_i \frac{1+\varphi_i}{2}$$

instead of $L_i\left(\beta_i, \varphi_i, \tau\right) = (1-\tau)\,\beta_i \frac{2}{1+\varphi_i}$. This implies that an increase in $\varphi_i$ would lead to an increase rather than a decrease in labor supply. Hence, for any $\beta_i$ the maximum labor supply is attained at $\varphi_i = \overline{\varphi}$ rather than at $\varphi_i = \underline{\varphi}$, as in the text.

From the Proof of Proposition 5 we know that for the utility formulation used in Section 6 the critical value

$$\widetilde{\beta}_1 = \frac{1+\underline{\varphi}}{1+\overline{\varphi}} < 1$$

divides the range of productivity ratios such that for any $\widetilde{\beta} > \widetilde{\beta}_1$ only cohesive equilibria exist, while for any $\widetilde{\beta} < \widetilde{\beta}_1$ only clustered equilibria exist. By a similar argument, using the utility formulation (44), we have that in a cohesive equilibrium

$$L_u\left(\beta_u, \varphi_u, \tau\right) = L_s\left(\beta_s, \varphi_s, \tau\right) \Longleftrightarrow \beta_u\left(1+\varphi_u\right) = \beta_s\left(1+\varphi_s\right). \tag{45}$$

As in the text, an increase in the productivity spread leads skilled workers to work relatively more. This can be compensated, however, by a lower $\varphi_i$. Therefore, a cohesive equilibrium can be sustained as long as

$$\beta_u\left(1+\overline{\varphi}\right) \geq \beta_s\left(1+\underline{\varphi}\right) \Longleftrightarrow \widetilde{\beta} \geq \frac{1+\underline{\varphi}}{1+\overline{\varphi}}, \tag{46}$$

which is precisely the same threshold as in the case considered in the text. This implies that cohesive equilibria can be sustained only if the productivity difference is not too large. Thus, what explains cohesive equilibria is not the substitutability between economic and moral incentives but rather the relative extremes of the two. Notice, however, that a cohesive equilibrium as in (45) is not stable. Any deviation leads dynamically to a clustered equilibrium. Consider, for example, the case in which $L_s > L_u$. From the dynamic evolution of self-esteem and social esteem this leads to an increase in $\varphi_s$ and a decrease in $\varphi_u$. As result we observe a further increase in the gap $L_s - L_u$. The process continues until a clustered equilibrium is reached with $\varphi_s = \overline{\varphi}$ , $\varphi_u = \underline{\varphi}$ and $L_s\left(\overline{\varphi}\right) > L_u\left(\underline{\varphi}\right)$.[41] As in the text, this clustered equilibrium is unique when inequality is sufficiently large, i.e. $\widetilde{\beta} < \frac{1+\underline{\varphi}}{1+\overline{\varphi}}$. Hence, the role of the self-regulatory function of changes in self-esteem, as in (1), is to insure the stability of equilibrium. Finally, notice that the result on the non-monotonic behavior of equilibrium redistribution does not depend on the self-regulatory role of emotions since it is induced by the increasing bias against the poor in clustered equilibria.

[41] In fact in this case a clustered equilibrium with $\varphi_u = \overline{\varphi}$, $\varphi_s = \underline{\varphi}$ and $L_u\left(\overline{\varphi}\right) > L_s(\underline{\varphi})$ can also be sustained. This equilibrium, however, disappears when inequality is sufficiently large, that is if $\widetilde{\beta} < \frac{1+\underline{\varphi}}{1+\overline{\varphi}}$.