Economic and Class Voting in a Model of Redistribution with Social Concerns*

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Abstract

We investigate how concerns about social status may affect individuals' preferences for redistribution. In our model, agents are heterogeneous across two dimensions, productivity and social class, and an individual's social status is defined as his relative standing in terms of a weighted average of these two components. The weight on each component depends positively on its standard deviation. Redistribution thus simultaneously affects labor supply and the weights that determine social status. As such, taxation not only redistributes resources from the rich to the poor but also becomes a way of preserving or modifying social status. Thus, individuals who have the same productivity but belong to different social classes support different tax rates. We characterize the equilibrium of the political game as the solution of a system of non-linear equations and identify the interclass coalition of voters who support the equilibrium tax rate.

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1 Introduction

Attitudes towards redistributive policies are one of the issues over which voters, political parties, and governments around the world differ the most. For instance, the most recent

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World Values Survey (2014) reports that the percentage of respondents who strongly believe that the fact that "governments tax the rich and subsidize the poor" is an essential characteristic of a democracy is 17.8% in the US, 31.8% in Japan, 46.9% in Germany, and 57.2% in India.

Standard models of political economics suggest that, at the individual level, the main determinant of an agent's preferences concerning taxation (hence, redistribution) is income. This insight generates so-called "economic voting". As a rule of thumb, "poor" individuals should favor greater redistribution, whereas the opposite holds for "rich" individuals (see Meltzer and Richard, 1981).

However, the actual correlation between income and attitude toward redistribution is far from perfect (see Piketty, 1995). This discrepancy has been rationalized by models that postulate that an agent's voting behavior concerning redistribution is driven not only by his income but also by his personal history (Giuliano and Spilimbergo, 2014, Fisman *et al.*, 2015), race (Alesina and La Ferrara, 2005), and culture (Alesina and Glazer, 2004, Luttmer and Singhal, 2011), by his faith in the returns to effort (Benabou and Tirole, 2006), by his subjective assessment of the fairness of market outcomes (Fong, 2001, Alesina and Angeletos, 2005), by his future prospects (Piketty, 1995, Benabou and Ok, 2001, Acharya, 2014), by issues of group loyalty, social identity, and social recognition (Corneo and Grüner, 2000, Luttmer, 2001, Corneo and Grüner, 2002, Shayo, 2009, Cervellati *et al.*, 2010), or by the structure of inequality (Lupu and Pontusson, 2011).[1]

A well-documented deviation from pure economic voting (see the evidence in Gilens, 1999, and Fong, 2001) is illustrated by the fact that in a number of countries, non-negligible fractions of relatively poor individuals appear to be less in favor of redistribution than suggested by their material interest. Symmetrically, a significant share of the socioeconomic elites tend to support high levels of redistribution, even though such a policy hurts them from an economic point of view. For instance, referring again to the World Values Survey (2014), 26.2% of US respondents who reported belonging to the working class do not believe that the government should tax the rich and subsidize the poor, whereas 16.6% of respondents who reported belonging to the upper middle class strongly agree with such a statement.[2]

In this paper, we rationalize these patterns by introducing a model in which individuals' attitudes towards redistribution are affected by social status considerations. In particular, we study an environment in which heterogeneous agents care about consumption, leisure, and *social status* and must decide upon the level of redistribution through majoritarian voting. In our model, agents differ across two dimensions, *productivity* and *social class*, and both dimensions contribute to defining the agent's overall social status. Productivity

[1] See Alesina and Giuliano (2010) and Costa-Font and Cowell (2015) for recent reviews of the determinants of an agent's individual preferences towards redistribution.

[2] For the attitude toward redistribution in the US, see also Bartels (2005, 2009).

influences an agent's labor supply and thus ultimately determines his income and level of consumption. Social class instead captures all of those factors that affect an agent's social prestige, even after controlling for the income differences that these factors may entail. Examples of such factors thus include the agent's family background, his educational and cultural level, or his occupation.

Consistent with the well-known "Keep up with the Joneses" effect (see Clark and Oswald, 1996, and Hopkins and Kornienko, 2004), we define social status as a relative concept. In particular, in our framework, an agent's social status is given by a weighted average of his relative standing in terms of both consumption level and social class, and the larger the (positive or negative) distance between the agent's relevant characteristics and the average level in the population, the larger the (positive or negative) effects on his well-being. In line with the literature related to status anxiety (Wilkinson and Pickett, 2009, Layte, 2012, and Layte and Whelan, 2014) and social distance (Akerlof, 1976, Akerlof, 1997), we then postulate that the weights that determine the relevance of consumption and social class for an agent's status increase based on the standard deviation of the relevant dimension in the population. Put differently, the more unequal the society is in terms of consumption (respectively, social class), the larger the impact that consumption (social class) has in determining an individual's overall status.

Because we define social status as a multidimensional attribute (see Hollingshead, 2011), in our setting, two individuals with the same level of consumption may still differ in terms of social status (and thus overall utility), with the individual who belongs to a higher social class being in a better position. Thus, in our model *class voting* arises together with standard economic voting. Indeed, voters can use taxation as a strategic tool to preserve (respectively, overcome) initial advantages (respectively, disadvantages) in terms of social class. In particular, individuals who belong to high social classes may support relatively high levels of redistribution. The intuition is that even though a high tax rate reduces the disposable income and thus the consumption of such agents, it also reduces the consumption level of *everyone else* in the population. Consequently, consumption inequality shrinks and so does the importance of consumption in determining social status. This change helps individuals who belong to high social classes to maintain the social prestige that stems from such a membership. In other words, members of the elites may enact a sort of "status-preserving voting" and strategically support more generous redistributive policies. Symmetrically, individuals in low social classes may be against redistribution, as a low tax rate widens the distribution of consumption in the society and thus increases its importance in determining status while simultaneously downgrading the role played by social class.

Building upon these insights, we then investigate how individual preferences aggregate in a voting equilibrium. We show that social stratification introduces political disagreement among individuals who have the same income but belong to different classes. Importantly, for any possible level of redistribution, we fully characterize the interclass coalition of voters who would support it. Based on this result, we can thus define the political equilibrium of the game (i.e., the tax rate that emerges as the Condorcet winner) as the solution of a non-linear system of two equations in two unknowns. Although the actual solution to the system depends on the specific parametrization of the model, we derive general results for some focal cases. We then present some numerical examples that highlight how the model can generate a number of non-trivial patterns and interesting predictions (for instance, concerning the role of the elites or the relative position of the middle class).

The paper is organized as follows. Section 2 introduces the model and discusses the notion of social status. Section 3 derives voters' optimal behavior and solves for their preferred tax rate. Section 4 defines the political equilibrium of the game. Section 5 concludes. All proofs are presented in the Appendix.

2 The Model

A polity is made by a unit mass of citizens. Citizens are heterogeneous in two dimensions: social class and productivity. Each citizen belongs to a social class $k \in K$, where K is a finite ordered set. Let n be the cardinality of set K (i.e., $n = |K|$). The proportion of citizens in social class $k \in K$ is given by $\alpha_k \geq 0$. We denote with $\succeq$ the order over set K. Strict order $\succ$ is defined in the usual way. We rule out non-generic splits of the population into classes by assuming that $\sum_{k' \succ k} \alpha_{k'} \neq \frac{1}{2}$ for every $k \in K$.[3]

Let $\kappa : K \to \mathbb{R}$ be a function that measures the social prestige associated with class k. Therefore, $\kappa(k) > \kappa(k')$ if and only if $k \succ k'$, namely higher classes (according to ordering $\succeq$) entail a higher social prestige. In our setting, the social class of a citizen captures all the aspects that affect his social standing other than his income and consumption level. Among other factors, these may include the prestige and the social network that the agent inherits from his family of origin (Lin, 1999), the agent's educational and cultural level (Jencks, 1979), the agent's occupation (Ganzeboom and Treiman, 2003) or the agent's marital status (Davis and Robinson, 1988).

Example 1 *Let $K = \{l, m, h\}$, where l denotes the low class, m denotes the middle class, and h denotes the high class. Thus $h \succ m \succ l$. Let $\alpha_k = \frac{1}{3}$ for every $k \in K$ and the function*

[3] If this condition were not satisfied, all of our insights would hold, but the equilibrium policy rate (see Theorem 1 below) could belong to a range instead of being uniquely pinned down.

κ be such that:

$$\kappa(k) = \begin{cases} 0 & \textit{if } k = l \\ 16 & \textit{if } k = m \\ 50 & \textit{if } k = h \end{cases}$$

This representation describes a society that is partitioned into three social classes of equal size, and the differences in social prestige that exist between the high class and the middle class are larger than the differences that exist between the middle class and the low class.

Individuals also differ in terms of productivity. The productivity of an individual in class k is captured by the parameter θ, which is distributed over $[\theta_{\min}, \theta_{\max}] \subseteq [0, \infty)$ according to an absolutely continuous cdf, $F_k(\cdot)$. Let $f_k(\cdot)$ be the pdf associated with $F_k(\cdot)$. We assume that for every $\theta \in [\theta_{\min}, \theta_{\max}]$, $f_k(\theta) > 0$ for some k, namely all productivity levels arise with a positive probability.[4] Let $\bar{\theta}$ be the average productivity level and θ^m be the median productivity level. In line with the literature (see for instance, Meltzer and Richard, 1981, and Shayo, 2009), we assume that $\theta^m < \bar{\theta}$. We also assume that the family of distributions $(F_k(\cdot))_{k\in K}$ can be ordered according to weak first-order stochastic dominance. Because in our model, income is fully determined by the productivity of an individual, this assumption implies that in general, higher classes are weakly richer than lower classes. This outcome is consistent with the fact that individuals who belong to higher classes are endowed with a higher social capital (see for instance, Lin *et al.*, 1981) and usually have access to a better education (Archer *et al.*, 2005, Breen and Jonsson, 2005). Formally:

Assumption 1 *For every $\theta \in [\theta_{\min}, \theta_{\max}]$, if $k \succeq k'$, then $F_k(\theta) \leq F_{k'}(\theta)$.*

Each citizen is thus characterized by the pair $(\theta, k) \in [\theta_{\min}, \theta_{\max}] \times K$, which we refer to as the citizen's *type*. Type (θ, k) has an endowment of time equal to $1+\theta$, which he/she must allocate between labor (ℓ) and leisure (x). More formally, the following "time constraint" holds: $1+\theta = \ell + x$.[5] Citizens receive a unit wage for every unit of labor they supply. Thus, labor supply equals gross income.

The government taxes income through a proportional tax rate $\tau \in [0,1]$, and tax revenues are used to finance the provision of a lump-sum monetary transfer $g \geq 0$ to all citizens. Thus, the *consumption utility* function of type (θ, k) is given by:

$$u(c, x, \ell, g, \tau \mid \theta, k) = c + R(x) + g \tag{1}$$

[4] If we define $\theta_{k,\min} = \sup\{\theta : F_k(\theta) = 0\}$ and $\theta_{k,\max} = \inf\{\theta : F_k(\theta) = 1\}$, the assumptions on $(F_k(\cdot))_{k\in K}$ imply that if $k \succ k'$, then $\theta_{k,\min} < \theta_{k',\max}$.

[5] In line with the formulation proposed by Persson and Tabellini (2000), we thus assume that an agent's productivity influences his "effective time", such that more productive individuals have more time at their disposal. Paired with the fact that individuals are endowed with quasi-linear preferences (see below), such a formulation implies that changes in taxation do not have any income effect on the optimal choices of individuals. This implication in turn yields analytical tractability.

where $c = (1-\tau)\,\ell$ is the consumption level (net of the transfer g) and $R(\cdot)$ is a three-times differentiable, strictly increasing and strictly concave function that captures the utility of leisure. To simplify our analysis, we further assume that $\lim_{x\to 0} \frac{dR(x)}{dx} = +\infty$, so that individuals always choose a positive level of leisure. Moreover, to guarantee that the preferences of voters are concave in τ, we assume that $\frac{d^3R(x)}{dx^3} > 0$.[6]

Let $\ell^*(\tau \mid \theta, k)$ be the optimal labor supply of type (θ, k) when the tax rate is τ.[7] The total labor supply is then defined as $L^*(\tau) := \sum_{k\in K} \alpha_k \left(\int_{\theta_{\min}}^{\theta_{\max}} \ell^*(\tau \mid \theta, k)\, dF_k(\theta)\right)$. Notice that by construction, $L^*(\tau)$ is also equal to the average labor supply.

Departing from the literature, we assume that individuals care not only about their consumption utility, which is given by (1), but also about their *social status*. An individual's social status is determined by his relative standing in terms of consumption and social class. The social status of an individual of type (θ, k) is thus captured by a function $S(c-\bar{c}, \kappa(k) - \bar{\kappa})$, where $\bar{c}$ is the average consumption in the population (to be determined in equilibrium) and $\bar{\kappa} = \sum_{k\in K} \alpha_k \kappa(k)$ is the "average social prestige".[8] The function $S(\cdot,\cdot)$ is strictly increasing in both its arguments and such that $S(0,0) = 0$. Intuitively, the social status of an individual is higher, the larger is the (positive) distance between the agent's attributes (his level of consumption and his social class) and the mean values in the population.[9]

In particular, we assume that

$$S(c-\bar{c}, \kappa(k) - \bar{\kappa}) = \eta \cdot \left(W_c(\sigma_c, \sigma_k) \cdot (c - \bar{c}) + W_k(\sigma_c, \sigma_k) \cdot (\kappa(k) - \bar{\kappa})\right). \qquad (2)$$

The parameter $\eta \geq 0$ captures the overall importance of social status considerations, while W_c and W_k denote the relative weight of consumption and social class in determining the agent's status.

In line with the findings that stem from the literature concerning the relationship between

[6]This condition guarantees that, in the absence of social concerns, the optimal level of taxation of every type (θ, k) is determined by the first order condition of the indirect utility function. See below for details.

[7]We will formally show below that in equilibrium, the level of transfer does not affect the individual labor supply because g is given once the tax rate τ is chosen.

[8]Notice that social comparisons made in terms of *net* consumption (i.e., $c - \bar{c}$) are analogous to comparisons that are based on *total* consumption (i.e., $(c+g) - (\bar{c}+\bar{g})$), as the lump-sum transfer g is the same for all citizens (i.e., $\bar{g} = g$). As such, our analysis applies to the case in which citizens are forward-looking and correctly anticipate the transfer g that they will receive in equilibrium.

[9]We thus assume that social status depends in a cardinal way on an individual's relative standing in the society. In particular, a formulation that postulates that status depends on the difference between one's own value and the average value appears, among other works, in Cooper *et al.* (2001), Bowles and Park (2005), and Gallice and Grillo (2015). An alternative approach assumes that status depends in an ordinal way on an individual's relative standing (see for instance, Hopkins and Kornienko, 2004, and Becker *et al.*, 2005). The two approaches may lead to different implications (see Clark and Oswald, 1998, for differences in the attitudes towards emulation and deviance, or Bilancini and Boncinelli, 2012, for differences in the impact of redistributive policies and the relevance of social waste when status is determined by the consumption of a conspicuous good).

status anxiety (i.e., the importance of status concerns in influencing an agent's behavior and well-being) and the level of inequality in the society (see Wilkinson and Pickett, 2009, Layte, 2012, and Layte and Whelan, 2014), we assume that W_c and W_k are increasing in the level of dispersion of the relevant variable. This formulation captures the fact that as the distribution of consumption (respectively, social class) widens, the importance of relative consumption (respectively, relative social class) in determining the agent's overall status becomes more salient with respect to the other dimension. From a methodological point of view, such an approach can be micro-founded and rationalized by a model that considers agents' concerns about social status to be instrumental. According to this interpretation (see Postlewaite, 1998), people do not care about social status per se, but only insofar as it positively influences individuals' future consumption possibilities.[10]

Formally, we postulate the following functional forms:

$$W_c(\sigma_c, \sigma_k) = \frac{\sigma_c}{\sigma_c + \sigma_k} \quad \text{and} \quad W_k(\sigma_c, \sigma_k) = \frac{\sigma_k}{\sigma_c + \sigma_k}, \tag{3}$$

where σ_c is the standard deviation of the distribution of consumption,[11] and σ_k is the standard deviation of the social prestige conveyed by classes.[12]

The actual tax rate that emerges in the 'political equilibrium' of the model, τ^{PE}, and the associated amount of public expenditure, g^{PE}, are chosen according to a standard Downsian electoral model. Neither borrowing nor lending occurs, so that candidates are forced to announce policy pairs (τ, g) that satisfy the government budget constraint:

$$g \leq \tau L^*(\tau). \tag{4}$$

Thus, we can assume that candidates compete by announcing tax rate τ, while g is residually determined by $g = \tau L(\tau)$. Announcements are binding; if a candidate is elected, she must implement the policy she promised.

[10] For instance, consider a model of marriage with positive assortative matching and let individuals differ across two dimensions: the level of (conspicuous) consumption (c) and the social class (k). As the variance in one of the two dimensions vanishes (say, all the potential partners have the same level of consumption), the signaling and status conferral power of an individual's specific realization in that dimension disappears. The relevance of the other dimension (say, social class) in determining the actual matching will then automatically increase. Kalmijn (1994) empirically assesses the importance of social status in determining assortative mating.

[11] Clearly, the distribution of private consumption c has the same standard deviation (σ_c) as the distribution of total consumption $c + g$ (see also footnote 9).

[12] For instance, in the context of Example 1 introduced above, one would have that $\bar{\kappa} = 22$ and thus $\sigma_k = \sqrt{\frac{1}{3} \cdot (0 - 22)^2 + \frac{1}{3} \cdot (16 - 22)^2 + \frac{1}{3} \cdot (50 - 22)^2} \simeq 20.85$.

3 Individual behavior

Each citizen maximizes his *total utility*, which is given by the sum of (1) and (2). Formally, an individual of type (θ, k) solves the following problem:

$$\begin{aligned} &\max_{c,\ell,x} c + R(x) + g + \eta \left(\tfrac{\sigma_c}{\sigma_c+\sigma_k} (c - \bar{c}) + \tfrac{\sigma_k}{\sigma_c+\sigma_k} (\kappa(\kappa) - \bar{\kappa}) \right) \\ &\qquad\qquad \text{subject to:} \quad \text{(i) } c = (1-\tau)\,\ell \quad \text{ and } \quad \text{(ii) } 1+\theta = \ell + x \end{aligned} \tag{5}$$

The agent's optimal labor supply is thus given by:

$$\ell^*(\tau \mid \theta, k) = \ell^*(\tau \mid \theta) = \max\left\{ 1 + \theta - \left(\frac{dR}{dx}\right)^{-1} \left((1-\tau) \left(1 + \frac{\eta \sigma_c}{\sigma_c + \sigma_k} \right) \right), 0 \right\} \tag{6}$$

For analytical tractability, in what follows we assume that all individuals supply a positive amount of labor.[13] The aggregate (and average) labor supply thus amounts to:

$$L^*(\tau) = \sum_{k \in K} \alpha_k \int_{\theta_{\min}}^{\theta_{\max}} \ell^*(\tau \mid \theta)\, dF_k(\theta) = 1 + \bar{\theta} - \left(\frac{dR}{dx}\right)^{-1} \left((1-\tau) \left(1 + \frac{\eta \sigma_c}{\sigma_c + \sigma_k} \right) \right) \tag{7}$$

and the following relationship holds:

$$\ell^*(\tau \mid \theta) - L^*(\tau) = \theta - \bar{\theta} \tag{8}$$

In words, individuals whose productivity level is above (respectively, below) the average supply more (respectively, less) labor than the average. Because the optimal consumption level of type (θ, k) is equal to $c^*(\tau \mid \theta) = (1-\tau)\,\ell^*(\tau \mid \theta)$, we can further conclude that the aggregate (and average) consumption equals $\bar{c}^*(\tau) = (1-\tau)\,L^*(\tau)$. It follows that the standard deviation of consumption is equal to $\sigma_c = (1-\tau)\,\sigma_\theta$.

The individual labor supply can thus be rewritten as

$$\ell^*(\tau \mid \theta) = 1 + \theta - \left(\frac{dR}{dx}\right)^{-1} \left((1-\tau) \left(\frac{(1+\eta)(1-\tau)\,\sigma_\theta + \sigma_k}{(1-\tau)\,\sigma_\theta + \sigma_k} \right) \right), \tag{9}$$

whereas the optimal choice of leisure, $x^*(\tau \mid \theta)$, and consumption, $c^*(\tau \mid \theta)$, are determined by the constraints.

The following proposition summarizes how the individual and aggregate labor supply change in response to the parameters of the model. The proof is omitted, as it follows immediately from the properties of function $R(\cdot)$.

[13] In other words, we focus on the case in which all agents are productive enough to find it convenient to supply a positive amount of labor. More formally, $\theta_{\min} > \tilde{\theta}$ where $\tilde{\theta} = \left(\frac{dR}{dx}\right)^{-1} \left((1-\tau) \left(1 + \frac{\eta \sigma_c}{\sigma_c+\sigma_k} \right) \right) - 1$.

Proposition 1 *$\ell^*(\tau \mid \theta)$ and $L^*(\tau)$ are decreasing in τ and σ_k and increasing in η and σ_θ. Moreover, $\ell^*(\tau \mid \theta)$ is increasing in θ and does not depend on k.*

As in standard models of taxation (see Romer, 1975, or Meltzer and Richard, 1981), an increase in the tax rate reduces the individual and aggregate labor supply, whereas, for any given τ, more productive individuals supply more labor. However, in our model, the individual and aggregate labor supply are also affected by other factors, such as the overall importance of social concerns (η) and the standard deviation of the distributions of productivity and social class (σ_θ and σ_k). In particular, an increase in the importance of social status and/or in the standard deviation of productivity leads to an increase in the labor supply, at both the individual and aggregate levels. Indeed, both η and σ_θ raise the importance of relative consumption to an individuals' utility and thus push agents to work more to boost their relative standing within society. In contrast, if σ_k increases, the relative importance of consumption in determining social status decreases. This change reduces the marginal utility of labor and yields a decrease in labor supply. Proposition 1 also highlights an additional result: the labor supply of type (θ, k) is not affected by her social class k. Intuitively, although the social class affects an individual's overall utility, it does not modify the key trade-off between consumption and leisure.

Given $\ell^*(\tau \mid \theta)$, $L^*(\tau)$, and the fact that $\sigma_c = (1-\tau)\sigma_\theta$, the social status of type (θ, k) (see (2)) can be formulated more explicitly as:

$$S(c^*(\tau \mid \theta) - \bar{c}^*(\tau), \kappa(k) - \bar{\kappa}) = \eta\left(\frac{(1-\tau)^2\sigma_\theta \cdot (\ell^*(\tau \mid \theta) - L^*(\tau)) + \sigma_k \cdot (\kappa(k) - \bar{\kappa})}{(1-\tau)\sigma_\theta + \sigma_k}\right) \tag{10}$$

The indirect utility function of type (θ, k) can thus be written as:

$$v(\tau, g \mid \theta, k) = c^*(\tau \mid \theta) + R(x^*(\tau \mid \theta)) + g + S(c^*(\tau \mid \theta) - \bar{c}^*(\tau), \kappa(k) - \bar{\kappa}) \tag{11}$$

and the optimal policy vector for type (θ, k) is given by the solution to the following program:

$$\max_{\tau, g}\ v(\tau, g \mid \theta, k)\ \text{ s.t. } (4). \tag{12}$$

Substituting for the constraint in the objective function, taking the derivative with respect to τ and applying the envelope theorem, we obtain:

$$\begin{aligned}\frac{\partial v(\tau, \tau L^*(\tau) \mid \theta, k)}{\partial \tau} &= L^*(\tau) - \ell^*(\tau \mid \theta) + \left(\tau - \eta\sigma_\theta \cdot \frac{(1-\tau)^2}{(1-\tau)\sigma_\theta + \sigma_k}\right)\frac{dL^*(\tau)}{d\tau} - \\ &- \eta\sigma_\theta \cdot \frac{(1-\tau)((1-\tau)\sigma_\theta + 2\sigma_k)(\ell^*(\tau \mid \theta) - L^*(\tau)) - \sigma_k(\kappa(k) - \bar{\kappa})}{((1-\tau)\sigma_\theta + \sigma_k)^2}.\end{aligned} \tag{13}$$

Expression (13) captures how the indirect utility of type (θ, k) changes when we change τ (and we simultaneously adjust g to satisfy (4) with equality). To understand the meaning of (13), it is useful to distinguish the effects that do not depend on social concerns (i.e., the terms $L^*(\tau) - \ell^*(\tau \mid \theta) + \tau \frac{dL^*(\tau)}{d\tau}$) from those that are instead mediated by social status considerations (i.e., all of the remaining terms).

Focusing on the first group, and in line with classical models of taxation (see Romer, 1975, and Meltzer and Richard, 1981), an increase in τ yields (i) a decrease in the net income of type (θ, k), as taxes on income are higher (the term $-\ell^*(\tau \mid \theta)$), and (ii) a change in the lump-sum transfer g due to the change in the level of tax revenues. This second effect is, in turn, the sum of two components: an increase in the tax revenues associated with the increase in τ (the term $L^*(\tau)$) and a decrease in the level of taxable income due to the distorsive effect of taxation $\left(\text{the term } \tau \frac{dL^*(\tau)}{d\tau}\right)$. Because $L^*(\tau) - \ell^*(\tau \mid \theta) = \bar{\theta} - \theta$, the net effect of these three forces is more likely to be negative (respectively, positive) for individuals with high (resp., low) productivity.

In addition to these standard effects, social concerns activate new channels through which τ may affect an individual's utility. First, because an increase in the tax rate generates inefficiencies and reduces average consumption, an individual of type (θ, k) benefits from the fact that the benchmark level of consumption goes down $\left(\text{the term } -\frac{\eta(1-\tau)^2\sigma_\theta}{(1-\tau)\sigma_\theta+\sigma_k} \cdot \frac{dL^*(\tau)}{d\tau}\right)$. Second, as an increase in τ decreases the standard deviation of consumption (recall that $\sigma_c = (1-\tau)\sigma_\theta$), it also decreases W_c and increases W_k (the remaining term in equation (13)). This change may benefit or harm the individual depending on his standing in the population. In particular, the individual's well-being increases if he is less productive than the average and belongs to a high social class, whereas the individual's well-being decreases if he is more productive than the average and belongs to a low social class. In the remaining two cases (namely, if either $\kappa(k) < \bar{\kappa}$ and $\theta < \bar{\theta}$ or $\kappa(k) > \bar{\kappa}$ and $\theta > \bar{\theta}$), the net effect is ambiguous and depends on which of the two dimensions is more relevant in determining social status.

To simplify notation, it is convenient to define

$$\varphi(\tau, \theta, k) := \frac{\partial v(\tau, \tau L^*(\tau) \mid \theta, k)}{\partial \tau}. \tag{14}$$

In what follows, we assume that the function $\varphi(\tau, \theta, k)$ is strictly decreasing (i.e., the agent's indirect utility function $v(\tau, g \mid \theta, k)$ is strictly concave).[14] Thus, the maximization of the indirect utility function has a unique internal solution, which we denote by $\tau^*(\theta, k)$. Formally, $\varphi(\tau^*(\theta, k), \theta, k) = 0$. The next proposition highlights some important properties of $\tau^*(\theta, k)$.

Proposition 2 *$\tau^*(\theta, k)$ is a continuous function. Furthermore, it is decreasing in θ and increasing in k.*

Proposition 2 states two results. The first result shows that in our model a standard form of economic voting holds: the preferred tax rate of an agent of type (θ, k) is decreasing in his level of productivity. Indeed, holding fixed the social class, more productive (i.e., richer) individuals dislike high levels of redistribution because the cost they pay $(\tau\ell^*(\tau \mid \theta))$ exceeds the benefit they receive (g). The second result is novel and highlights the role of class voting. This result states that the optimal tax rate of an agent of type (θ, k) is increasing in the agent's social class. Indeed, high levels of taxation decrease the standard deviation of consumption and consequently the importance of consumption in determining the agent's overall status. It follows that an increase in the tax rate τ raises the relative importance of the social class vis-a-vis consumption. Thus, coeteris paribus, individuals who belong to higher classes will be more in favor of redistribution. Similarly, individuals in low classes may be in favor of little redistribution because a low tax rate increases the importance of consumption and simultaneously reduces the role played by social class in determining an agent's status. In this respect, taxation emerges as an instrument for preserving or modifying an individual's position in terms of social standing.

Figure 1 illustrates the previous discussion in the context of a society with two social classes $(k \in \{l, h\})$. As a benchmark, consider the tax rate $\tau^*(\theta_{\min}, l)$ (i.e., the preferred tax rate of type $(\theta_{\min}, l)$). Type $(\theta_{\max}, l)$ is more productive than type $(\theta_{\min}, l)$ such that he benefits less from redistribution. It follows that his preferred tax level $\tau^*(\theta_{\max}, l)$ is certainly below $\tau^*(\theta_{\min}, l)$. In contrast, the preferred tax rate of type $(\theta_{\min}, h)$ is certainly above $\tau^*(\theta_{\min}, l)$, as a high level of taxation helps to preserve his high social standing. Finally, the preferred tax rate of type $(\theta_{\max}, h)$ may be higher or lower than $\tau^*(\theta_{\min}, l)$. On the one hand, type $(\theta_{\max}, h)$ dislikes high taxes as he is a net loser in terms of monetary redistribution.

[14] Since the function is twice differentiable, this is guaranteed by the following condition:

$$\frac{\partial^2 v(\tau, g \mid \theta, k)}{\partial \tau^2} = \left(\frac{\partial L^*(\tau)}{\partial \tau}\right)^2 \left(\frac{d^2 R(1 + \theta - L^*(\tau))}{dx^2}\right) + \left(\tau - \frac{\eta(1-\tau)^2 \sigma_\theta}{(1-\tau)\sigma_\theta + \sigma_k}\right) \frac{\partial^2 L^*(\tau)}{\partial \tau^2} + \\ + \left(\frac{2\eta\sigma_k\sigma_\theta}{(\sigma_k + (1-\tau)\sigma_\theta)^3}\right)\left[\sigma_k\left(\theta - \bar{\theta}\right) + \sigma_\theta(\kappa(k) - \bar{\kappa})\right] < 0.$$

Given our assumption on $\frac{d^3 R(x)}{dx^3}$, the previous inequality is satisfied as long as η is not too far away from 0.

On the other hand, he benefits from taxation, as taxation protects his advantage in terms of social class. As such, his preferred tax rate, $\tau^*(\theta_{\max}, h)$, is certainly higher than $\tau^*(\theta_{\max}, l)$ and lower than $\tau^*(\theta_{\min}, h)$. However, the ordering of $\tau^*(\theta_{\max}, h)$ with respect to $\tau^*(\theta_{\min}, l)$ remains ambiguous and depends on the functional and distributional assumptions of the model, as well as on the magnitude of the differences $(\theta_{\max} - \theta_{\min})$ and $(\kappa(h) - \kappa(l))$. This simple example highlights the main insights of our model. In line with the anecdotal evidence mentioned in the Introduction (see also Gilens, 1999, or Fong, 2001), individuals with the same income may have different attitudes toward redistribution. In particular, members of the socioeconomic elite (in this example, individuals of type $(\theta_{\max}, h)$) may be in favor of higher taxes than citizens who belong to the working class.

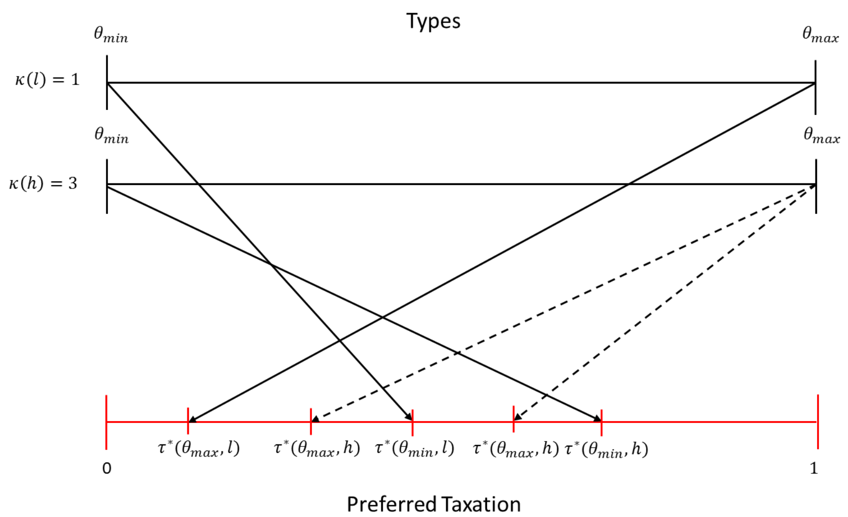

Figure 1: Agents' preferred tax rates as a function of their type.

4 Voting Equilibrium

We now investigate how individual preferences are aggregated in the political equilibrium. To achieve this goal, notice that Proposition 2 implies that social concerns introduce a disagreement between voters who have the same productivity level, but belong to different social classes. In particular, individuals in higher (respectively, lower) classes are increasingly more (respectively, less) in favor of redistributive policies.

In our setting, this relationship can be expressed quite simply. Pick any type (θ, k), so that $\tau^*(\theta, k) \in (0, 1)$. By definition, $\varphi(\tau^*(\theta, k), \theta, k) = 0$. Now, consider a different social class $\hat{k} \neq k$. By definition, $\tau^*(\theta, k)$ is the preferred tax rate of some type $\left(\hat{\theta}, \hat{k}\right)$ if and only if $\varphi\left(\tau^*(\theta, k), \hat{\theta}, \hat{k}\right) = 0$. As $\varphi\left(\tau^*(\theta, k), \hat{\theta}, \hat{k}\right)$ is linear in $\hat{\theta}$, we can find a $\hat{\theta}$ for which $\varphi\left(\tau^*(\theta, k), \hat{\theta}, \hat{k}\right) = 0$. Since $\varphi(\tau^*(\theta, k), \theta, k) = 0 = \varphi\left(\tau^*(\theta, k), \hat{\theta}, \hat{k}\right)$, we can define the mapping $\vartheta : [\theta_{\min}, \theta_{\max}] \times K^2 \to \mathbb{R}$ as follows

$$\vartheta\left(\theta, k, \hat{k}\right) = \theta + \left(\kappa\left(\hat{k}\right) - \kappa\left(k\right)\right) Q\left(\eta, \sigma_\theta, \sigma_k \mid \theta, k\right), \tag{15}$$

where

$$Q\left(\eta, \sigma_\theta, \sigma_k \mid \theta, k\right) = \frac{\eta\sigma_\theta\sigma_k}{\left(1+\eta\right)\left(1-\tau^*\left(\theta,k\right)\right)^2\sigma_\theta^2 + 2\left(1+\eta\right)\left(1-\tau^*\left(\theta,k\right)\right)\sigma_\theta\sigma_k + \sigma_k^2}. \tag{16}$$

Obviously, $Q\left(\eta, \sigma_\theta, \sigma_k \mid \theta, k\right) \geq 0$ for any profile of parameters $\left(\eta, \sigma_\theta, \sigma_k\right)$; moreover, it is strictly positive whenever η, σ_θ, and σ_k are different from 0.

Intuitively, starting from an arbitrary type (θ, k), (15) identifies the interclass coalition of voters whose preferred tax rate is given by $\tau^*\left(\theta, k\right)$. This coalition is composed of relatively less productive agents in classes with low social prestige and relatively more productive agents in classes with high social prestige. Formally, if types (θ, k) and $\left(\hat{\theta}, \hat{k}\right)$ belong to the same coalition, then $\hat{\theta} > \theta$ if and only if $\hat{k} \succ k$.[15] Indeed, the term $Q\left(\eta, \sigma_\theta, \sigma_k \mid \theta, k\right)$ captures the slope of adjustment in the productivity dimension that is necessary to compensate for a change in social class to guarantee that citizens in different classes have the same optimal tax rate. In this respect, $Q\left(\eta, \sigma_\theta, \sigma_k \mid \theta, k\right)$ can also be interpreted as a measure of the disagreement generated by social concerns among individuals who belong to different social classes. In particular, if $Q\left(\eta, \sigma_\theta, \sigma_k \mid \theta, k\right)$ is small, then the set of types who share the same preferred tax rate is relatively homogeneous in terms of productivity. In contrast, if $Q\left(\eta, \sigma_\theta, \sigma_k \mid \theta, k\right)$ is large, the coalition includes individuals with rather different levels of productivity.

Importantly, the disagreement we just described exists independent of any difference in the distribution of productivity across classes. In other words, $Q\left(\eta, \sigma_\theta, \sigma_k \mid \theta, k\right) > 0$, even if $F_k\left(\cdot\right) = F\left(\cdot\right)$ for every k. Thus, if the distribution of productivity (hence, of income levels) were the same in all classes, social concerns would introduce differences in the distribution of preferred tax rates across classes. Finally, notice that $Q\left(\eta, \sigma_\theta, \sigma_k \mid \theta, k\right)$ is increasing in the preferred tax rate of type (θ, k).[16] This finding implies that, coeteris paribus, more productive individuals tend to have preferred levels of taxation that are more alike than less productive individual. This difference is caused by the distorsive effect of taxation. Indeed, consider a less productive voter in a class with high social prestige. Given his type, the agent is willing to accept high levels of labor supply distortion to achieve a high level of redistribution. However, individuals in less prestigious classes are overall less in favor

[15] Notice that a coalition may in principle include some fictitious agents, as for some $\hat{k}$, $\vartheta\left(\theta, k, \hat{k}\right)$ may lie outside $[\theta_{\min}, \theta_{\max}]$ or be such that $f_{\hat{k}}\left(\vartheta\left(\theta, k, \hat{k}\right)\right) = 0$.

[16] This follows from Proposition 2 and the fact that $Q\left(\cdot\right)$ is increasing in $\tau^*\left(\theta, k\right)$.

of redistribution. Thus, an individual in a lower ranked class is willing to support the same high level of distortion if and only if he is sufficiently less productive. As a result, $Q(\eta, \sigma_\theta, \sigma_k \mid \theta, k)$ must be sufficiently large.

Figure 2 illustrates the role of mappings $\vartheta(\cdot)$ and $Q(\cdot)$ in a society that is stratified into three social classes: $K = \{l, m, h\}$, with $\kappa(l) = 1$, $\kappa(m) = 2$, and $\kappa(h) = 3$. Let $\tau^*(\theta, l)$ be the preferred tax rate of type (θ, l). Then, $\tau^*(\theta, l)$ is also the preferred tax rate of types $(\vartheta(\theta, l, m), m)$ and $(\vartheta(\theta, l, h), h)$, where $\vartheta(\theta, l, m) = \theta + Q(\eta, \sigma_\theta, \sigma_k \mid \theta, k)$ and $\vartheta(\theta, l, h) = \theta + 2Q(\eta, \sigma_\theta, \sigma_k \mid \theta, k)$. Similarly, $\tau^*(\theta', l)$ is the preferred tax rate of types (θ', l), $(\vartheta(\theta', l, m), m)$ and $(\vartheta(\theta', l, h), h)$. Because $\tau^*(\theta, l) > \tau^*(\theta', l)$, the difference $\vartheta(\theta, l, k) - \theta$ is larger than $\vartheta(\theta', l, k) - \theta'$ for any $k \in \{m, h\}$.

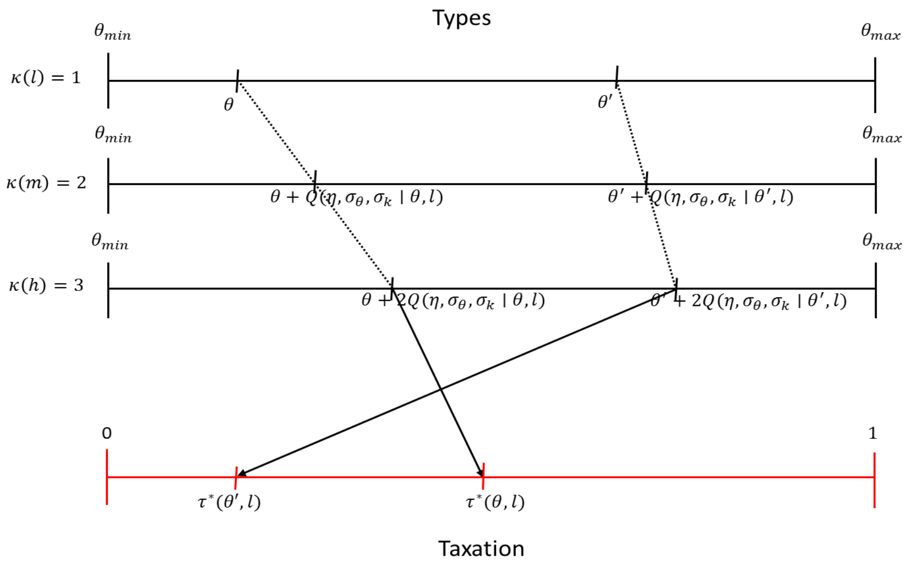

Figure 2: Coalition of types with the same preferred tax rates.

Proposition 2 and function $\vartheta(\cdot)$ enable us to rank all individuals based on their preferred tax rates. We can then apply standard results to conclude that the political game has a unique equilibrium in which both candidates announce the same tax rate τ^{PE} and that tax rate is a Condorcet winner.[17] The amount of the transfer g^{PE} is then determined by (4). We refer to the pair (τ^{PE}, g^{PE}) as the equilibrium policy. Because τ^{PE} must be a Condorcet winner, it must be the preferred tax rate for a voter of type $(\theta, k) \in [\theta_{\min}, \theta_{\max}] \times K$, such that:

$$\sum_{k' \in K} \alpha_{k'} F_{k'}(\vartheta(\theta, k, k')) = \frac{1}{2}. \tag{17}$$

Intuitively, equation (17) states that exactly half of the voters prefer a tax rate lower or

[17] See Gans and Smart (1996).

equal than τ^{PE}; consequently, half of the voters prefer a tax rate higher or equal than τ^{PE}. Thus, no other tax rate τ' can win against τ^{PE} under majoritarian voting.

By construction, if type (θ, k) satisfies (17), type $(\vartheta(\theta, k, k'), k')_{k' \in K}$ also satisfies (17). To solve this indeterminacy, let:

$$k^d := \kappa^{-1}\left(\min_{x \in \left\{k : \sum_{k' : k \succeq k'} \alpha_{k'} > \frac{1}{2}\right\}} \kappa(x)\right). \tag{18}$$

In words, k^d is the least prestigious social class for which at least half of the population belongs to classes that entail a lower or equal social prestige. We will refer to k^d as the *decisive class*. The next proposition shows that we can identify a unique type in the decisive class that satisfies (17). We refer to type $\left(\theta^d, k^d\right)$ as the *decisive voter*.

Proposition 3 *Consider the decisive class k^d. Then, there is a unique productivity level θ^d such that $\sum_{k' \in K} \alpha_{k'} F_{k'}\left(\vartheta\left(\theta^d, k^d, k'\right)\right) = \frac{1}{2}$.*

According to Proposition 3, the decisive voter can be uniquely determined within the decisive class k^d. For future reference, it is convenient to define the function $\psi : [\theta_{\min}, \theta_{\max}] \times K \to \left[-\frac{1}{2}, \frac{1}{2}\right]$ as follows:

$$\psi(\theta, k) := \sum_{k' \in K} \alpha_{k'} F_{k'}\left(\vartheta(\theta, k, k')\right) - \frac{1}{2}. \tag{19}$$

Intuitively, for every productivity level $\theta \in [\theta_{\min}, \theta_{\max}]$ in class k, the function $\psi(\theta, k)$ measures the extent to which the mass of voters with a preferred tax policy greater or equal than $\tau^*(\theta, k)$, exceeds $\frac{1}{2}$. An immediate corollary of Proposition 3 is that the decisive voter is given by the unique type $\left(\theta^d, k^d\right)$ for which $\psi\left(\theta^d, k^d\right) = 0$. The following theorem summarizes our discussion.

Theorem 1 *The policy that arises in the political equilibrium, τ^{PE}, is the policy preferred by the decisive voter $\left(\theta^d, k^d\right)$. Thus, τ^{PE} and $\left(\theta^d, k^d\right)$ jointly satisfy the following system of equations:*

$$\varphi\left(\tau^{PE}, \theta^d, k^d\right) = 0 \tag{20}$$

$$\psi\left(\theta^d, k^d\right) = 0 \tag{21}$$

Furthermore, $g^{PE} = \tau^{PE} L^*\left(\tau^{PE}\right)$.

The political equilibrium is thus given by the solution of the system of non-linear equations (20)-(21). In particular, our analysis provides a procedure that simplifies the computation of the political equilibrium. The procedure can be described in three subsequent steps:

1. Identify the decisive class k^d.

2. For every voter in the decisive class, compute his preferred tax rate $\tau^*\left(\theta, k^d\right)$.

3. Find the unique value $\theta^d \in [\theta_{\min}, \theta_{\max}]$ that satisfies the following equation:

$$\sum_{k \in K} \alpha_k F_k\left(\vartheta\left(\theta^d, k^d, k\right)\right) - \frac{1}{2} = 0,$$

where $\vartheta\left(\theta^d, k^d, k\right)$ is defined by (15).

We now characterize the equilibrium policy in some special cases of our model. First, consider the benchmark case in which individuals do not care about social concerns (we index the benchmark case with the subscript B).

Proposition 4 *Let $\eta = 0$. Denote with $\left(\tau_B^{PE}, g_B^{PE}\right)$ the equilibrium policy. Then, for every $k \in K$, $\tau^*\left(\theta, k\right) = \tau^*\left(\theta\right)$ and $\tau_B^{PE} = \tau^*\left(\theta^m, k\right)$.*

Proposition 4 implies that in the absence of social concerns, the equilibrium tax rate coincides with the rate preferred by the voter with median productivity, independent of his social class. Indeed, when $\eta = 0$, $Q\left(\cdot\right) \equiv 0$ and the model collapses to a standard model à la Meltzer and Richard (1981).

Instead, if individuals care about social status (namely, if $\eta > 0$), the equilibrium departs from the benchmark case characterized in Proposition 4 in two dimensions. First, the identity of the decisive voter changes as the existence of social concerns introduces disagreement among individuals with the same productivity in different classes. Second, the preferred tax rate of each individual (hence, of the decisive voter) is modified by the existence of social concerns. Indeed, *coeteris paribus*, more productive (respectively, less productive) individuals are less (respectively, more) supportive of redistributive policies, as by lowering the weight W_c, these policies weaken the channel through which these agents can signal their social status. Furthermore, individuals who belong to more prestigious (respectively, less prestigious) social classes are more (respectively, less) in favor of redistributive policies, as these policies raise W_k and thus make an individual's social class more salient in determining his overall social status.

Given the non-linearity of system (20)-(21), the way in which these two channels modify the political equilibrium depends on the functional form of $R\left(\cdot\right)$ and on the distributional assumptions about θ and k. Thus, a general analytical characterization cannot be provided. However, we study two polar cases. First, we consider a setting in which the heterogeneity in terms of one of the two dimensions of social comparison (consumption or social class) tends to vanish (Proposition 5). Then, we study a case in which agents are heterogeneous in both dimensions, but the overall importance of social status considerations is small (Proposition 6).

Proposition 5 *If individuals belong to different social classes and the heterogeneity in terms of productivity vanishes (i.e.,* $\sigma_k > 0$ *and* $\sigma_\theta \to 0$*), then* $\tau^{PE} \to 0$*. If instead individuals differ in productivity but the heterogeneity in terms of social class vanishes (i.e.,* $\sigma_\theta > 0$ *and* $\sigma_k \to 0$*), then* $\tau^{PE} > \tau_B^{PE}$*.*

The intuition behind Proposition 5 is straightforward. If $\sigma_\theta \to 0$, the scope for redistributive policies disappears, as the productivity of all of the individuals converges to the average productivity. However, the tax rate still has a distorsive effect on the individual and aggregate labor supply. As a result, the decisive voter will support a tax rate (hence, a level of redistribution) close to 0.

Instead, if $\sigma_k \to 0$, the heterogeneity of voters in terms of social classes vanishes, and the identity of the decisive voter is determined as in a standard model à la Meltzer and Richard (1981). Thus, $\theta^d \to \theta^m$. However, because $\theta^m < \bar{\theta}$, the decisive voter has a consumption level lower than the average. Thus, he has an additional reason to support a positive level of redistribution, namely reducing the social stigma he experiences in the consumption dimension. This additional force pushes the equilibrium tax rate above the rate we identified in Proposition 4.

Proposition 6 *Let the importance of social concerns be small (i.e.,* $\eta \simeq 0$*). Then,* θ^d *is increasing in* η *(hence* $\theta^d > \theta^m$*) if and only if* $\sum_{k\in K} \alpha_k f_k(\theta^m)\left(\kappa(k) - \kappa\left(k^d\right)\right) \leq 0$*. Furthermore, there exists* $z \in \mathbb{R}$ *such that* τ^{PE} *is increasing in* η *(hence,* $\tau^{PE} > \tau_B^{PE}$*) if and only if* $\frac{\sum_{k\in K} \alpha_k f_k(\theta^m)(\kappa(k)-\bar{\kappa})}{\sum_{k\in K} \alpha_k f_k(\theta^m)} \geq z$*.*[18]

Proposition 6 characterizes the equilibrium effect of an increase in the relevance of social concerns in a neighborhood of $\eta = 0$.

First, consider the identity of the decisive voter. As already discussed, an increase in η introduces disagreement among voters in different classes who have the same productivity level. Obviously, this affects the mass of voters with a preferred tax rate above τ_B^{PE}. As highlighted above, this mass decreases (resp., increases) in classes whose social prestige is below (resp., above) the average. If $\sum_{k\in K} \alpha_k f_k(\theta^m)\left(\kappa(k) - \kappa\left(k^d\right)\right) < 0$, the mass of voters that is lost in classes with relatively low social prestige is higher than the mass gained in classes with relatively high social prestige. As such, $\psi\left(\theta^m, k^d\right) < 0$. To compensate for such a decrease, the productivity level of the decisive voter must go up. The opposite adjustment takes place if $\sum_{k\in K} \alpha_k f_k(\theta^m)\left(\kappa(k) - \kappa\left(k^d\right)\right) > 0$.

[18] The term z is a function of σ_θ, σ_k, θ^m, and $\bar{\theta}$. Its actual characterization is provided in the proof of the proposition.

Now, consider the equilibrium level of taxation. As η goes up, the identity of the decisive voter changes, as described in the previous paragraph. Furthermore, the preferences of all voters also change with respect to the benchmark case in which social concerns do not exist. The interaction between these two forces determines the equilibrium level of taxation. In particular, if $\frac{\sum_{k\in K}\alpha_k f_k(\theta^m)(\kappa(k)-\bar{\kappa})}{\sum_{k\in K}\alpha_k f_k(\theta^m)} < z$, the change in η yields a decrease in the weighted social class with respect to the average social class. As a result, the general support for redistributive policies in the population goes down, and the equilibrium tax rate is larger than the rate that emerges in the benchmark model. Once more, the opposite phenomenon arises if the reverse inequality holds.

We conclude this section by presenting some examples that clarify our results and illustrate the effects that a change in the parameters of the model may have on the equilibrium tax rate. Throughout these examples, we assume that $R(x) = \ln(x)$. Thus, $\frac{dR(x)}{dx} = \frac{1}{x}$, $\frac{d^2R(x)}{dx^2} = -\frac{1}{x^2}$, $\frac{d^3R(x)}{dx^3} = \frac{2}{x^3}$ and the individual labor supply (see (9)) is given by $\ell^*(\tau \mid \theta) = 1 + \theta - \frac{(1-\tau)\sigma_\theta + \sigma_k}{(1-\tau)((1+\eta)(1-\tau)\sigma_\theta + \sigma_k)}$.

4.1 Example 1: The Prestige of the Elite

Consider a society that is divided into a low social class that represents 80% of the population and an elite social class that represents the remaining 20%. Formally, let $K = \{l, h\}$, $\alpha_l = 0.8$ and $\alpha_h = 0.2$. Further assume that $F_l(\theta) \sim U[10, 20]$, $F_h(\theta) \sim U[10, 22]$, $\kappa(l) = 1$ and $\kappa(h) = x$, where $x \in \{5, 50\}$. Intuitively, the scenario with $\kappa(h) = 5$ captures a situation in which the two classes are not too distant in terms of social prestige, whereas the scenario with $\kappa(h) = 50$ depicts a society in which the difference in terms of social prestige between the two classes is more pronounced.

Given these assumptions, we can immediately verify that $\bar{\theta} = 15.2$, $\theta^m = 15.1724$ and $\sigma_\theta \cong 3.04$. Moreover,

$$\bar{\kappa} = \begin{cases} 1.8 & \text{if } \kappa(h) = 5; \\ 10.8 & \text{if } \kappa(h) = 50; \end{cases} \quad \text{and } \sigma_k = \begin{cases} 1.6 & \text{if } \kappa(h) = 5; \\ 19.7 & \text{if } \kappa(h) = 50. \end{cases}$$

Notice that in this example, the decisive class is the low class (i.e., $k^d = l$).[19]

In the absence of social concerns ($\eta = 0$), Proposition 4 implies that the identity of the decisive voter is given by $(\theta^d, k^d) = (\theta^m, l)$ and that the equilibrium level of taxation τ_B^{PE} solves equation $\tau_B^{PE} = (\bar{\theta} - \theta^m)(1 - \tau_B^{PE})^2$. Thus, $\tau_B^{PE} \cong 2.61\%$. Now, consider what happens if $\eta > 0$. Because in this example, the decisive class is also the class with the lowest

[19] Therefore, in a framework of majoritarian voting, the elite class is not pivotal in determining the actual equilibrium policy. Lizzeri and Persico (2004) instead investigate the decisive role of the elite class in extending the franchise (and thus ultimately determining the level of redistribution) in nineteenth century Britain.

social prestige, Proposition 6 implies that for small values of η, θ^d is decreasing in η and is lower than θ^m for every $x \in \{5, 50\}$. Similarly, the proof of Proposition 6 implies that for small values of η, the equilibrium tax rate increases or decreases in η depending on the sign of $\frac{\sigma_\theta \sigma_k \sum_{k\in K} \alpha_k f_k(\theta^m)(\kappa(k)-\bar{\kappa})}{\left(\left(1-\tau_B^{PE}\right)\sigma_\theta+\sigma_k\right)^2} - z$. Substituting the values of parameters, one can show that the previous expression is positive if $x = 5$ and negative if $x = 50$. As a result, the equilibrium tax rate τ^{PE} is increasing in η if $x = 5$ and decreasing in η if $x = 50$. Figure 3 illustrates these effects.

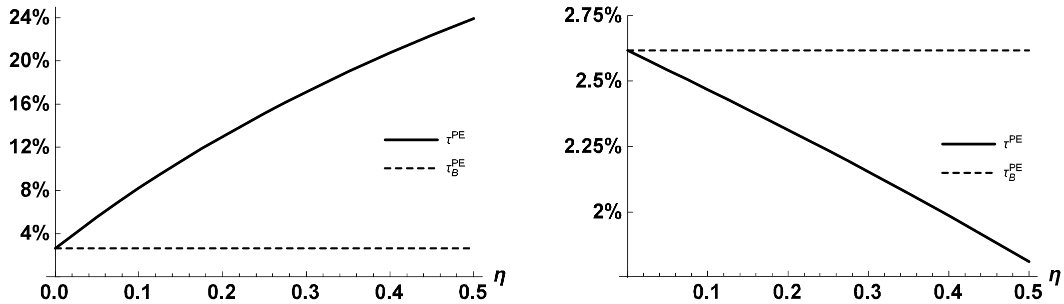

Figure 3: τ^{PE} as a function of η when the elite entails moderate (left chart) or high (right chart) social prestige.

To understand these patterns, notice that in the example, the decisive voter has both a productivity level and a social prestige below the average. However, if the gap in social prestige between the two classes is not too large (i.e., $\kappa(h) = 5$), the main determinant of an agent's overall social status is consumption. Thus, the decisive voter supports a level of redistribution that is higher than τ_B^{PE} to reduce income inequality and thus limit the social stigma he suffers in the consumption dimension. In other words, he behaves as predicted by economic voting. In contrast, if the gap in social prestige between the two classes is large ($\kappa(h) = 50$), then the main determinant of an agent's status is social class. In such a framework, although the decisive voter still has a level of consumption below the average, the stigma that he suffers in the consumption dimension is now smaller than the one he suffers in terms of social class. Therefore, his behavior is mostly determined by class voting (namely, by the desire to reduce W_k against W_c). As a result, he supports lower levels of redistribution and the equilibrium tax rate goes down.

4.2 Example 2: The Relative Position of the Middle Class

The literature that relates individual preferences for redistribution with issues of social identity or with the structure of inequality in the society has suggested that the relative position of the middle class plays a key role in shaping the equilibrium tax rate. For instance, Corneo and Grüner (2000) argue that if the middle class is "closer" to the working class (resp., to the elite) in terms of status, then the level of redistribution is relatively high (resp., low). Lupu and Pontusson (2011) postulate a similar relation when the distance among different social classes is measured in terms of income rather than status. In the context of our model, we can refine this claim and show that the above-mentioned relations depend on the specific dimension on which this distance is measured.

To clarify this point, consider a society that is stratified into three different social classes: $K = \{l, m, h\}$, with $F_l(\theta) \sim U[10, 20]$, $F_m(\theta) \sim U[10 + t, 20 + t]$, and $F_h(\theta) \sim U[20, 32]$ with $t \in [0, 10]$. Further assume that $\kappa(l) = 1$, $\kappa(m) = w$ and $\kappa(h) = 50$ with $w \in [1, 50]$. Finally, let $\alpha_l = 0.25$, $\alpha_m = 0.5$ and $\alpha_h = 0.25$. The decisive voter thus belongs to the middle class.

In what follows, we investigate what happens when we change the relative position of the middle class in terms of average income (namely, when we change t in the interval $[0, 10]$ keeping social prestige fixed at the level $\kappa(m) = 25.5$) or in terms of social prestige (namely, when we change w in the interval $[1, 50]$, keeping $t = 5$ fixed). Figure 4 depicts the equilibrium tax rate that emerges in the two scenarios.

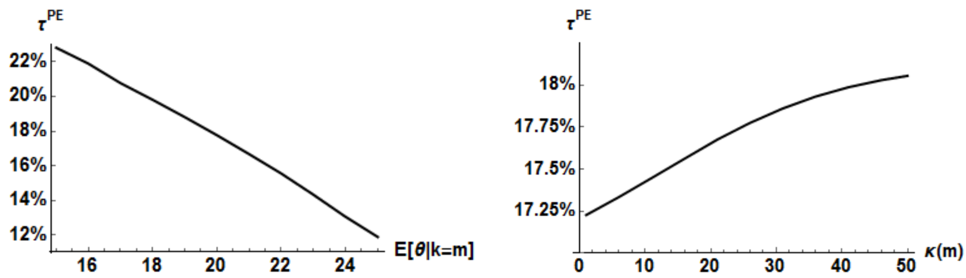

Figure 4: τ^{PE} as a function of $E[\theta \mid k = m]$ (left chart) and of $\kappa(m)$ (right chart) when $\eta = 0.1$.

Intuitively, in the first scenario (left chart in Figure 4), as the average income of the middle class increases, the decisive voter becomes richer. As such, the cost he pays to finance redistributive policies increases. Therefore, he will support relatively lower levels of redistribution. In such a scenario, our model thus replicates the pattern described in Corneo and Grüner (2000). In contrast, if the middle class "gets closer" to the high class in terms of social prestige (right chart in Figure 4), the equilibrium level of redistribution increases. This is because the higher social prestige that the decisive voter enjoys due to his class membership yields him to support a higher level of taxation with the goal of making social prestige a more relevant determinant of his overall social status. To put it differently, the decisive voter enacts class voting in order to reduce W_c against W_k such as to maintain the high social status that stems from his class.

4.3 Example 3: The Relevance of Social Concerns

Proposition 6 is useful for characterizing the equilibrium implications of a change in η in a neighborhood of $\eta = 0$. However, the proposition is silent about what happens when η is sufficiently large. In this case, the equilibrium must be computed as described in Theorem 1.

To illustrate this last point, assume that the society is stratified into three equal-sized classes (i.e., $K = \{l, m, h\}$ with $\alpha_k = \frac{1}{3}$ for every k). Furthermore, let

$$F_k(\theta) = \begin{cases} 0 & \theta < 5; \\ \int_5^6 2(6-t)\,dt & \theta \in [5,6]; \\ 1 & \theta > 6, \end{cases}$$

for every $k \in K$. Thus, the classes are identical in all dimensions, except for social prestige. Indeed, assume that $\kappa(l) = 1$, $\kappa(m) = 25$, and $\kappa(h) = 50$. Given the distributional assumptions, we can conclude that $\bar{\theta} \cong 5.33$, $\theta^m \cong 5.29$, $\sigma_\theta \cong 0.24$, $\sigma_k \cong 22.48$, $\bar{\kappa} \cong 25.33$, and $\sigma_k \cong 20$. Clearly, the decisive class is the middle class (i.e., $k^d = m$).

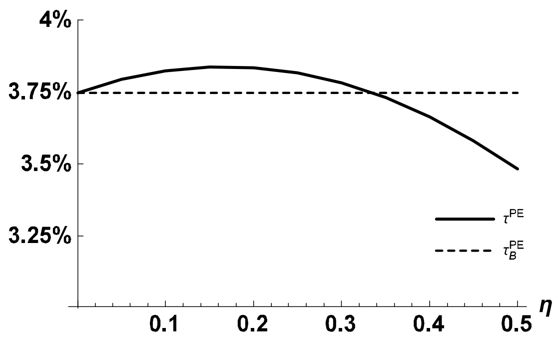

Figure 5: τ^{PE} as functions of η.

In the absence of social concerns, the equilibrium level of taxation, τ_B^{PE}, solves equation $\tau_B^{PE} = \left(\bar{\theta} - \theta^m\right)\left(1 - \tau_B^{PE}\right)^2$. Thus, $\tau_B^{PE} \cong 3.75$. Furthermore, by Proposition 6 we can conclude that in a neighborhood of $\eta = 0$, τ^{PE} is increasing in η and $\tau^{PE} > \tau_B^{PE}$. Nonetheless, Figure 5 shows that when η is sufficiently large, the equilibrium level of redistribution may actually decrease and fall below the level that emerges in the benchmark case.

5 Conclusions

People care about their relative standing in the society. The relevance of social status considerations for individual behavior has been acknowledged in a variety of contexts, such as consumption choices (Hopkins and Kornienko, 2004), financial strategies (Barberis and

Thaler, 2003), and engagement in prosocial activities (Benabou and Tirole, 2006).

In this paper, we investigated how concerns about social status may affect individuals' preferences for redistribution and thus ultimately determine the tax rate that emerges in equilibrium. We postulated that agents differ across two dimensions, productivity and social class, and that both dimensions contribute to determining an agent's overall social status. We showed that the stratification of a society into different social classes implies that individuals who have the same productivity (and thus the same income) may have different views about the desired level of redistribution. In particular, concerns about status may either reinforce or countervail the otherwise standard (negative) relationship between an individual's income and his preferred tax rate. The predictions of our model can help rationalize some well-documented deviations from pure economic voting, such as the fact that in many countries, a non-negligible fraction of the socioeconomic elites appear to be relatively favorable to redistribution, whereas the opposite holds true for some members of the working class. Indeed, we showed that by affecting the distribution of consumption, taxation not only redistributes resources from the rich to the poor but also impacts on the importance of different individual attributes in determining an agent's overall social status. In this respect, taxation may thus also serve as a tool for preserving or modifying one's own relative social standing.

6 Appendix

Proof of Proposition 2.

Observe that (13) is decreasing in θ and increasing in k. Since $v(\tau, \tau L^*(\tau) \mid \theta, k)$ is strictly concave, we know that $\frac{\partial^2 v(\tau,\tau L^*(\tau)|\theta,k)}{\partial \tau^2} < 0$ and the maximization problem has a unique maximizer. By Berge's theorem, $\tau^*(\theta, k)$ is a continuous function of θ and k. If $\tau^*(\theta, k) = 0$, then $\frac{\partial v(\tau,\tau L^*(\tau)|\theta,k)}{\partial \tau} < 0$ for all τ. Thus, $\frac{\partial v(\tau,\tau L^*(\tau)|\theta',k)}{\partial \tau} < 0$ for all $\theta' \geq \theta$ and $\frac{\partial v(\tau,\tau L^*(\tau)|\theta,k')}{\partial \tau} < 0$ for all $k' < k$. Therefore, $\tau^*(\theta', k') = 0$ for every $\theta' \geq \theta$ and $k' \leq k$. A similar reasoning implies that whenever $\tau^*(\theta, k) = 1$, then $\tau^*(\theta', k') = 1$ for every $\theta' \leq \theta$ and $k' \geq k$. Furthermore, if $\tau^*(\theta, k) > 0$, the implicit function theorem ensures that $\tau^*(\theta, k)$ is decreasing in θ and increasing in k. ∎

Proof of Proposition 3 and Theorem 1.

Given the set K and the ordering $\succeq$, define $k_{\min} := \{k \in K : \kappa(k') \succeq \kappa(k) \ \forall k' \in K\}$, $\theta_{\min,k} = \sup\{\theta : F_k(\theta) = 0\}$, and $\theta_{\max,k} = \inf\{\theta : F_k(\theta) = 1\}$.

For every type (θ, k), let $\psi(\theta, k) := \sum_{k' \in K} \alpha_{k'} F_{k'}(\vartheta(\theta, k, k')) - \frac{1}{2}$ and recall that $\tau^*(\theta, k)$ is the value τ^* that satisfies the condition $\varphi(\tau^*(\theta, k), \theta, k) = 0$. Furthermore, define the function $\hat{\vartheta} : [\theta_{\min}, \theta_{\max}] \times K \to \mathbb{R}$ such that

$$\hat{\vartheta}(\theta, k) = \theta + (\kappa(k_{\min}) - \kappa(k))\, Q(\eta, \sigma_\theta, \sigma_k \mid \theta, k).$$

By construction, for every (θ, k), $\hat{\vartheta}(\theta, k) = \vartheta(\theta, k, k_{\min})$. Mapping $\hat{\vartheta}(\cdot)$ is well defined as $\varphi(\tau, \theta, k_{\min})$ is linear in θ. Notice however that $\hat{\vartheta}(\theta, k)$ may lie outside $[\theta_{\min,k_{\min}}, \theta_{\max,k_{\min}}]$. Finally, $\hat{\vartheta}(\theta, k)$ is a continuous and strictly increasing function of θ for every k. To see this last point, notice that

$$\frac{\partial \hat{\vartheta}(\theta, k)}{\partial \theta} = 1 - (\kappa(k) - \kappa(k_{\min})) \cdot \frac{\partial Q(\eta, \sigma_\theta, \sigma_k \mid \theta, k)}{\partial \tau} \cdot \frac{\partial \tau^*(\theta, k_{\min})}{\partial \theta}.$$

By Proposition 2, we know that $\frac{\partial \tau^*(\theta,k_{\min})}{\partial \theta} < 0$. Furthermore, by (16) $\frac{\partial Q(\eta,\sigma_\theta,\sigma_k|\theta,k)}{\partial \tau} > 0$. Thus, $\frac{\partial \hat{\vartheta}(\theta,k)}{\partial \theta} > 0$.

Let $\hat{\theta}_{\min} = \min_{(\theta,k)} \hat{\vartheta}(\theta, k)$ and $\hat{\theta}_{\max} = \max_{(\theta,k)} \hat{\vartheta}(\theta, k)$ and $\hat{\Theta} = \left[\hat{\theta}_{\min}, \hat{\theta}_{\max}\right]$. Define $\hat{\psi}(\theta) = \psi(\theta, k_{\min})$. By definition, $\hat{\psi}\left(\hat{\theta}_{\max}\right) = \frac{1}{2}$, while $\hat{\psi}\left(\hat{\theta}_{\max}\right) = -\frac{1}{2}$. By construction, $\hat{\psi}(\theta) = \sum_{k' \in K} \alpha_{k'} F_{k'}\left(\hat{\vartheta}(\theta, k')\right) - \frac{1}{2}$. Since $\hat{\vartheta}(\theta, k)$ is continuous and increasing in θ for every k, $\hat{\psi}(\theta)$ is also continuous and weakly increasing in θ. To see this, recall that $\hat{\vartheta}(\theta, k)$ is strictly increasing in θ and $F_k(\theta)$ is weakly increasing in θ. By the intermediate value theorem, we can thus conclude that there exists a productivity level $\hat{\theta}$ such that $\hat{\psi}\left(\hat{\theta}\right) = 0$ or, equivalently, $\sum_{k' \in K} \alpha_{k'} F_{k'}\left(\hat{\vartheta}\left(\hat{\theta}, k'\right)\right) = \frac{1}{2}$. Moreover, the value $\hat{\theta}$ that satisfies the previous equality is unique. Indeed, if $\hat{\psi}\left(\hat{\theta}\right) = \hat{\psi}\left(\tilde{\theta}\right) = 0$ with $\tilde{\theta} > \hat{\theta}$, then $\hat{\psi}(\theta') = 0$ for every $\theta' \in \left[\hat{\theta}, \tilde{\theta}\right]$. This is possible if and only if $F_{k'}\left(\hat{\vartheta}(\theta', k')\right) \in \{0,1\}$ for every $\theta' \in \left[\hat{\theta}, \tilde{\theta}\right]$ and $k' \in K$, which in turn implies that we can find a k^* such that $\sum_{k \succ k^*} \alpha_{k^*} = \frac{1}{2}$, violating the assumption that $\sum_{k' \succ k} \alpha_{k'} \neq \frac{1}{2}$ for every $k \in K$.

Thus, starting from type $\left(\hat{\theta}, k_{\min}\right)$ and using function $\hat{\vartheta}\left(\hat{\theta}, \cdot\right)$ we can uniquely identify a mass of voters in each class k that supports levels of redistribution above (resp., below) the one of type $\left(\hat{\theta}, k_{\min}\right)$, $F_k\left(\hat{\vartheta}\left(\hat{\theta}, k\right)\right)$ (resp., $1 - F_k\left(\hat{\vartheta}\left(\hat{\theta}, k\right)\right)$). Obviously, this mass may be equal to 0 or 1 for some classes.

Theorem 1 follows from the previous discussion by noticing that $\varphi(\tau, \theta, k)$ is decreasing in τ and, consequently, $\varphi(\tau, \theta, k) = 0$ has a unique solution for every (θ, k). ∎

Proof of Proposition 4.

If $\eta = 0$, the function $\varphi(\tau, \theta, k)$ simplifies to $L^*(\tau) - \ell^*(\tau \mid \theta) + \tau \frac{dL^*(\tau)}{d\tau}$. Thus, for every level of θ, $\tau(\theta, k)$ does not depend on k. We conclude that agents with the same productivity have the same preferred policy independently of the social class to which they belong. Moreover, $Q(0, \sigma_\theta, \sigma_k \mid \theta, k) = 0$ for every σ_θ, σ_k and every type (θ, k). As such, $\vartheta(\theta, k, k') = \theta$ for every (θ, k, k') (see (15)). Equation $\psi(\theta) = 0$ simplifies to $\sum_{k' \in K} \alpha_{k'} F_{k'}(\theta) - \frac{1}{2} = 0$ (see (19)) and it is verified at $\theta^d = \theta^m$. We conclude that $\tau_B^{PE} = \tau^*(\theta^m)$. ∎

Proof of Proposition 5.

Suppose $\sigma_k > 0$ and $\sigma_\theta \to 0$. Then, $\varphi(\tau, \theta, k) \to L^*(\tau) - \ell^*(\tau \mid \theta) + \tau \frac{dL^*(\tau)}{d\tau}$ (see (14)). Furthermore, $\lim_{\sigma_\theta \to 0}(L^*(\tau) - \ell^*(\tau \mid \theta)) = 0$ (see (8)). Since $\frac{dL^*(\tau)}{d\tau} < 0$, it follows that $\varphi(\tau, \theta, k) < 0$ for every $\tau > 0$. Thus, $\tau^{PE} \to 0$.

Now suppose that $\sigma_\theta > 0$ and $\sigma_k \to 0$. Then, $Q(\eta, \sigma_\theta, \sigma_k \mid \theta, k) \to 0$ (see (16)) and $\sum_{k' \in K} \alpha_{k'} F_{k'}\left(\vartheta\left(\theta, k^d, k'\right)\right) \to \sum_{k' \in K} \alpha_{k'} F_{k'}(\theta)$ (see (15)). As a result, $\theta^d \to \theta^m$ (see Proposition 4). Moreover, $\varphi(\tau, \theta, k) \to \left(\bar{\theta} - \theta\right)(1 + \eta) + (\tau - \eta(1 - \tau)) \frac{\partial L^*(\tau)}{\partial \tau}$ (see (14) and (8)). Our assumptions imply that $\theta^m \leq \bar{\theta}$, $\frac{\partial L^*(\tau)}{\partial \tau} < 0$ and $\frac{\partial \varphi(\tau, \theta, k)}{\partial \tau} < 0$. It follows that $\varphi\left(\tau_B^{PE}, \theta^m, k\right) > 0$ and $\varphi\left(\tau^{PE}, \theta^m, k\right) = 0$ if and only if $\tau^{PE} > \tau_B^{PE}$. ∎

Proof of Proposition 6.

The equilibrium tax rate τ^{PE} and the identity of the decisive voter $\left(\theta^d, k^d\right)$ must jointly satisfy (20) and (21). Since $\varphi\left(\tau^{PE}, \theta^d, k^d\right) = 0$ implies $\tau^{PE} = \tau^*\left(\theta^d, k^d\right)$, $\left(\tau^{PE}, \theta^d\right)$ solves (20)-(21) if and only if it solves

$$\begin{aligned} \varphi\left(\tau^{PE}, \theta^d, k^d\right) &= 0; \\ \tilde{\psi}\left(\tau^{PE}, \theta^d, k^d\right) &= 0. \end{aligned}$$

where $\tilde{\psi}(\tau,\theta,k) = \sum_{k'\in K} \alpha_{k'} F_{k'}\left(\tilde{\vartheta}(\tau,\theta,k,k')\right) - \frac{1}{2}$ with

$$\tilde{\vartheta}(\tau,\theta,k,k') = \theta + \frac{(\kappa(k') - \kappa(k))\,\eta\sigma_\theta\sigma_k}{(1+\eta)(1-\tau)^2\sigma_\theta^2 + 2(1+\eta)(1-\tau)\sigma_\theta\sigma_k + \sigma_k^2}.$$

Omitting to specify the arguments and applying the implicit function theorem, we conclude that:

$$\begin{bmatrix} \frac{d\tau^{PE}}{d\eta} \\ \frac{d\theta^d}{d\eta} \end{bmatrix} = -\frac{1}{\frac{\partial\varphi}{\partial\tau}\frac{\partial\tilde{\psi}}{\partial\theta} - \frac{\partial\varphi}{\partial\theta}\frac{\partial\tilde{\psi}}{\partial\tau}} \begin{bmatrix} \frac{\partial\tilde{\psi}}{\partial\theta} & -\frac{\partial\varphi}{\partial\theta} \\ -\frac{\partial\tilde{\psi}}{\partial\tau} & \frac{\partial\varphi}{\partial\tau} \end{bmatrix} \cdot \begin{bmatrix} \frac{\partial\varphi}{\partial\eta} \\ \frac{\partial\tilde{\psi}}{\partial\eta} \end{bmatrix}. \tag{22}$$

We now proceed to the characterization of all the relevant partial derivatives in the special case in which $\eta = 0$. To this goal, it is useful to recall that if $\eta = 0$, then $\tau^{PE} = \tau_B^{PE}$ and $\theta^d = \theta^m$ (see Proposition 4).

Consider the first equation and recall that

$$\begin{aligned}\varphi(\tau,\theta,k) &= L^*(\tau) - \ell^*(\tau\mid\theta) + \left(\tau - \frac{\eta(1-\tau)^2\sigma_\theta}{(1-\tau)\sigma_\theta + \sigma_k}\right)\frac{dL^*(\tau)}{d\tau} \\ &- \frac{\eta\sigma_\theta}{((1-\tau)\sigma_\theta+\sigma_k)^2}\left((1-\tau)((1-\tau)\sigma_\theta + 2\sigma_k)\cdot(\ell^*(\tau\mid\theta) - L^*(\tau)) - \sigma_k\cdot(\kappa(k)-\bar{\kappa})\right)\end{aligned}$$

Since $L^*(\tau)$ and $\ell^*(\tau\mid\theta)$ differ only by a constant $\left(\bar{\theta}-\theta\right)$, we know that $\frac{\partial(L^*(\tau)-\ell^*(\tau|\theta))}{\partial\eta} = \frac{\partial(L^*(\tau)-\ell^*(\tau|\theta))}{\partial\tau} = 0$. Thus, $\frac{\partial\varphi}{\partial\theta}\Big|_{\eta=0} = -1$, $\frac{\partial\varphi}{\partial\tau}\Big|_{\eta=0} = \frac{dL^*\left(\tau_B^{PE}\right)}{d\tau} + \tau_B^{PE}\frac{d^2L^*\left(\tau_B^{PE}\right)}{d\tau^2}$ and

$$\begin{aligned}\frac{\partial\varphi}{\partial\eta}\Big|_{\eta=0} &= \tau_B^{PE}\frac{d^2L^*(\tau)}{d\tau d\eta} - \frac{\left(1-\tau_B^{PE}\right)^2\sigma_\theta}{(1-\tau_B^{PE})\sigma_\theta+\sigma_k}\frac{dL^*(\tau)}{d\tau} \\ &- \frac{\sigma_\theta}{((1-\tau_B^{PE})\sigma_\theta+\sigma_k)^2}\left[\left(1-\tau_B^{PE}\right)\left(\left(1-\tau_B^{PE}\right)\sigma_\theta + 2\sigma_k\right)\left(\theta^m-\bar{\theta}\right) - \sigma_k\left(\kappa\left(k^d\right)-\bar{\kappa}\right)\right].\end{aligned}$$

Notice that $\frac{\partial\varphi}{\partial\tau}\Big|_{\eta=0} < 0$ as τ_B^{PE} is optimal in the benchmark case in which $\eta = 0$.

Now consider equation $\tilde{\psi}\left(\tau^{PE},\theta^d,k^d\right) = 0$. If $\eta = 0$, then $Q(\eta,\sigma_\theta,\sigma_k\mid\theta,k) = 0$ and $\vartheta(\theta,k,k') = \theta$ for every k and k' belonging to K. Therefore, $\frac{\partial\tilde{\psi}}{\partial\tau}\Big|_{\eta=0} = 0$, $\frac{\partial\tilde{\psi}}{\partial\theta}\Big|_{\eta=0} = \sum_{k'\in K}\alpha_{k'}f_{k'}(\theta^m) > 0$ and

$$\frac{\partial\tilde{\psi}}{\partial\eta}\Big|_{\eta=0} = \frac{\sigma_\theta\sigma_k}{((1-\tau_B^{PE})\sigma_\theta+\sigma_k)^2}\sum_{k'\in K}\alpha_{k'}f_{k'}(\theta^m)\left(\kappa(k') - \kappa\left(k^d\right)\right)$$

As a result, (22) evaluated at $\eta = 0$ becomes

$$\begin{bmatrix} \left.\frac{d\tau^{PE}}{d\eta}\right|_{\eta=0} \\ \left.\frac{d\theta^{d}}{d\eta}\right|_{\eta=0} \end{bmatrix} = -\frac{1}{\left.\frac{\partial\tilde{\psi}}{\partial\theta}\right|_{\eta=0}\cdot\left.\frac{\partial\varphi}{\partial\tau}\right|_{\eta=0}} \begin{bmatrix} \left.\frac{\partial\tilde{\psi}}{\partial\theta}\right|_{\eta=0} & 1 \\ 0 & \left.\frac{\partial\varphi}{\partial\tau}\right|_{\eta=0} \end{bmatrix} \cdot \begin{bmatrix} \left.\frac{\partial\varphi}{\partial\eta}\right|_{\eta=0} \\ \left.\frac{\partial\tilde{\psi}}{\partial\eta}\right|_{\eta=0} \end{bmatrix}$$

Thus

$$\left.\frac{d\theta^{d}}{d\eta}\right|_{\eta=0} = -\frac{\left.\frac{\partial\tilde{\psi}}{\partial\eta}\right|_{\eta=0}}{\left.\frac{\partial\tilde{\psi}}{\partial\theta}\right|_{\eta=0}}.$$

Since $\left.\frac{\partial\tilde{\psi}}{\partial\theta}\right|_{\eta=0} > 0$, we conclude that the productivity of the decisive voter increases (resp., decreases) with η (in a neighborhood of $\eta = 0$) if and only if $\left.\frac{\partial\tilde{\psi}}{\partial\eta}\right|_{\eta=0} < 0$ is negative (resp., positive), or equivalently if and only if $\sum_{k'\in K}\alpha_{k'}f_{k'}(\theta^m)\left(\kappa(k') - \kappa\left(k^d\right)\right) < 0$ (resp., > 0). Instead,

$$\left.\frac{d\tau^{PE}}{d\eta}\right|_{\eta=0} = -\frac{\left.\frac{\partial\varphi}{\partial\eta}\right|_{\eta=0}\cdot\left.\frac{\partial\tilde{\psi}}{\partial\theta}\right|_{\eta=0} + \left.\frac{\partial\tilde{\psi}}{\partial\eta}\right|_{\eta=0}}{\left.\frac{\partial\tilde{\psi}}{\partial\theta}\right|_{\eta=0}\cdot\left.\frac{\partial\varphi}{\partial\tau}\right|_{\eta=0}}$$

Since $\left.\frac{\partial\varphi}{\partial\tau}\right|_{\eta=0} < 0$, the denominator of the previous expression is negative. Thus $\left.\frac{d\tau^{PE}}{d\eta}\right|_{\eta=0}$ is positive (resp., negative) if and only if the numerator of the previous expression is positive (resp., negative). In particular, the numerator of $\left.\frac{d\tau^{PE}}{d\eta}\right|_{\eta=0}$ is positive if and only if:

$$\begin{aligned} &\left(\tau_B^{PE}\frac{\partial^2 L^*(\tau)}{\partial\tau\partial\eta} - \frac{\left(1-\tau_B^{PE}\right)^2\sigma_\theta}{\left(1-\tau_B^{PE}\right)\sigma_\theta+\sigma_k}\frac{\partial L^*(\tau)}{\partial\tau}\right)\cdot\sum_{k'\in K}\alpha_{k'}f_{k'}(\theta^m) + \\ &\quad - \frac{\sigma_\theta\left(1-\tau_B^{PE}\right)\left(\left(1-\tau_B^{PE}\right)\sigma_\theta+2\sigma_k\right)}{\left(\left(1-\tau_B^{PE}\right)\sigma_\theta+\sigma_k\right)^2}\left(\theta^m-\bar{\theta}\right)\sum_{k'\in K}\alpha_{k'}f_{k'}(\theta^m) \\ &\quad + \frac{\sigma_\theta\sigma_k}{\left(\left(1-\tau_B^{PE}\right)\sigma_\theta+\sigma_k\right)^2}\sum_{k'\in K}\alpha_{k'}f_{k'}(\theta^m)\cdot\left(\kappa(k')-\bar{\kappa}\right) > 0 \end{aligned}$$

The condition stated in the proposition follows from rearranging the previous expression after noticing that the optimal labor supply does not depend on the class and defining

$$z = \frac{\sigma_\theta\left(1-\tau_B^{PE}\right)\left(\left(1-\tau_B^{PE}\right)\sigma_\theta+2\sigma_k\right)}{\left(\left(1-\tau_B^{PE}\right)\sigma_\theta+\sigma_k\right)^2}\left(\theta^m-\bar{\theta}\right) - \left(\tau_B^{PE}\frac{\partial^2 L^*(\tau)}{\partial\tau\partial\eta} - \frac{\left(1-\tau_B^{PE}\right)^2\sigma_\theta}{\left(1-\tau_B^{PE}\right)\sigma_\theta+\sigma_k}\frac{\partial L^*(\tau)}{\partial\tau}\right).$$

This concludes our proof. ∎

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