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# Social Status Concerns and the Political Economy of Publicly Provided Private Goods\*

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## Abstract

We analyze the political economy of the public provision of private goods when individuals care about their social status. Status concerns motivate richer individuals to vote for the public provision of goods they themselves buy in markets: a higher provision level attracts more individuals to the public sector, enhancing the social exclusivity of market purchases. Majority voting may lead to a public provision that only a minority of citizens use. Users in the public sector may enjoy better provision than users in the private system. We characterize the coalitions that can prevail in a political equilibrium.

*Keywords:* In-kind provision, Status preferences, Majority voting.

*JEL Classification:* H42, D72.

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# 1 Introduction

Most countries devote considerable resources to the public provision of private goods such as education, childcare, housing, transport, health or food.<sup>1</sup> For many such goods and services, close substitutes are additionally supplied by markets, giving citizens the choice of whether to consume the publicly provided good or its private sector counterpart: parents can send their children to public schools and kindergartens or to private ones; people can live, if eligible, in private apartments or social housing and they can, in many places, commute by public transport or by private car. In democratic systems, public provision is determined through elections and referenda. A substantial body of research has studied the underlying political economy and its interaction with market provision (see, e.g., Stiglitz, 1974; Epple and Romano, 1996b; Glomm and Ravikumar, 1998; Fletcher and Kenny, 2008; Lülfsmann and Myers, 2011). In a number of ways, the predictions from existing models do not square with empirical observations of public-private (dual) provision systems. In particular, existing models do not capture the observations 1) that richer individuals, who consume the private alternative, often support public provision, 2) that democratic governments provide goods and services to their citizens although a majority of voters do not use them, and 3) that publicly provided goods and services are sometimes of better quality than their alternative in the private market.

Almost all research on the public provision of private goods assumes that individual choices between public and private alternatives are driven solely by price and quality. This neglects that consumer choice is often also shaped by social and reputational concerns: individuals pay attention to the social perceptions of their consumption, which confers on them prestige, esteem or social approval (see, e.g., Veblen, 1899 [1994]; Leibenstein, 1950; Frank, 1985; Bagwell and Bernheim, 1996; Glazer and Konrad, 1996; Corneo and Jeanne, 1997; Hopkins and Kornienko, 2004). Status concerns also matter in choices between publicly provided goods and their private alternatives: sending one's child to a private rather than to a public school may conspicuously signal high income, great wealth or refined tastes – and thus caters to needs for social distinction and elitism (Ireland, 1994; Fershtman et al., 1996; Akerlof and Kranton, 2002; Levy and Razin, 2015). More-

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<sup>1</sup>In some OECD countries, around a third of the GDP is devoted to such government programs, which are growing both in developed and developing countries (Currie and Gahvari, 2008; OECD, 2015, pp. 72f).

over, private schools often award intangible rents by providing access to socially valuable resources – such as (job) networks, friends or mating partners – for which only imperfect markets exist (Granovetter, 1973).<sup>2</sup> Private cars and apartments reflect economic prowess and social success and deliver larger image rents than public transportation or social housing, which are often considered the poor man’s choice (Frank, 1985; or Litman, 2009, on “bus stigma” in the US or the UK). *A fortiori*, public alternatives are often tainted with welfare stigma, and people may not take up social benefits out of fear of being stereotyped as unsuccessful, idle or morally weak (Moffitt, 1983; Besley and Coate, 1992; Lindbeck et al., 1999, Friedrichsen et al., 2018).

In this paper, we analyze the political economy of the public provision of private goods when individuals care about their social status or reputation. We provide a simple model where the level of provision for the tax-financed, publicly provided good is determined by majority voting and a competitive private market for this good is available where individuals can purchase their preferred level of the good at their own cost. The decision whether or not to consume the publicly provided good provides an informative signal about income; and the ascription of higher income confers a higher social standing on individuals.

We show that status concerns generate a social feedback effect of public provision. Different provision levels partition society differently into public and private sector users, changing both the social perceptions of how rich (or poor) a typical public and private sector user is and the associated status rents. Presuming standard income sorting (richer [poorer] people tend to consume the private [public] alternative), behavior is characterized by a threshold income that increases in the tax (Corollary 2). Thus, the status rents of both public and private sector consumption increase when public provision increases: a higher provision level attracts more and, on average, richer people into the public sector, increasing average incomes both in- and outside the public sector (Lemma 5). This reduces the social stigma from taking up the publicly provided good and also enhances the social prestige of private sector consumption, as opting out becomes more socially exclusive.

These social feedback effects can help to explain several puzzling empirical features of public provision that are hard to reconcile with standard voting models in a unified

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<sup>2</sup>For an instrumental notion of status, see, e.g., Cole et al. (1992); Postlewaite (1998); Mailath and Postlewaite (2003).

theoretical framework. First, richer individuals often support public services and public welfare although they make no or only little use of such services (Burchardt and Propper, 1999; Busemeyer and Iversen, 2014; Wearing, 2015). For example, in both the US and the UK more than half of the wealthiest quarter of households favor more government spending on health and education, even though they are well aware that this would imply considerable tax increases for them.<sup>3</sup> If only pecuniary motives mattered, this would be puzzling: richer individuals who choose private alternatives and thus tax-finance public provision without benefiting from it should always favor a retrenchment of public provision. Status concerns, as in our model, can accommodate the puzzle: those opting out of public provision may still be willing to pay for (higher) public supply as that would attract more individuals to the public sector, thus increasing the image value of the private alternative (see Proposition 3 and Lemma 5).

Second, pocketbook voting models predict that the public provision of a good can arise as a voting equilibrium only when a majority of the population actually takes up the publicly provided good. Such majority take-ups are, by and large, observed in the education systems in most OECD countries, where only a minority of about 15 percent of students attend private educational institutions (OECD, 2010). However, other important goods and services like housing, nutritional assistance, and sometimes public transport, *are* government-provided although a majority of citizens predominantly purchase them in markets (Currie, 2006).<sup>4</sup> If support for public provision is also driven by the social prestige of being a private consumer, voting may well lead to public provision that is only used by a minority of the population: proponents of public provision may recruit both from in- and outside the public sector and can add up to more than half of the population

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<sup>3</sup>For example, in the US and the UK, 58 and 72 percent of respondents in the top income quartile state that governments should spend more or much more on education; similar figures are found for public spending on health. In the 2001 wave of the British Social Attitudes Survey, which explicitly classifies respondents into users and non-users of several kinds of public services, over two-thirds of the respondents whose children or themselves went to a private school stated that they would favor or strongly favor a 1 percent increase in their income tax to be spent on public education (Sefton, 2003). Similarly, a British housing poll by IPSOS Mori (2014) reveals that a majority of owner-occupiers and private renters speak out for more social housing being built in their locality. Such findings are corroborated in lab experiments: Buckley et al. (2015) find that the majority-preferred tax rate is significantly higher than predicted under the opt-out provision, due to higher-income individuals supporting the public sector without any pecuniary incentives to do so.

<sup>4</sup>For example, the share of individuals living in social housing is about 17 percent in the UK (Andrews et al., 2011); roughly 15 percent of the US population receive benefits from food stamp programs (USDA, 2015). Likewise, in the typical US city, less than 5 percent of the population utilize the public transport system (Litman, 2009).

even if less than half of the population actually consume the publicly provided good (see Proposition 4).

Third, if only price-quality considerations mattered in dual provision, the quality level in the public sector could never be higher than in the private sector: nobody would be willing to incur the extra expenses (say, tuition fees in private schools) in the private system unless quality standards were higher than in the public sector (on schools, see De Fraja, 2004). Again, this is different in the presence of reputation effects: status-concerned citizens are willing to sacrifice a higher quality in the public sector in exchange for the image gain in the private scheme (see Proposition 2). In fact, empirical studies on education reveal that private schools are quite heterogeneous, some offering poorer academic quality than in public schools (Martinez-Mora, 2006; Brunello and Rocco, 2008).<sup>5</sup> Conversely, status concerns may explain why eligible households forgo substantial economic benefits by not taking up in-kind programs such as food stamps or Medicare in the US and constrain themselves to the lower qualities of food or medical care which they can afford themselves (Currie and Gahvari, 2008): individuals trade off the avoidance of stigma from program participation against better consumption.<sup>6</sup>

We characterize the political coalitions that can emerge in a voting equilibrium. Assuming – as is empirically plausible for normal goods such as education or childcare – that public-sector consumers with higher incomes have a higher willingness to pay for the publicly provided good, voting equilibria on dual provision in the absence of image concerns are necessarily of the so-called “end-against-the middle”-type (Epple and Romano, 1996b). Such equilibria feature a coalition structure where “the rich” (who opt out) and “the poor” (who think that the provision level and tax burden are already too high) would prefer less public provision while the (equally populous) “middle class” inside the public sector would prefer higher public provision. As previously discussed, with status concerns, some of those who opt out may support (more) public provision. If the status rent from being an exclusive private-sector consumer has higher value the richer people get, then

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<sup>5</sup>For example, Bertola and Checchi (2004) find that Italian public schools, on average, show better academic performance than (religious and lay) private schools. Looking at standardized tests scores in mathematics, reading, and science reported in the 2000 OECD Pisa Program, Vandenberghe and Robin (2004) find that public schools outperform private schools in France and Austria. Figlio and Stone (1999) assess the effect of religious and non-religious US private schools on educational outcomes and find that only the latter increase individual outputs relative to public schools; for religious private schools, the treatment effects on math and science high school performance are significantly negative.

<sup>6</sup>For laboratory evidence on stigma-driven non-take up, see Friedrichsen et al., (2018).

these supporters will be the “very affluent.” They will coalesce with the middle class and vote for more public provision, being balanced in equilibrium by the moderately rich and the poor who oppose public provision. Even “median income earner”-equilibria can emerge, where all individuals who earn more than median income would support higher taxes (see Proposition 5). Hence, in the presence of status preferences the collection of possible voting equilibria becomes richer.

In parts, the empirical phenomena described above might be driven by factors other than status concerns. For instance, altruism, preferences for redistribution or paternalistic concerns might make richer voters support public services that they themselves do not use (Gasparini and Pinto, 2006). Indirect incidence may also matter: Fack and Grenet (2010) show that public school performance capitalizes in housing prices, which would then make homeowners support public provision. However, unlike status concerns, such motives and channels cannot plausibly explain why provision quality could be lower in the private sector. On the other hand, the few exceptions in the literature that allow for a lower quality in the private sector – see Brunello and Rocco (2008) who argue that private schools can sell lower educational standards at a positive price because they attract students with higher costs of effort – cannot explain why individuals politically support services that they do not use. Our model captures several empirical features of dual provision systems in a single theoretical framework, clearly without claiming that status concerns are the only relevant aspect.

Our modeling of social status can also be interpreted in terms of social networks or spillovers: the utility of being associated with other individuals is higher the richer these others are or, more generally, the larger their status-relevant assets are, such as ability, soft skills or cultural capital. In such settings, richer individuals would also support increases in the public provision level in order to keep the circle of private-sector consumers socially exclusive. In this sense, our paper makes a first step toward a political economy of social networks when individuals can sort across two social platforms with distinct reputations. Our paper complements the literature, cited above, on image and status concerns in consumer demand and on suppliers’ reactions to such desires for distinction (Rayo, 2013; Vikander, 2015; Friedrichsen, 2018). These studies cover market provision only; the role of status concerns – to our knowledge – has not yet been considered for dual-provision, political economy scenarios. There is a growing literature on the role of social status

concerns for normative policy analysis (see, e.g., Truyts, 2012; Bilancini and Boncinelli, 2012, and the references therein). Still, positive studies on the political economy with status concerns are scarce. Corneo and Grüner (2000) study voting over redistributive income taxation when relative consumption serves as an instrumental signal for relative wealth. Higher taxes lessen the consumption gap between rich and poor, thereby reducing the signaling advantage for the rich. Status concerns thus reinforce the reluctance of the rich to redistribute to the poor in their setting. This is different in our paper: higher income taxes and better public services may benefit the rich as they keep their social clubs (private schools, private housing) smaller and less socially diluted.<sup>7</sup>

Our paper contributes to a small but growing literature at the intersection between social status and political economy, reconsidering the voting incentives of the rich. Levy and Razin (2015) forcefully demonstrate that richer individuals with incomes above the mean may politically prefer full income equalization to a *laissez-faire* society. In their setup, individuals purchase a costly signaling good in the private market (private education). In the signaling equilibrium, the rich cannot improve their social standing, but they have to engage in conspicuous consumption to deter the poor from catching up. Full income equality (corresponding to pooling in the public sector) can be beneficial for the rich, as it allows them to forgo the signaling costs of the separating signaling equilibrium (tuition fees for private schools). This is different in our paper: First, the rich consume in the private system, and they support redistribution because it enhances the social exclusivity of the private system. Put differently, redistribution is a vehicle for social signaling rather than a remedy against it. Second, as Levy and Razin focus on conditions for when there is a political majority for social pooling, their results cannot be easily transferred to the case of public provision of private goods, where we usually observe social stratification, with the poor [rich] staying in the public [private] system. The focus of our paper is to characterize conditions for separation to occur as a political equilibrium. Third, we assume that private alternatives are not purely wasteful signaling items but that they also have intrinsic consumption value. This enables us to explicitly analyze potential quality differences between the public and private sector.

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<sup>7</sup>Recently, the model of Corneo and Grüner (2000) has been extended by Ferrari (2018) who provides economic conditions such that medium income earners form a political coalition with the rich to support a policy that increases their own social distance to the poor. In our paper, the rich tend to lure middle class voters into the public sector. This increases the social distance between the rich and the middle class—at least to those individuals from the middle of the income distribution who decide to opt out.

More recently, also Gallice and Grillo (2019) investigate how social status may affect voters' preferences for redistribution. Defining social status as a weighted average of the agents' relative standing in the distributions of consumption and social class, the authors show that high income taxation makes consumption less salient so that differences across agents in that dimension will be less pronounced, relative to social class. They show that (and derive conditions when) members of the socio-economic elites may benefit from this effect. We share with Gallice and Grillo the view on taxation as a strategic tool for the rich to increase relative status, which is new to the social status literature. But in contrast to their findings, higher redistribution (in-kind) makes differences in consumption choices, if anything, more pronounced in our model: private schools become more socially exclusive. Gallice and Grillo (2019) further show that, as status concerns become more relevant, individual preferences for redistribution become more polarized: the rich want higher levels and the poor lower levels of redistribution. In our paper, higher social status (attached to the private system) can drive the rich into a coalition with poorer individuals in the public sector with the goal to increase income taxation. In that sense, social status tends to decrease differences in class voting in our model.

More generally, our paper relates to the recently emerging field of behavioral political economy. Within this field, a small but growing strand of research analyzes the role of non-standard incentives and beliefs for preferences for redistribution. For instance, several papers have documented that individuals have biased perceptions of their own social position, which reflect in their policy demand for redistribution (see, e.g., Cruces et al., 2013; Kuziemko et al., 2015; and the references cited therein.) This literature aims to account for the observation that poorer individuals often want levels redistribution lower than those predicted by pocketbook voting. By contrast, we assume that individuals hold rational beliefs about their social standing and also study the voting behavior of the rich, which has received less attention. In a different context, Ortoleva and Snowberg (2015) have shown that false beliefs (overconfidence) can exacerbate differences in ideology and fuel extremes in political behavior. In our paper, the behavioral motive has instead a moderating effect on political preferences; the rich may want to vote with the poor. In this respect, our results relate to Alesina and Passarelli (2019) who find that also loss-aversion can make class differences in voting over redistribution less pronounced.

The rest of this paper is organized as follows: In Section 2, we introduce a simple voting

model with two income levels, rich and poor. We use this model to derive a set of results on the economic outcomes in equilibria with dual provision in Section 3. Then, Section 4 lays out what distinguishes the predictions of the status-enriched voting model from those of paternalism and altruism. We then move to a model with a continuous distribution of income in Section 5 and discuss which political coalitions may occur in a political equilibrium. Section 6 provides numerical results for our continuous-type model. We conclude in Section 7.

## 2 A two type voting model of dual provision

### 2.1 Framework

**General.** The economy is populated by two types of individuals who differ in their exogenous incomes  $y$ . The income distribution is fully characterized by the mean income  $Y$ , a parameter of mean-preserving income inequality  $\gamma$ , and the share of the poor in the population,  $0 < p_\ell < 1$ . Denote by  $y_\ell$  the income of the “poor” and by  $y_h > y_\ell$  the income of the “rich”. Then, mean income is given by  $Y = p_\ell y_\ell + (1 - p_\ell)y_h$ , and the two income levels can be written as  $y_\ell(\gamma) = Y - (1 - p_\ell)/p_\ell \gamma$  and  $y_h(\gamma) = Y + \gamma$ . For  $\gamma = 0$ , income is equalized:  $y_\ell = y_h = Y$ . Inequality reaches its maximum for  $\gamma^{max} := Y p_\ell / (1 - p_\ell)$ , where the poor earn  $y_\ell = 0$  and the rich  $y_h = Y + \gamma^{max}$ . We will typically suppress the dependence of  $y_\ell$  and  $y_h$  on  $\gamma$  and  $Y$  to simplify the notation.

**Goods and their provision.** There are two private goods, denoted by  $x$  and  $c$ . Good  $c$ , which serves as the numéraire, is exclusively supplied via markets. Both goods are normal. For good  $x$ , there is dual provision: a uniform per-capita level  $\bar{x}$  is provided by the government to all individuals free of charge; as an alternative to consuming  $\bar{x}$ , individuals can opt out of public provision and buy their desired quantity of  $x$  in a competitive market. Public and private sector consumption are mutually exclusive: individuals cannot supplement or diminish the publicly provided quantity via additional purchases or sales in the private market. Think of this as parents sending their children to either a public or a private school, but not to both simultaneously.<sup>8</sup> To finance public provision, the

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<sup>8</sup>There are also topping up models of public provision (for political economy models, see, e.g., Epple and Romano, 1996a; and Levy, 2005). If a topping up system is at least partly financed by redistributive

government levies a proportional income tax at rate  $t$ . Everybody has to pay the tax, irrespective of whether she consumes  $\bar{x}$  or opts out. The production technology of good  $x$  is linear and identical in the public and the private sector: one unit of the numéraire can be transformed into one unit of  $x$ . We assume a competitive private market and correspondingly normalize the market price of good  $x$  to one for both public and private provision.<sup>9</sup>

**Preferences.** All individuals have identical preferences. They derive utility from the consumption of goods  $x$  and  $c$ , represented by a smooth, strictly increasing, and strictly quasi-concave utility function  $u(x, c)$ . We make additional assumptions on  $u(x, c)$  below. In addition to material utility, individuals can gain social prestige when consuming good  $x$  in the market. The status utility attached to market consumption depends on who consumes  $x$  in the public sector. Specifically, preferences are given by

$$U(x, c, S) = u(x, c) + \mathbb{1} \cdot S, \quad (1)$$

where  $\mathbb{1}$  is an indicator for consuming  $x$  in the market, and  $S = S(h^{in})$  represents social prestige from market consumption. Denote by  $h^{in}$  the share of individuals consuming  $x$  in the public sector. We impose that status is given as

$$S(h^{in}) = \begin{cases} \bar{S} & \text{if } h^{in} = p_\ell, \\ 0 & \text{otherwise.} \end{cases} \quad (2)$$

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income taxes, then, in a neoclassical model, the rich prefer a pure market solution also with this provision type. As the rich must co-finance the poor via the tax system, they effectively face a price for the publicly provided good, which exceeds the market price. Therefore, topping up alone cannot explain why richer individuals may want to support publicly provided alternatives. For the examples we have in mind—public schooling and social housing—opting out is possible in most of the countries (see, e.g., Besley and Coate, 1991); and we think that status is relevant for these cases. We therefore do not consider a provision system with topping in this paper.

<sup>9</sup>An alternative model could allow for monopolistic supply in the private sector that may offer good  $x$  at a price exceeding that in the public sector and the rich would be happy to accept. Excessive prices in the private sector would allow for equilibria where the rich consume in the private market whereas the poor consume in the public sector but the rich would, in contrast to our model, not vote in favor of public provision because the price of private education already ensures separation. Price regulation as observed in several countries' education markets as well as free entry would work against separation through prices.

This formulation is decidedly simple. The additive separability between  $u(x, c)$  and  $S$  in (1) allows for a clear distinction between consumption and status utility. The linearity of  $U$  in  $S$  reflects a constant marginal relevance of status concerns. Here, status can only be gained by the rich when they consume in the private market and the poor consume in the public sector. This simplifies the exposition. We could also allow for status changing smoothly with the fraction consuming in the public sector or for it to be the expectation of income conditional on sector choice as in the general model to follow later.

Preferences in (1) to (2) capture various social perceptions of public provision and market purchases. For instance, sending one's child to a private rather than to a public school gives social prestige as long as private education is chosen by the rich. When, however, everybody attends private schools ( $h^{in} = 0$ ), private schools lose their distinction value. Below, we will show that individuals sort into the public and private sector according to income. We therefore can interpret (1) as also to accommodate income signaling concerns: sending one's children to private schools conveys a signal of having high instead of low income. Similarly, private housing is usually associated with a higher social standing than living in social housing, which is often stigmatized as the poor man's choice; and  $\bar{S}$  represents the status differential between public and private housing (vanishing to zero when everybody lives in either public or private housing).<sup>10</sup>

The assumption that choices between publicly provided and private options confer social status requires that they are observable. This is arguably the case for the examples we have in mind: attending private schools is typically noticed by colleagues, friends, family members, and other social peers. Living in social housing does not usually remain private (think of urban public housing areas), and it is often subject to welfare stigma. In reality, the binary choice between the public and the private system is hardly the only source of public inferences about income (or some status-bearing asset that positively correlates with income). We deliberately exclude other potential signaling channels because consumption often provides only a noisy signal and choices between publicly provided and private options affect social status also for a given consumption pattern. For example, attending a private school enhances one's social status even when already wearing designer clothes or driving a luxury car. Likewise, living in social housing means a decrease in

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<sup>10</sup>Observe that, with two types, our utility formulation in (1) and (2) requires an ordinal notion of social status only: all that matters is that consuming in the private sector provides higher status than in the public sector (the latter we normalize to zero).

social standing, independent of one's consumption.<sup>11</sup>

Alternatively, our modeling can also capture peer group or social network effects: in an instrumental interpretation of status, (2) measures the social benefit from being grouped together with someone from the given sector and from getting access to their social resources and connections. For example, private schools may provide different (and typically more valuable) personal contacts for job and marriage markets than their publicly provided counterparts. Similarly, residential areas with private houses are typically embedded in different (and typically better) social environments than areas of public housing. Key to our formulation in (2) is that the network value being matched with private sectors users is higher the larger their status-correlated assets are, such as ability, soft skills, cultural capital or, as in our model, incomes. Note that under network effects, private schools may provide social value, even if incomes or education levels were perfectly observable.

**Sequence of events.** The model proceeds in three stages. First, a policy  $(t, \bar{x})$  is selected by majority voting (political equilibrium). Second, each individual decides whether to consume good  $x$  in the public sector or to purchase it on the market (sector choice). Third, individuals spend their after-tax incomes, taking the policy  $(t, \bar{x})$  and the status value  $\bar{S}$  as given (consumption choice).

**Equilibrium.** We focus on equilibria with *consistent expectations* and *budget balance*. That is, in equilibrium, the expected share consuming in the public sector, denoted by  $\hat{h}^{in}$  coincides with the actual share  $h^{in}$  and

$$t \cdot Y = \bar{x} \cdot h^{in}. \quad (3)$$

By rational expectations and equation (3), for any given mean income  $Y$ , the publicly provided level  $\bar{x}$  is fully determined by  $\hat{h}^{in}$  and  $t$  as  $\bar{x} = \frac{tY}{\hat{h}^{in}}$ . Directly replacing the rational expectation with the realized values, we can hence analyze behavior at Stages 2 and 3 for a given pair  $(t, h^{in})$  and define an equilibrium of the game starting in Stage 2 as follows:

**Definition 1.** *A pair  $(t, h^{in})$  is an equilibrium economy if*

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<sup>11</sup>As we demonstrate below, in our model, quality in the private sector can be lower than in the public sector. This would have an opposing effect on status, if status is not only determined by the sectoral choice, but also by the level of consumption, e.g., the level of education. Note, however, that education levels or school quality are typically less observable than the sectoral choice.

1. Individuals with  $y_i$ ,  $i \in \{\ell, h\}$  choose between private and public sector consumption as to maximize their utility given an expected participation of  $h^{in}$  in the public sector (Utility maximization).
2. The expected share of the population consuming in the public sector coincides with the share actually consuming in the public sector,  $\hat{h}^{in} = h^{in}$  (Rational expectations).
3. The policy balances the government budget (Budget balance).

For expositional clarity, we restrict attention to cases where all individuals with the same income make the same deterministic sector choices.

**Assumption 1.** *The choice between consuming in the private or in the public sector is deterministic and the same for all individuals with identical incomes.*

## 2.2 Consumption and system choice

**Stage 3.** An individual with gross income  $y$  who opts out of public provision purchases the (unique) bundle  $(x, c) > (0, 0)$  that maximizes  $u(x, c)$  subject to the budget constraint  $c + x = y(1 - t)$ . Let  $x^* = x^*(y(1 - t))$  and  $c^* = c^*(y(1 - t)) = y(1 - t) - x^*(y(1 - t))$  be the Marshallian demand for goods  $x$  and  $c$ . By the separability of  $U$  in (1),  $x^*$  and  $c^*$  do not depend on status concerns. Denote  $v(y(1 - t)) := u(x^*, y(1 - t) - x^*)$ . Indirect utility when staying out of the public sector is given by

$$V^{out}(t, h^{in}; y) := v(y(1 - t)) + S(h^{in}).$$

If an individual consumes in the public sector, she receives  $\bar{x}$  for free and spends her entire net income on good  $c$ . Indirect utility from an individual who stays in the public sector is therefore

$$V^{in}(t, h^{in}; y) := u\left(\frac{tY}{h^{in}}, y(1 - t)\right).$$

**Stage 2.** Anticipating the decisions in Stage 3, an individual opts out if  $V^{out}(t, h^{in}; y) > V^{in}(t, h^{in}; y)$ , or, equivalently, if the status utility attached to private sector consumption is large enough as to compensate for differences in material consumption utility:

$$S(h^{in}) > u\left(\frac{tY}{h^{in}}, y(1 - t)\right) - v(y(1 - t)) := \Delta^M(t, h^{in}; y). \quad (4)$$

Condition (4) partitions the population into users and non-users of the public sector.

The following assumption excludes economies where the rich consume in the public sector and the poor in the market. Define  $u_c := \partial u(x, c)/\partial c$  and  $v' := \partial v(y(1-t))/\partial(y(1-t))$ .

**Assumption 2** (Diminishing marginal utility (DMU)). *For all  $c, x > 0$ ,  $u_c - v' < 0$ .*

Assumption 2 implies that  $\Delta^M(t, h^{in}; y)$  decreases with income. Intuitively, based on pure material considerations, the private sector consumption is more attractive the richer an individual is.<sup>12</sup> This ensures that whenever the poor are indifferent between public and private sector consumption, the rich opt out. Conversely, whenever the rich decide to attend public schools, so do the poor. As a consequence,  $h^{in}$  can only take on three values in equilibrium: 0 (pooling in the market),  $p_\ell$  (separating equilibrium), or 1 (pooling in the public sector).

We make the following assumptions, that facilitate the characterization of when which of these equilibria obtains.

**Assumption 3.** *For all  $y \in \{y_\ell, y_h\}$  and  $h^{in} > 0$ :*

$$(i) \quad v(y) + S(h^{in}) - u(0, y) > 0,$$

$$(ii) \quad v(0) + \bar{S} - u\left(\frac{Y}{h^{in}}, 0\right) < 0.$$

*For all  $t > 0$ :*

$$(iii) \quad v((Y + \gamma^{max})(1-t)) + \bar{S} - u(tY/p_\ell, (Y + \gamma^{max})(1-t)) > 0.$$

If the tax rate is zero, then, by the public budget constraint,  $\bar{x}$  is zero, too. Assumption 3 (i) ensures that individuals always opt out in this case—otherwise there can be only pooling in the public sector. Note that this condition holds with pooling in the private market where  $S(0) = 0$  and becomes less demanding if status was higher so that it holds for all status values. If an individual's income is fully taxed away ( $t = 1$ ), Assumption 3 (ii) requires that she must be attracted by the public sector which holds if status is not too important. This condition holds for  $\bar{S}$ , the highest achievable status level from a separating equilibrium, and for  $h^{in} = 1$ , the worst case in terms of material utility

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<sup>12</sup>In the market, individuals can choose their consumption bundle freely, whereas in the public sector they have to “accept” the given provision level. Assumption 2 entails that the marginal utility from income is higher when being able to choose freely.

from consuming in the public sector when all others do so. This implies that individuals will choose the public sector for any expected  $h^{in}$ . Finally, if inequality is maximal, the rich individual must want to consume in the market given that the poor consume in the public sector (Assumption 3 (iii)). This last part ensures that we can indeed observe dual provision.

As  $u(\frac{Y}{h^{in}}, 0)$  is decreasing in  $h^{in}$ , Assumption 3 (ii) effectively imposes a maximum value for the status parameter  $S$ :

$$S \leq u(Y) - v(0) := S^{max}.$$

For later use, define  $\hat{t}(y, h^{in}, S)$ , the tax rate of indifference, as the tax rate that solves Equation (4) with equality. We can show that in a separating equilibrium, the higher is the prestige attached to the private system, the higher a tax rate is needed to attract an individual toward the public sector which due to the status difference is relatively less attractive.

**Lemma 1.** *Suppose Assumptions 2 and 3 hold. Then, an individual  $y$ 's tax rate of indifference,  $\hat{t}(y, h^{in}, S)$ , uniquely exist, it is increasing in income and, for  $h^{in} = p_\ell$ , increasing in the status level  $S$ .*

*Proof.* By Assumption 3 (i) and (ii), for all  $y \in \{y_\ell, y_h\}$  and  $h^{in} > 0$  there exists a tax rate  $t(y, h^{in}) \in [0, 1]$  such that the individual with income  $y$  is indifferent between consuming in the private or the public sector. By Assumption 2, the material utility difference in (4) decreases in income. This directly implies that the tax rate of indifference increases in income. For  $h^{in} = p_\ell$ , the tax rate of indifference solves  $v(y(1 - t)) + S - u(tY/p_\ell, y(1 - t)) = 0$ . Implicitly differentiating this equation gives  $\hat{t}(y, h^{in}, S)/dS = [y(u_c - v') - u_x Y/p_\ell]^{-1}$ . By Assumption 2, this expression is positive.  $\square$

**Stage 1.** At Stage 1, there is majority voting over policies  $(t, \bar{x})$ . As noted above,  $\bar{x}$  is fully determined by  $t$  and  $h^{in}$ . We can therefore think of majority voting over  $(t, \bar{x})$  as majority voting over equilibrium economies  $(t, h^{in})$  that fulfill Definition 1. In a pairwise comparison, an individual with income  $y$  casts her vote for those economy that maximizes

the upper envelope of  $V^{out}(t, \cdot)$  and  $V^{in}(t, \cdot)$

$$V(t, h^{in}; y) := \max\{V^{out}(t, h^{in}; y), V^{in}(t, h^{in}; y)\}. \quad (5)$$

A majority voting or a “political equilibrium” is an economy that cannot be defeated in any pairwise comparison with another equilibrium economy:

**Definition 2.** *An equilibrium economy  $(t, h^{in})$  is a political equilibrium if it garners at least 50 percent of the votes in any pairwise comparison.*

To determine a political equilibrium, it is crucial how indirect preferences depend on  $t$ . Single-peakedness of  $V(t, h^{in})$  over  $t \in [0, 1]$  is typically violated for given  $h^{in}$ . For low tax rates, the public sector is not attractive due to its low provision levels, so people opt out. But when consuming in the market, they want to minimize taxes so that  $V$  decreases in  $t$  for low tax rates. When taxes are high, individuals are attracted by the public sector, and they prefer positive taxation instead. Hence,  $V(t, h^{in})$  has (at least) two peaks. In a model with two types, a further complication comes in:  $h^{in}$  can only take on specific values such that we cannot express indirect preferences as a continuous function of the tax rate alone (as in our continuous income type model in Section 5 where the tax rate determines a cutoff income level and the user share of the public sector).

To obtain clear results, we impose that  $V^{in}(t, h^{in}) = u(\frac{tY}{h^{in}}, y(1-t))$  is strictly concave and single-peaked over  $t$  given  $h^{in}$  for  $y \in \{y_\ell, y_h\}$  and  $h^{in} > 0$ . This assumption ensures that, for given  $h^{in}$ , an individual that stays in the public sector has a most preferred tax rate which we denote by  $t^*(y, h^{in})$ .

**Assumption 4.** *For given  $h^{in}$ ,  $V^{in}(t, h^{in}; y)$  is concave in  $t$  and single-peaked at  $t^*(y, h^{in})$  for all  $y \in \{y_\ell, y_h\}$  and  $h^{in} > 0$ .*

For those in the public sector, a higher tax rate involves a trade-off in consumption utility  $u(tY/h^{in}, y(1-t))$ : it means a higher provision level  $\bar{x}$  but comes at the cost of reducing the consumption level of the other good,  $c = y(1-t)$ . Assumption 4 economically means that, for low taxes the positive provision effect dominates whereas for high taxes, the negative cost effect dominates.

In addition, we make a technical assumption that ensures the most preferred tax rates are increasing in income. Define  $u_x := \partial u(x, c)/\partial x$  and recall that  $u_c = \partial u(x, c)/\partial c$ .

**Assumption 5.** For all  $y \in \{y_\ell, y_h\}$  and  $(t, \bar{x})$  satisfying  $tY = h^{in}\bar{x}$ :

$$\frac{u_x(\bar{x}, y(1-t))}{yu_c(\bar{x}, y(1-t))} \text{ increases in } y.$$

Formally,  $t^*(y, h^{in})$  solves  $\partial V^{in}(t, h^{in}; y)/\partial t = 0$  which is equivalent to  $u_x/(yu_c) = h^{in}/Y = t/\bar{x}$ , where the last equality follows from budget balance. Under Assumption 5, the LHS is increasing in  $y$  implying that individuals with higher income have higher preferred tax rates.

The intuition is the following: By normality of good  $x$ , individuals with higher income have a larger willingness to pay for good  $x$ . However, a higher income also implies a higher “price” of the publicly provided good since richer individuals have to pay higher taxes which reduces their ability to spend on good  $c$ .<sup>13</sup> Assumption 5 assumes that the normality prevails. This assumption is perhaps plausible for goods like education, nutrition and housing: When attracted by the public sector, richer individuals demand higher quality of these goods (e.g., education, housing, etc.), compared to the poor.<sup>14</sup>

### 3 Economic outcomes in the two-type voting model

#### 3.1 Majority of the poor

In this section, we analyze the properties of the political equilibrium under status concerns when the poor have the majority  $p_\ell > \frac{1}{2}$ . We demonstrate that with status concerns, there can be a separating equilibrium entailing the most preferred tax of the poor, even when societies are relatively equal. Furthermore, with status concerns the rich may consume a lower quality in the market than the poor staying in the public sector. Finally, the rich may endorse positive tax rates, so that there can be unanimity for public provision.

When the poor hold the majority, their vote is decisive. They will thus select the economy that maximizes their utility from those that are equilibrium candidates according to Definition 1.<sup>15</sup> In Lemma 2, we show that, if it is a candidate, the separating equilibrium with

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<sup>13</sup>The implicit price of good  $x$  when consuming in the public sector is given by  $h^{in}y/Y$ . This term increases with  $y$ .

<sup>14</sup>For a discussion of the assumption of increasing most preferred tax rates, see, for example, Epple and Romano (1996b) and Lülfsmann and Meyers (2011).

<sup>15</sup>Note that this implies that the equilibrium is then unique, provided that the poor are not indifferent between several tax candidates. If that were the case, we could introduce a tie-breaking rule to let the

the rich consume in the private market is uniquely preferred by the poor and will thus be the outcome of the political process. We will then focus the subsequent discussion on this separating equilibrium because we are most interested in equilibria where dual provision actually occurs.<sup>16</sup>

**Lemma 2.** *Assume  $p_\ell > 1/2$  and  $S > 0$ . If, for given parameters, the economy  $(t, h^{in}) = (t^*(y_\ell, p_\ell), p_\ell)$  is feasible, then a political equilibrium with  $t > 0$  uniquely exists, and it is given by  $(t^*(y_\ell, p_\ell), p_\ell)$ .*

The proof of Lemma 2 is in the Appendix.

The intuition for this result is that individuals with incomes below the mean (i.e., the poor) materially benefit from the redistributive nature of public provision. Therefore, the poor give any economy entailing their most preferred tax the edge over the pure market economy. But a separating economy also dominates pooling inside the public sector, because redistribution from rich to poor is higher if the rich consume in the market and social status to the poor is the same (equal to zero). We now develop conditions on inequality and status such that the poor's most preferred political equilibrium exists. In this respect, Lemma 2 proves useful. It tells us that if the separating economy with  $(t, h^{in}) = (t^*(y_\ell, p_\ell), p_\ell)$  is feasible, then it is indeed the unique political equilibrium so that we can concentrate on feasibility.

The poor's most preferred economy is *feasible* if it satisfies Definition 1. Thus, if for the poor's most preferred tax rate ( $t = t^*(y_\ell, p_\ell)$ ) and anticipating that only the poor consume in the public sector ( $h^{in} = p_\ell$ ), the rich are better off from opting out, whereas the poor are better off when staying in the public sector. Thus, using condition (4), we must have that the status attached to the private system is high enough so that the rich want to opt out. At the same time, status must be low enough not to exceed the material utility differential between public and private sector consumption for the poor:

$$\Delta^M(t^*(y_\ell, p_\ell), p_\ell; y_h < S) \leq \Delta^M(t^*(y_\ell, p_\ell), p_\ell; y_\ell). \quad (6)$$

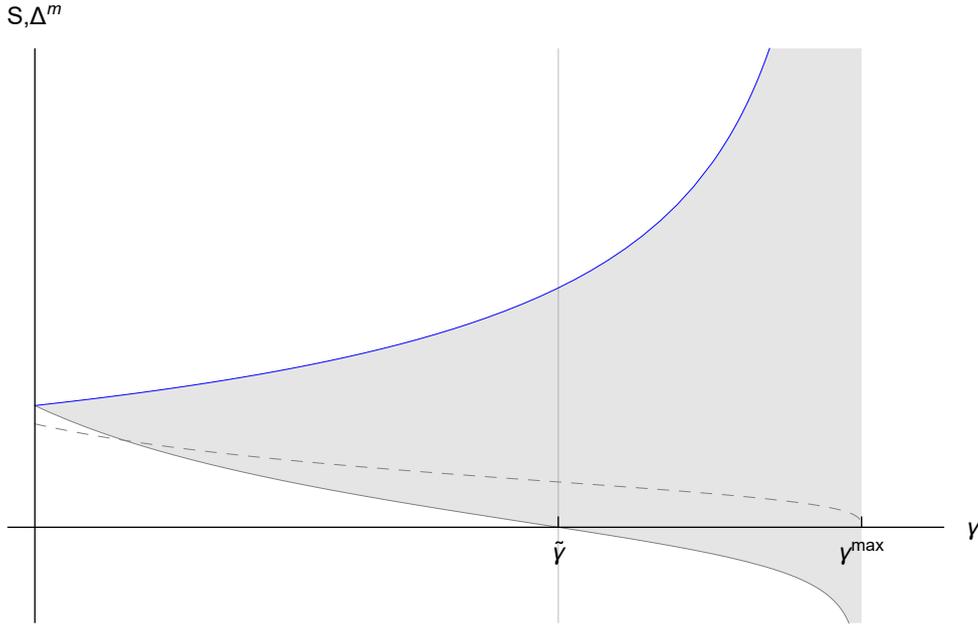
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poor select the economy with the lowest tax rate when indifferent. For clarity, we rule out ties (see Assumption 4).

<sup>16</sup>We can explicitly characterize equilibria outside the region where dual provision at the decisive voter's most preferred tax rate arises as the unique political equilibrium. We can also show for which parameters which type of alternative equilibrium results. As this is of little interest for this paper, we concentrate on the dual provision equilibrium described here. Additional results are available upon request.

As the income of the poor and the rich are functions of income inequality, these two conditions imply that, for any  $\gamma$ , an intermediate range for the status level  $S$  exists such that  $(t^*(y_\ell, p_\ell), p_\ell)$  is in a political equilibrium.<sup>17</sup> We graphically illustrate the conditions in (6) in Figure 1 and derive some of their properties in Lemma 3.

Figure 1: Separating equilibrium under status concerns with majority of the poor ( $p_\ell > 1/2$ ).



The graph draws the material utility differential between staying in and opting out,  $\Delta^M$ , for the rich (grey) and the poor (black) as a function of the degree of inequality  $\gamma$ . The grey area in between the lines represents the parameter combinations  $(\gamma, S)$  such that the separating equilibrium with the poor enforcing their most preferred tax rate,  $(t, h^{in}) = (t^*(y_\ell, p_\ell), p_\ell)$ , exists. The dashed line plots the utility differential for the rich between opting out and utility in the market solution. In the example, the utility function is  $u(x, c) = \frac{1}{1-\rho} (\alpha x^{1-\rho} + (1-\alpha) c^{1-\rho})$  with  $\rho = 1.5$ ,  $\alpha = 1/2$ ,  $p_\ell = 0.75$ , and  $Y = 1$ .

**Lemma 3.** *The material utility differential of the rich between private and public sector consumption given a separating equilibrium at the poor's most preferred tax rate,  $\Delta^M((t^*(y_\ell, p_\ell), p_\ell; y_h)$ , is (i) positive for  $\gamma = 0$ , (ii) monotonically decreasing in  $\gamma$ , and (iii) negative for  $\gamma = \gamma^{max}$ . There exists (iv)  $\tilde{\gamma} \in (0, \gamma^{max})$  such that the rich opt out for  $\gamma > \tilde{\gamma}$ .*

*Proof.* If  $\gamma = 0$ , then both the poor and the rich earn mean income. In the separating equilibrium,  $h^{in} = p_\ell$ . Therefore, the implicit price for public provision that the poor face

<sup>17</sup>Note that any  $S$  satisfying Condition 6 also satisfies  $S \leq S^{max}$ . By Assumption 2 (DMU),  $\Delta^M(t, h^{in}; y)$  is increasing in  $t$ . As  $t^*(y, h^{in}) \leq 1$ , it follows that, for any  $\gamma$ ,  $\Delta^M(t^*(y_\ell, p_\ell), p_\ell; y_\ell) \leq S^{max}$ .

is  $h^{in}y/Y = p_\ell < 1$ . Hence, the poor are better off than in the market solution under their most preferred tax rate. But then,  $\Delta^M(t^*(Y, p_\ell), p_\ell; Y) > 0$ . Moreover, it holds that  $\partial(\Delta^M(t^*(y_\ell, p_\ell), p_\ell; y_h)) / \partial\gamma = [u_x Y / h^{in} - y_h(u_c - v')] \partial t^*(y_\ell, \cdot) / \partial\gamma + (u_c - v') \partial y_h / \partial\gamma (1 - t^*(y_\ell, \cdot))$ . This expression is negative by Assumptions 2 and 3 (i)-(ii). For maximal inequality, the material utility differential of the rich is negative by Assumption 3 (iii). As a consequence, there is a critical inequality level  $\tilde{\gamma}$ , solving  $\Delta^M(t^*(y_\ell(\gamma), p_\ell), p_\ell; y_h(\gamma)) = 0$ , above which the rich opt out.  $\square$

For equal societies, both rich and poor earn the mean income and are indifferent between public and private sector consumption, when faced with their most preferred tax rate. As a consequence, for  $\gamma = 0$ ,  $\Delta^M$  is positive for the rich, and it coincides with  $\Delta^M$  of the poor. Higher inequality increases the relative income of the rich, and therefore decreases the attractiveness of the public sector. This effect is amplified by the endogeneity of  $t^*(y_\ell, p_\ell)$ : a higher inequality makes the poor relatively poorer, so they demand less of good  $x$ . But a lower provision level (resp., lower tax rate) further reduces the relative attractiveness of the private sector for the rich.

For the poor, the situation looks different. The poor's income decreases with  $\gamma$ , so their material utility differential between public and private sector consumption increases. But the equilibrium tax rate, being endogenous and set by the poor, exerts a countervailing effect: an increasing tax rate, ceteris paribus, reduces the relative attractiveness of the public sector. In what follows, we assume that the direct effect prevails, ensuring that  $\Delta^M$  for the poor is increasing in  $\gamma$ . Formally, this is equivalent to assuming that the reaction of the optimal tax rate with respect to  $\gamma$  is sufficiently weak.<sup>18</sup>

**Assumption 6.** *For all  $\gamma > 0$ , we assume that  $\partial t^*(y_\ell) / \partial\gamma$  is sufficiently small such that  $\partial(\Delta^M(t^*(y_\ell(\gamma), p_\ell), p_\ell; y_\ell(\gamma))) / \partial\gamma > 0$ .*

For Figure 1, we use the utility function

$$u(x, c) = \frac{1}{1 - \rho} (\alpha x^{1-\rho} + (1 - \alpha) c^{1-\rho}), \quad (7)$$

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<sup>18</sup>It is  $\partial(\Delta^M(t^*(y_\ell(\gamma), p_\ell), p_\ell; y_\ell(\gamma))) / \partial\gamma = [u_x Y / h^{int} - y_\ell(u_c - v')] \partial t^*(y_\ell, \cdot) / \partial\gamma + (u_c - v') \partial y_\ell / \partial\gamma (1 - t^*(y_\ell))$ . Since  $u_x \partial \bar{x} / \partial t = u_c y_\ell$  at the poor's most preferred tax, this expression simplifies to  $y_\ell v' \partial t^*(y_\ell, \cdot) / \partial\gamma + (u_c - v') \partial y_\ell / \partial\gamma (1 - t^*(y_\ell, \cdot))$ , which is ambiguous in sign. For  $\partial t^*(y_\ell) / \partial\gamma$  sufficiently small, however, this expression is positive.

with  $\rho > 1$  and  $0 < \beta < 1$ , which has been frequently used in the public provision literature,<sup>19</sup> For  $\rho > 1$ , most preferred tax rates (not shown in the picture) are increasing in income. The assumptions we made so far are satisfied in this case, and as shown,  $\Delta^M$  for the poor is increasing in  $\gamma$ .

In the following, we demonstrate that status enlarges the range of parameters for which a separating equilibrium obtains. Consider first the case  $S = 0$  (no status concerns). Then, the separating equilibrium with  $t^*(y_\ell)$  exists if and only if  $\gamma > \tilde{\gamma}$ . Intuitively, when equality is relatively high, the rich's income is not high enough so that the benefits from buying good  $x$  freely in the market can outweigh the cross-subsidization of the public sector. When status concerns come into play, a separating equilibrium can also exist for  $\gamma \leq \tilde{\gamma}$ , if the status gain from opting out is large enough to compensate the rich for the material loss from opting out at a given level of inequality. This is the case if  $(S, \gamma)$  lies in the shaded area in Figure 1 to the left of  $\tilde{\gamma}$ . This triangle area always exist if  $\Delta^m$  is increasing in  $\gamma$  for the poor. We thus can state:

**Proposition 1.** *With status concerns, a separating political equilibrium  $(t^*(y_\ell, p_\ell), p_\ell)$  exists for  $\gamma < \tilde{\gamma}$  if both (i)  $\Delta^M(t^*(y_\ell, p_\ell), p_\ell; y_\ell)$  is monotone increasing in  $\gamma$  and (ii)  $\Delta^M(t^*(y_\ell, p_\ell), p_\ell; y_h) < S \leq \Delta^M(t^*(y_\ell, p_\ell), p_\ell; y_\ell)$ .*

For the following, we assume for clarity of the exposition that  $\Delta^M(t^*(y_\ell, p_\ell), p_\ell; y_\ell)$  is monotone increasing. Even if the poor's material utility differentialis decreasing in  $\gamma$ , a separating political equilibrium with  $t^*(y_\ell)$  can occur for  $\gamma \leq \tilde{\gamma}$ . As noted above,  $\Delta^M$  is the same for the rich and the poor when  $\gamma$  is zero. Due to sorting,  $\Delta^M$  of the poor is greater than  $\Delta^M$  for the rich at  $\tilde{\gamma}$ , where the latter equals zero. Therefore, a triangle in Figure 1 to the left of  $\tilde{\gamma}$  will always occur if  $\Delta^M$  is monotone in  $\gamma$ .

Proposition 1 implies that in contrast to the predictions of a model without status concerns, a separating equilibrium at the poor's most preferred tax rate may result even in very equal societies if status is important to the individuals in the respective society. Thus, status concerns may lead to an equilibrium with dual provision in which the rich consume in the private market. The quality of the public sector is, however, not eroded by status concerns as is often argued. Instead, the poor maintain high levels of public sector consumption which may even exceed those obtained by the rich in the private market as

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<sup>19</sup>See, for example, Glomm and Ravikumar (1998), Bearnse et al. (2000), Bearnse et al. (2001), Bearnse et al. (2005), Glomm et al. (2011).

we show in the following subsection.

### 3.1.1 Quality in the market vs. public sector

We now discuss the implications of status concerns for the quality of provision levels in the private market and the public sector. Recall that in a separating equilibrium without status ( $S = 0$ ), the quality of good  $x$  will always be higher in the private sector.<sup>20</sup> As noted in the introduction, this prediction is not always in line with empirical evidence, where individuals sometimes enter the private market and choose a lower level of good  $x$  than  $\bar{x}$ . Status concerns can rationalize this observation: in exchange for the gains in status utility from opting out of the public sector individuals might be willing to accept lower consumption levels of good  $x$  when buying in the market.

In Figure 2, we depict the quantities  $\bar{x}$  and  $x^*$  over  $\gamma$  in a separating equilibrium at the most preferred tax rate of the poor and for a fixed level of status concerns  $S$  such that condition (6) is satisfied for all  $\gamma$ .<sup>21</sup> If  $\gamma \geq \tilde{\gamma}$ , the rich would also opt out in the absence of status concerns and the equilibrium consumption levels of good  $x$  for the two income groups satisfy  $x^* > \bar{x}$ ; the rich consume a higher level of  $x$  in the market than is provided to the poor in the public sector. Now assume that  $\gamma$  decreases below  $\tilde{\gamma}$ . The quantity of good  $x$  consumed by the rich,  $x^*$ , will decline for two reasons as  $\gamma$  decreases. First, gross income  $y_h$  decreases; second, the equilibrium tax increases, as the poor demand lower levels of  $x$  (and thus  $t$ ) when getting relatively poorer in a more unequal economy. In contrast, the public provision level  $\bar{x}$  increases when  $\gamma$  decreases. As the rich consume less than the publicly provided level if incomes are very equal and more than the publicly provided level if inequality is high, we obtain the following result:

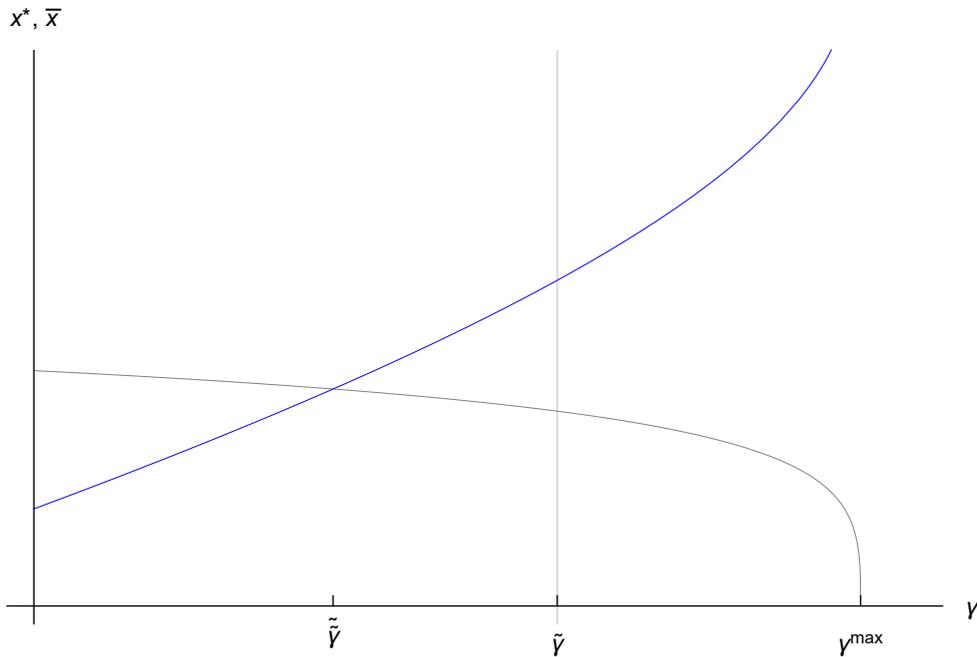
**Proposition 2.** *In a separating political equilibrium ( $t^*((y_\ell, p_\ell), p_\ell)$ ) with status concerns ( $S > 0$ ), we find  $0 < \tilde{\tilde{\gamma}} < \tilde{\gamma}$  such that the equilibrium is separating with  $x^* \leq \bar{x}$  if and only if  $\gamma \leq \tilde{\tilde{\gamma}}$  and  $\Delta^M(t^*(y_\ell, p_\ell), p_\ell; y_h) < S \leq \Delta^M(t^*(y_\ell, p_\ell), p_\ell; y_\ell)$ .*

The proof is in Appendix A.2.

<sup>20</sup>For  $S = 0$  individuals who opt out of the public sector are characterized by  $\Delta^M(t, h^{in}, y) < 0$ , or, equivalently, by  $u(x^*(y(1-t)), c^*(y(1-t))) > u(\bar{x}, y(1-t))$ . As  $c^* = y(1-t) - x^* < y(1-t)$ , this can only hold if  $x^*(y(1-t)) > \bar{x}$ . Thus, everybody who opts out of public provision purchases a higher level (or quality) of good  $x$  than the publicly provided level  $\bar{x}$ .

<sup>21</sup>The argument is more general as we could alternatively adjust  $S$  such that the separating equilibrium is maintained as  $\gamma$  changes.

Figure 2: Quality in the public vs. private sector.



The graph draws the separating equilibrium quantities consumed by the poor inside the public sector  $\bar{x}$  and the quantity of good  $x$  consumed by the rich in the market  $x^*$ , for varying degrees of inequality  $\gamma$ . The example is the same than used in figure 1.

The intuition for this result is as follows. Status tends to drive individuals out of the public sector. If status is so large that the rich opt out of the public sector even if they are relatively poor so, then they are forced to accept a lower consumption level of good  $x$  to be able to afford the cross-subsidization of the public sector. An interesting implication of Proposition 2 is that we expect quality differentials to the disadvantage of the market in relatively equal rather than in relatively unequal societies. A status-enhanced public provision model thus predicts that private schools being of low quality will rather be an issue in relatively egalitarian countries such as Sweden, France or Germany and less so for the US or the UK.

### 3.1.2 Voting behavior of the rich

A pure neoclassical model of voting entails that the rich will always oppose public provision. In contrast, empirical evidence suggests that richer individuals often support public services and public welfare although they make no or only little use of such services. Sta-

tus concerns can accommodate the puzzle: If the prestige of private sector consumption is high enough so as to compensate the utility loss from redistributing in-kind, the rich might be better off in a separating equilibrium with dual provision where they opt out compared to the plain market solution. In the following, we derive conditions for this to occur when the poor have the (majority) say over public provision and achieve the separating equilibrium from Proposition 1.

Define  $S^0(y_h)$  as the rich's material loss from financing public provision (represented by the dashed line in Figure 1):

$$S^0(y_h) := v(y_h) - v(y_h(1 - t^*(y_\ell))) \quad (8)$$

The rich are better off in the separating equilibrium as long as their material loss from financing public provision loss does not exceed the status gain realized from separation,  $S^0(y_h) \leq S$ . We show that in relatively equal societies, the rich must be better off in the separating equilibrium than in the market.

**Proposition 3.** *Suppose  $p_\ell > 1/2$ . Then, there exists  $0 < \bar{\gamma}$  such that for all  $\gamma < \bar{\gamma}$ , the rich are better off in any separating equilibrium  $(t^*(y_\ell, p_\ell), p_\ell)$ , compared to pure market economy  $(0, 0)$ .*

Proposition 3 illustrates that under status concerns there are situations with relatively little inequality where rich individuals consuming outside the public sector endorse positive taxes that are used to finance public provision. Figure 1 shows that for the specific utility function used there, the rich would endorse public provision for many more parameter constellations than for which they would oppose it (within the shaded area above the dashed line as compared to the shaded area below the dashed line). In consequence, unanimity in favor of public provision, which, in a standard voting model, can never occur becomes relatively likely in a model with status concerns. Clearly, there are additional reasons for why the rich may prefer positive provision, such as altruism and paternalism which we discuss in Section 4. A specific prediction of this model is that we expect the rich to endorse public provision, at least in very equal societies and when the poor are the majority.

## 3.2 Provision for a minority

For some goods like nutritional assistance or housing, we observe public provision even though a majority does not consume the publicly provided good or service. This is in stark contrast to a textbook voting model, which cannot explain public provision with a majority opting out. We will show that status concerns may lead to minority provision in our simple two income type model. To do so, we give the rich the majority—a scenario in which a neoclassical voting model is maximally biased against public provision—and derive the conditions under which a separating equilibrium occurs.

### 3.2.1 Majority of the rich

A separating equilibrium supported by a rich majority can only exist if we find a separating economy  $(t, p_\ell)$ , such that (i) the poor stay in the public sector, (ii) the rich opt out, and (iii) the separating equilibrium wins in any pairwise comparison. (i) is satisfied if

$$S \leq u\left(\frac{tY}{p_\ell}, y(1-t)\right) - v(y(1-t)). \quad (9)$$

Income sorting (Assumption 2) ensures that the rich opt out (ii) at the tax rate of indifference of the poor. For (iii) note that the utility of the rich when opting out,  $V^{out} = v(y(1-t))$ , is strictly decreasing in  $t$ . Hence, the only possible candidate for a separating equilibrium is the lowest tax rate satisfying equation (9). This is the tax rate of indifference of the poor,  $\hat{t}(p_\ell, S, y_\ell)$  from Lemma 1. At this tax rate, the rich are better off than in the pure market economy if status is large enough:

$$v(y(1 - \hat{t}(p_\ell, S, y_\ell))) + S > v(y_h) \Leftrightarrow S > v(y_h) - v(y_h(1 - \hat{t}(p_\ell, S, y_\ell))) := \tilde{S}^0(p_\ell, S) \quad (10)$$

Whenever the rich prefer  $(\hat{t}(p_\ell, S, y_\ell), p_\ell)$  over the market economy  $(0, 0)$ , they also prefer  $(\hat{t}(p_\ell, S, y_\ell), p_\ell)$  over any economy with pooling in the public sector because redistribution lowers their utility. Thus, under condition (10), the economy  $(\hat{t}(p_\ell, S, y_\ell), p_\ell)$  is the unique political equilibrium and we can state:

**Proposition 4.** *Suppose  $p_\ell < \frac{1}{2}$  and  $S > 0$ . If status is sufficiently high,  $S > \tilde{S}^0(p_\ell, S)$  as defined in (10), an inner political equilibrium  $(t, h^{in}) = (\hat{t}(p_\ell, S, y_\ell), p_\ell)$  exists and is unique.*

Intuitively, the rich trade off two motives. Driving the poor into the public sector increases their own social status, as the social prestige from private schooling increases. But financing the public sector entails a utility loss from paying taxes. If the status effect is sufficiently large, the rich are willing to endorse public provision, even though they will consume in the market. However, in order to minimize their tax burden, the rich choose the lowest tax rate that prevents the poor from opting out of the public sector.

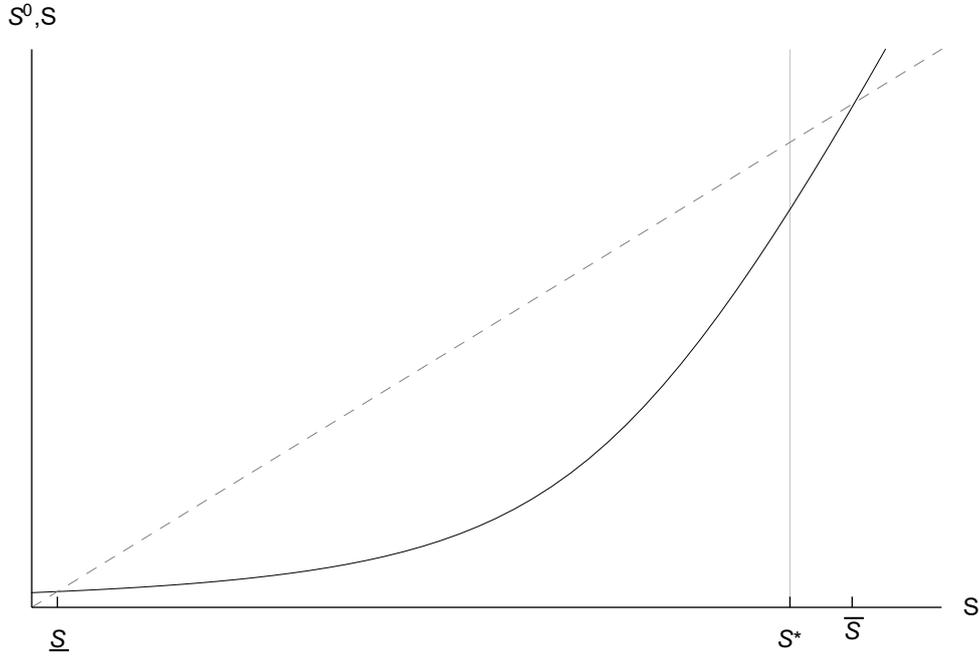
We illustrate condition (10) with an example in Figure 3. Here, provision for the poor minority exists if social prestige is neither too low nor too high. Intuitively, for social status being too low, the separating equilibrium fails to be a political equilibrium because the rich are not sufficiently compensated for their tax payments in terms of status from opting out and, therefore, do not endorse public provision. When social status increases, the poor must be offered a higher tax to stay in the public sector—and thus, to keep the private system socially exclusive. If  $V^{in}$  is hump-shaped over  $t$  (Assumption 4), then the rich are better off under public provision, compared to the market situation (in which they receive no status), if status passes a certain minimum level  $\underline{S}$ . As status increases further, public provision eventually becomes too costly so that the rich are worse off again. The separating equilibrium therefore ceases to be a political equilibrium for social status exceeding a certain upper level,  $\bar{S}$ .

The  $\tilde{S}^0$ -curve may take a different shape than the one depicted in Figure 3. In Corollary 1 we state sufficient conditions for the separating equilibrium to exist for at least some  $S$ .

**Corollary 1.** *Assume  $p_\ell < 1/2$  and  $S > 0$ . If  $\Delta^M(t^*(y_\ell, p_\ell); y_\ell)$  is increasing and  $S^0$  is decreasing in  $\gamma$ , we find  $\underline{S}$  and  $\epsilon > 0$  such that a minority provision equilibrium exists for  $S = \underline{S} + \epsilon$ .*

*Proof.* Denote by  $S^* := \Delta^M(t^*(y_\ell, p_\ell); y_\ell)$  the level of  $S$  such that the poor's indifference tax coincides with their most preferred tax. At  $S = S^*$ ,  $S^0 = \Delta^M(t^*(y_\ell, p_\ell); y_h)$ , which is the material utility differential of the rich evaluated at the poor's most preferred tax rate. Note that for  $S = 0$ ,  $\tilde{S}^0 > S$ , and  $\tilde{S}^0$  is continuous in  $S$ . If  $\tilde{S}^0 = S^0 < S^*$  at  $S = S^*$ , then there is  $\underline{S} < S^*$  solving the fix-point equation  $S = \tilde{S}^0(p_\ell, S)$ . By continuity, we find  $\epsilon > 0$  such that condition 10 is met also for  $S = \underline{S} + \epsilon$  (see Figure 3).  $\square$

Figure 3: Separating equilibrium under status concerns with majority of the rich ( $p_\ell < 1/2$ ).



The graph depicts  $\tilde{S}^0$ , representing the rich’s utility difference between a situation where they offer the poor their tax rate of indifference and a situation with no provision, over  $S$ . The political equilibrium with the poor minority staying in the public sector exists for intermediate status levels  $\underline{S} < S < \bar{S}$ . In the example, we used the same utility function as in Figure 1. We set the parameters to  $\rho = 1.5$ ,  $\alpha = 0.1$ ,  $p_\ell = 0.25$ ,  $\gamma = 0.05$  and  $Y = 1$ .

## 4 Status versus paternalism and altruism

Status concerns endow richer individuals with a motive to vote for the public provision of private goods, such as public education and housing, even when they do not materially benefit from it. However, alternative (behavioral) assumptions may also explain some of the empirical features of real-world dual provision systems, which are hard to reconcile with standard voting models. In particular, paternalism and altruism constitute relevant candidate explanations. In this section, we show what our status model distinguishes from these approaches.

Suppose that (rich) individuals are paternalists who believe that the poor under-invest in “merit” goods like education or health. We use the same framework as above but now assume that the rich gain extra utility whenever the poor’s consumption of the merit good  $x$  exceeds some minimum level,  $x^{min}$ , which lies above the market consumption of

the poor:  $x^{min} > x^*(y_\ell)$ . Specifically, let the preference of the rich be given by

$$U(x, c) = u(x, c) + \mathbb{1} \cdot P, \quad (11)$$

where  $P$  is paternalism utility and  $\mathbb{1}$  is an indicator for when the poor's consumption  $x_\ell$  passes the minimum level:  $x_\ell > x^{min}$ . By contrast, the poor's utility is just  $u(x, c)$ .

Under paternalism, there can be provision for the (poor) minority—as is the case under status. To see this, assume that the rich have the majority ( $p_\ell < 1/2$ ). In a separating political equilibrium, the rich offer the poor just the tax that is consistent with the minimum level under the public budget constraint, i.e.,  $t^{min} := x^{min}p_\ell/Y$ . At this tax rate, the poor choose to consume in the public sector because  $x^{min} > x^*(y_\ell)$ , and therefore  $t^{min} > \hat{t}(y_\ell, p_\ell)$ .<sup>22</sup> In order for  $(t^{min}, p_\ell)$  to be a political equilibrium, the following is necessary and sufficient:

$$u(t^{min}Y/p_\ell, y_h(1 - t^{min})) + P < v(y_h(1 - t^{min})) + P, \quad (12)$$

$$P > v(y_h) - v(y_h(1 - t^{min})). \quad (13)$$

Condition (12) requires that the rich are not attracted by the public sector at the minimum tax of the poor (here, paternalism utility will cancel out). Condition (13) is the equivalent to condition (10) in the status case: paternalism utility  $P$  must be so high as to compensate the rich for the taxes they have to pay for the public sector (here, in order to force the poor to a certain minimum consumption level.)

While paternalism can thus also explain why richer individuals vote for the public provision of goods they themselves do not use, it cannot accommodate the observation that private schools may have lower quality than public schools. We can directly see this from condition (12) where the rich enjoy the poor having high consumption levels, irrespective of their own sector choice. Therefore, the material utility differential for the rich,  $\Delta^M(t, y_\ell, p_\ell)$ , must be negative for a separating equilibrium to exist in the paternalism

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<sup>22</sup>At the tax rate of indifference the poor receive utility  $v(y_\ell(1 - \hat{t}(y_\ell, p_\ell))) < v(y_\ell)$  and the public provision level is  $\bar{x} = \hat{t}(y_\ell, p_\ell)Y/p_\ell$ . As good  $x$  is normal,  $x^*(y_\ell) > x^*(y_\ell(1 - \hat{t}(y_\ell, p_\ell)))$ . Moreover, as the poor's material utility differential between public and private sector consumption  $\Delta^M$  is zero at  $\hat{t}(y_\ell, p_\ell)$ , we have  $x^*(y_\ell(1 - \hat{t}(y_\ell, p_\ell))) > \bar{x}$ . Therefore, in order to induce the poor to consume more of good  $x$  than in the market,  $x^{min} > x^*(y_\ell)$ , we must have  $t^{min} > \hat{t}(y_\ell, p_\ell)$ .

model. As argued in Section (2), this implies private market quality exceeds  $\bar{x}$ .

Relatedly, the paternalism model does not admit the preferred separating equilibrium of the poor as a political equilibrium for relatively equal societies even if the poor are the majority ( $p_\ell > 1/2$ ) because for  $\gamma < \tilde{\gamma}$ ,  $\Delta^M$  is positive for the rich so that a separating policy is not incentive-compatible toward the rich. A paternalism model thus cannot, in contrast to a model with sufficiently high status concerns, explain why there are dual provision systems for relative equal societies.

In an altruism model, we can derive quite similar results than under paternalism. If we assume that the rich feel pity for the poor (e.g., the rich's utility can be an increasing function of the utility of the poor or of the quantity of good  $x$  consumed by the poor), then we can accommodate minority provision. But, as the altruism utility that the rich realize from the poor's consumption does not depend on whether the rich consume in the public or private system, altruism does not interfere with the rich's sectoral choice. Therefore, as in the case of paternalism, the rich's material utility differential between the public and the private sector  $\Delta^M$  must be negative in any separating equilibrium. Consequently, there can be no lower provision level in the market, and there can be no separating equilibrium with the poor's most preferred tax rate for relatively equal societies ( $\gamma < \tilde{\gamma}$ ).<sup>23</sup>

As noted in the introduction, there can be also non-behavioral arguments for why quality in the private sector can be lower (and of course higher) than in the public sector. So, combining altruism or paternalism with other extensions of the neoclassical provision model can explain the observed puzzling phenomena of the introduction (though we think that the emergence of dual provision for relatively equal societies would still be difficult to explain). We do not want to claim that status is the only relevant factor in the context of dual provision. However, a status-enhanced model allows us to accommodate in a single, unified framework several phenomena of real-world dual provision systems that are hard to reconcile with neoclassical voting.

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<sup>23</sup>The same applies if we assume that the utility of the rich is increasing in the utility of the poor; in this case, the altruism utility would cancel out in the opting out condition for the rich, too.

## 5 Political Coalitions in a continuous type model

So far, we analyzed dual provision systems under status concerns with a focus on the economic outcomes, e.g., public vs. private sector quality or share of public vs. private sector users. We now investigate the political economy in more detail. As political coalitions in a model with two income classes are not very interesting, we move to a model with a continuous income distribution. Existing political economy models of public provision also give particular emphasis to the question of how the political coalitions in dual provision systems look like. Famous in this respect is the so called “ends-against-the-middle” result: in an interior majority voting equilibrium, a group of middle income earners who favor tax increases is exactly offset by a coalition of the rich and the poor, who both favor (marginally) cutting public funds. In this section, we show that status concerns give rise to a wider range of political coalitions, including a novel “ends-against-the-ends” constellation. Moreover, even a median-income equilibrium can emerge, where all individuals who earn more than the median income support higher taxes.

**Framework.** The economy is populated by a continuum of individuals with measure one. Individuals differ in their exogenous gross incomes  $y$ . Incomes in the population are distributed according to a continuous cumulative distribution function  $F(\cdot)$  with support on  $\mathcal{Y} = [\underline{y}, \bar{y}] \subset (0, \infty)$ . By  $y_{med} = F^{-1}(1/2)$  and  $Y = \int_{\mathcal{Y}} y dF(y)$  we denote, respectively, median and average income in the economy. Subsets of the population will be abbreviated by the capital letter  $H$ , the attending measure will be indicated by the lower-case  $h$ . That is, for  $H \subseteq \mathcal{Y}$  we have  $h = \int_{y \in H} dF(y)$ .

As in section 2, there are two private goods, the numéraire good  $c$ , which is exclusively supplied via markets, and good  $x$  which is provided publicly free of charge and financed by a linear income tax  $t$ , and available in the private market. Individuals can freely choose to consume  $x$  in either the public or the private system but not combine the two.

**Preferences and status.** Individuals derive material utility from the consumption of goods  $x$  and  $c$ , represented by the utility function  $u(x, c)$ . In addition to consumption utility, the decision whether to consume the publicly provided level of good  $x$  or to buy the good on the market confers to individuals a certain social reputation, status or (self-)image. Let  $S_a$  denote the status utility of consumption choice  $a$ , where the binary variable

$a \in \{in, out\}$  takes value “in” for an individual who consumes the publicly provided level  $\bar{x}$  and “out” for people who opt out of public provision and buy good  $x$  on the market. Preferences are given by

$$U(x, c, a) = u(x, c) + \beta \cdot S_a, \quad (14)$$

where scalar  $\beta \geq 0$  measures the weight of status concerns and status is the conditional expectation of an individual’s income given her choice  $a \in \{in, out\}$ :

$$S_a = \mathbf{E}(y|a) \text{ for } a \in \{in, out\}. \quad (15)$$

Status values  $S_a$  are endogenous, varying with the partition of individuals into public and private sector users: both  $S_{in}$  and  $S_{out}$  increase in the average incomes of the population subgroup they represent. (14) and (15) generalize the preferences from section 2 as now both public and private consumption confer a certain status value and the difference between the two constitutes the potential status gain from opting out.

One interpretation of the preferences given by (14) and (15) is in terms of social signaling: choices between publicly provided and private communicate about one’s income or wealth—or about some other status-bearing characteristic correlated to income or wealth (Charles et al., 2009; Heffetz, 2011). The social status of a public or private sector user then depends on how rich or poor a typical public or private sector is expected to be.<sup>24</sup> We later show that individuals sort according to income such that average income is higher in the private than in the public sector ( $S_{out} > S_{in}$ ). Due to this sorting, sending one’s child to a private rather than to a public school conveys high social standing, whereas staying in the public sector is associated with failure, idleness or other stereotypes of low-income earners.<sup>25</sup>

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<sup>24</sup>Our modeling is akin to Corneo and Jeanne (1997) and Bénabou and Tirole (2011) who also assume that the status value of a certain consumption decision is increasing in the (perceived) income of individuals who make the same choice. The formulation of status in (15) is cardinal. We expect our results to go through with an ordinal notion of status, for instance, if we model social status as the expected rank that an individual has. Then, under sorting, the expected rank increases when poorer individuals are driven in the public sector; high ranked persons may then also want to endorse public provision.

<sup>25</sup>In our model, the status-bearing attribute is pretax income. If status was instead defined over after-tax income, the status differential for a given partition of the population would be lower because taxes reduce income differences. At the same time, the marginal utility from status  $\beta$  may be higher because status effects could be more important for opting out behavior if the income distribution is more equal. Our later results rely entirely on the fact that there is income sorting in equilibrium. Those with higher

As in the two type model, (14) and (15) could also represent network effects: being grouped together in a given sector provides access to other network members, their social resources and connections. With our formulation in (15), the value from being matched with a group of individuals is higher, the richer these groups are.

**Sequence of events.** The sequence of the model is as before. First, a policy  $(t, \bar{x})$  is selected by majority voting. Second, each individual decides whether to consume good  $x$  in the public sector or to purchase it on the market. Third, given  $a$  and  $(t, \bar{x})$ , individuals spend their after-tax incomes to maximize utility.

## 5.1 Political preferences and status concerns

As in the 2-type model, we restrict attention to policies satisfying the public budget constraint (3) and consistent expectations. By the latter we mean that the status values that individuals expect when performing their decisions for given  $(t, x)$  are consistent with the actual status values (the actual mean incomes in the two systems).

We can use the public budget constraint to express the provision level as a function of the tax rate,  $\bar{x} = x(t)$ , rendering the police space one-dimensional. For a given tax rate, individuals decide whether or not consume in the public sector. These choices induce a partition of the population into public and private sector users, resulting in the status values  $S^{in}$  and  $S^{out}$ . Therefore, taxation does not only affect well-being through consumption utilities  $u(x(t), y(1 - t))$  and  $v(y(1 - t))$ , but also through social feedback effects. These social feedback effects translate into additional motives to favor or oppose public provision which are included in the indirect utility functions.

**Indirect utility.** Given a tax rate  $t$ , the indirect utility functions are as follows (see Appendix A.4):

$$\begin{aligned} V^{in}(t, y) &:= u(x(t), y(1 - t)) + \beta S^{in}(t), \\ V^{out}(t, y) &:= v(y(1 - t)) + \beta S^{out}(t) \quad \text{and} \\ V(t, y) &:= \max\{V^{out}(t, y), V^{in}(t, y)\}. \end{aligned} \tag{16}$$

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pretax income will also have higher after-tax income given that the tax is below 1. We could thus equally well define status over after-tax income, provided that higher taxes still attract more individuals to the public sector (see Lemma 4).

The functions  $V^{in}$ ,  $V^{out}$ , and  $V$  are continuous and differentiable in  $(t, y)$  with the exception that  $V(\cdot, y)$  has a (zero-measure) non-differentiability when  $V^{in}(t, y) = V^{out}(t, y)$ .

**Threshold income.** Everyday observation suggests that opting in and out of public consumption arise along income lines. We make the following assumptions to ensure that status concerns do not uproot this income sorting and that higher tax rates *ceteris paribus* make the public sector more attractive:<sup>26</sup>

**Assumption 7** (Income sorting). *For all  $y \in \mathcal{Y}$ :*

- (i)  $V^{out}(0, y) - V^{in}(0, y) > 0 > V^{out}(1, y) - V^{in}(1, y)$ ;
- (ii)  $\frac{\partial}{\partial t}[V^{out}(t, y) - V^{in}(t, y)] < 0$  for all  $t$ ;
- (iii)  $\frac{\partial}{\partial y}[V^{out}(t, y) - V^{in}(t, y)] > 0$  for all  $t$ .

Assumption 7 implies that for every income level  $y \in \mathcal{Y}$  there exists a unique tax rate of indifference  $\hat{t}(y)$  such that  $V^{in}(t, y) \geq V^{out}(t, y)$  for all  $t \geq \hat{t}(y)$ .

By Assumption 7 (iii),<sup>27</sup> an individual's tax rate of indifference monotonically increases:

**Lemma 4.** *Suppose Assumption 7 holds. Then, the tax rate of indifference increases in income,  $d\hat{t}(y)/dy > 0$  for all  $(t, y)$ .*

*Proof.* At the indifferent tax rate,  $V^{out} - V^{in} = 0$ . Using the Implicit Function Theorem, we then obtain the derivative of the indifferent tax rate as

$$\frac{d\hat{t}(y)}{dy} = -\frac{\partial(V^{out} - V^{in})/\partial y}{\partial(V^{out} - V^{in})/\partial t} \quad \text{for all } (t, y). \quad (17)$$

By Assumption 7, item (ii) and (iii) the numerator is positive and the denominator negative, so that the total expression is negative.  $\square$

Intuitively, for richer individuals a higher tax rate (equivalently, a higher public provision level) is needed to keep them consuming in the public sector. Using this result, we can invert  $\hat{t}(y)$ . Denote the inverse by  $\hat{y}(t)$ . We then have from Lemma 4.

<sup>26</sup>We could state Assumption 7 in terms of the utility functions  $u$  and  $v$  and the status terms  $\beta S^a$  for  $a \in \{\text{in}, \text{out}\}$ . As this is not easily possible for all following assumptions, which we state in terms of indirect utilities as is for instance also done in Lüllesmann and Myers (2011) and Glomm and Ravikumar (1998), we use indirect utilities already here for consistency and easier reading. Appendix A.6 contains a discussion of how the assumptions relate to assumptions on primitives.

<sup>27</sup>This assumption corresponds to Assumption 2 (DMU) from the two type model.

**Corollary 2.** *Suppose Assumption 7 holds. Given a tax rate  $t > 0$ , there exists an income threshold  $\hat{y}(t)$  such that individuals with incomes below [above]  $\hat{y}$  stay in [out of] the public sector. The income threshold increases in the tax rate,*

$$\frac{d\hat{y}(t)}{dt} > 0. \quad (18)$$

The status utilities ascribed to consuming good  $x$  in and outside the public sector are then the average incomes below and above the threshold  $\hat{y}$ :

$$S^{in}(t) = \mathbf{E}(y|y \leq \hat{y}(t)) \quad \text{and} \quad S^{out}(t) = \mathbf{E}(y|y \geq \hat{y}(t)). \quad (19)$$

We can use these expressions to show that status utilities have the following properties:

**Lemma 5.** *Under Assumption 7,  $S^{out}(t) > S^{in}(t)$  for all  $t \in (0, 1)$ . Moreover,*

$$\frac{dS^{out}(t)}{dt} > 0 \quad \text{and} \quad \frac{dS^{in}(t)}{dt} > 0. \quad (20)$$

The proof of Lemma 5 is in Appendix A.5.

Individuals who purchase good  $x$  in the market enjoy higher status utility than users in the public sector: by income sorting, the private sector users are, on average, richer ( $S^{out}(t) > S^{in}(t)$ ). Moreover, status utilities  $S^{in}$  and  $S^{out}$  each increase in the tax rate because a higher tax rate attracts richer individuals into the public sector ( $d\hat{y}(t)/dt > 0$ ) so that average incomes rise both in and out of the public sector. Consuming good  $x$  in the public sector loses some of its stigma, and buying it in the market becomes even more select.

The monotonicity of status utilities in (20) has important implications for political preferences  $V^{out}$  and  $V^{in}$ . For individuals outside of the public sector, consumption utility  $v(y(1-t))$  strictly decreases in the tax rate. Without status concerns, individuals in the private system would thus always favor cutting back tax and provision levels:  $\partial V^{out}/\partial t = -v' < 0$  if  $\beta = 0$ . By contrast, status concerns imply a benefit from higher taxes ( $dS^{out}/dt > 0$ ). If the status effect is strong enough, it can override the reduction in consumption utility and render  $\partial V^{out}(t)/\partial t = -v' + \beta dS^{out}/dt$  positive. This is in line with the empirical evidence, quoted in the introduction, that rich non-users of publicly provided goods often politically support public provision or its expansion.

Status concerns also imply an additional marginal benefit from higher tax rates for individuals staying in the public sector, leading *ceteris paribus* to stronger support for (or lower opposition to) increases in public provision among users ( $dS^{in}/dt > 0$ ). We will later see that it is the effect of taxes on the social status of individuals outside the public sector that drives our political economy results.

Given the importance of  $d\hat{y}(t)/dt > 0$  for our analysis, we trace (18) back to the primitives of the model in a more direct way in A.6. There we show that the conditions which ensure  $d\hat{y}(t)/dt > 0$  are joint conditions on material preferences ( $u$ ), status concerns ( $\beta$ ) and the distribution function ( $F$ ). In particular, under Assumption 2 (DMU) from Section 2.2, we demonstrate that sufficient for  $d\hat{y}(t)/dt > 0$  is that  $-\beta\Delta' < (1-t)(v' - u_c)$ , where  $\Delta'$  is the derivative of the status differential  $S^{out} - S^{in}$  with respect to the indifferent income, i.e.,  $\Delta'(\hat{y}) := \partial(\mathbf{E}(y|y \geq \hat{y}) - \mathbf{E}(y|y \leq \hat{y}))/\partial\hat{y}$ .<sup>28</sup>

Note that the condition  $-\beta\Delta' < (1-t)(v' - u_c)$  also rules out multiplicity of the critical income for a given tax rate. That multiple equilibria may occur in the presence of status concerns is well-known. We rule out multiplicity to focus on the possible political coalitions under status; in doing so, we will provide a condition which involves local tax changes, assuming existence of a critical income (see Proposition 5). If there is multiplicity of critical incomes, our results go through as long there is one critical income, which is increasing in the tax rate.

As this illustrates, the comparative statics (18) depend jointly on the properties and the interaction of consumption utility, status motives and the income distribution. For the analysis to come, such a nuanced picture is not always needed. Rather, we (only) need *summary* information on individual preferences over the policy space, making sure that behavioral responses and changes in aggregates are properly accounted for when policies change. Such information is conveniently collected in the reduced-form preferences,  $V^{in}(t, y)$  and  $V^{out}(t, y)$ . We therefore directly phrase Assumptions 7, 8, and 9 in terms of  $V^{in}$  and  $V^{out}$ , bearing in mind that any assumption imposes a joint restriction on the model's primitives.

**Single-peakedness and preferred tax rates.** With the following assumptions, we ensure that both  $V^{in}$  and  $V^{out}$  are single-peaked over  $t$ ; and that individual's most preferred

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<sup>28</sup>Bénabou and Tirole (2011) use a similar condition to ensure a cut-off equilibrium in a different context (see equation (6) and the discussion in footnote 12 in Bénabou and Tirole (2011).)

taxes both inside the public sector ( $t_{in}^*(y)$ ) and outside of the public sector ( $t_{out}^*(y)$ ) are increasing in income. Note that these requirements on  $V^{out}(t, y) = v(y(1-t)) + \beta S^{out}(t)$  and  $V^{in}(t, y) = u(x(t), y(1-t)) + \beta S^{in}(t)$  impose joint conditions on the reaction of material utility and the change in status, which is an equilibrium construct, to changes in  $t$  and  $y$ .

**Assumption 8** (Single-peakedness). *For every  $y \in \mathcal{Y}$ ,  $V^{in}(t, y)$  and  $V^{out}(t, y)$  are single-peaked in  $t$ .*

**Assumption 9** (Positive income monotonicity). *For all  $y > y'$ ,*

$$\frac{\partial V^{in}(t, y')}{\partial t} \geq 0 \Rightarrow \frac{\partial V^{in}(t, y)}{\partial t} > 0 \quad \text{and} \quad \frac{\partial V^{out}(t, y')}{\partial t} \geq 0 \Rightarrow \frac{\partial V^{out}(t, y)}{\partial t} > 0.$$

Since Epple and Romano (1996b), dual provision models have typically assumed that the marginal willingness to pay for the publicly provided good (weakly) monotonically varies with the incomes of its users. In the absence of status concerns, users of a publicly provided good whose (private) income elasticity exceeds, in absolute terms, its price elasticity exhibit a marginal willingness to pay that increases with their income; education or health goods are prime examples (see also section 2.2). Once status concerns prevail, measures of willingness to pay need to account for them. Importantly, the association between income and willingness to pay for public provision now also matters for non-users (without status concerns, all that matters is that their willingness to pay is zero). Economically, this reduces to the question of whether the gains in status utility from a more elitist private system matter more or less as income increases.

A frequent assumption in matching models with an instrumental interpretation of status concerns (see, e.g., Levy and Razin, 2015) is that the utility gain from mixing with the rich is complementary to income. Assumption 9 carries this idea to our framework. Combined with single-peakedness, this assumption implies that whenever some person with income  $y'$  in the “in”- or in the “out”-group likes to see public provision raised (i.e., would prefer a higher tax rate) then so does any richer person in that group. In particular, individuals who consume outside of the public sector prefer higher tax rates when their income increases. Economically, the very rich are more eager to make private clubs socially exclusive than the not-so-rich, which appears plausible for the case of (private) education.

## 5.2 Majority voting equilibrium

### 5.2.1 Definitions

A majority voting equilibrium (MVE) is defined as a feasible tax rate that beats every other feasible tax rate in pairwise comparison. Let  $H^{in}(t)$  denote the set of individuals staying in the public sector, and  $H^{out}(t)$  the set of those who opt out;  $h^{in}(t)$  and  $h^{out}(t)$  denote their corresponding measures (population shares). We define

**Definition 3.** *A feasible tax rate  $t^*$  is a majority voting equilibrium (MVE) if at least half of the population prefers, with respect to  $V(t, y)$ , policy  $t^*$  to any other feasible tax rate. A MVE is called interior if  $t^* > 0$  and, consequently,  $x(t^*) > 0$ . A MVE is said to feature dual provision or to be separating if both  $H^{out}(t^*) \neq \emptyset$  and  $H^{in}(t^*) \neq \emptyset$ .*

Given a tax rate  $t$ , the following four (not necessarily non-empty) subsets of individuals partition the population into individuals with like-minded preferences and consumption system choices:

$$\begin{aligned} H_-^{in}(t) &= H^{in}(t) \cap \left\{ y \mid \frac{\partial V^{in}(t, y)}{\partial t} < 0 \right\}, \\ H_+^{in}(t) &= H^{in}(t) \cap \left\{ y \mid \frac{\partial V^{in}(t, y)}{\partial t} \geq 0 \right\}, \\ H_-^{out}(t) &= H^{out}(t) \cap \left\{ y \mid \frac{\partial V^{out}(t, y)}{\partial t} \leq 0 \right\}, \\ H_+^{out}(t) &= H^{out}(t) \cap \left\{ y \mid \frac{\partial V^{out}(t, y)}{\partial t} > 0 \right\}. \end{aligned}$$

As before, superscripts *in* and *out* collect individuals who consume the publicly provided good or opt out. Subscripts + and – indicate whether individuals would favor a (marginal) reduction of the tax rate or would like to see the tax rate increased. The following technical result will be helpful:

**Lemma 6.** *Under Assumption 7, in an interior MVE with dual provision, it is:*

$$h_-^{in}(t^*) + h_-^{out}(t^*) = \frac{1}{2} = h_+^{in}(t^*) + h_+^{out}(t^*). \quad (21)$$

Lemma 6 states that there are two opposing coalitions in any interior MVE: those who advocate (slightly) higher tax rates,  $H_+^{out}(t) \cup H_+^{in}(t)$ , and those who advocate (slightly)

lower tax rates,  $H_-^{out}(t) \cup H_-^{in}(t)$ . Coalitions encompass half of the population each; they, thus, exactly offset one another in political power.

Assumptions 7 and 9 together imply that the sets  $H_-^{in}$  through  $H_+^{out}$ , defined for Lemma 6, are intervals that partition  $\mathcal{Y}$  into ascending income brackets. In particular, under Assumptions 7, 8 and 9 there exist, for any feasible  $t$ , income thresholds  $y_s^{in}(t)$  and  $y_s^{out}(t)$  with  $y_s^{in}(t) \leq \hat{y}(t) \leq y_s^{out}(t)$  (with at least one strict inequality) such that<sup>29</sup>

$$\begin{aligned} H_-^{in}(t) &= [\underline{y}, y_s^{in}(t)), & H_+^{in}(t) &= [y_s^{in}(t), \hat{y}(t)], \\ H_-^{out}(t) &= (\hat{y}(t), y_s^{out}(t)], & H_+^{out}(t) &= (y_s^{out}(t), \bar{y}]. \end{aligned} \tag{22}$$

When they belong to the interior of  $\mathcal{Y}$ , the thresholds  $y_s^{in}(t)$  and  $y_s^{out}(t)$  separate, within the “in”- and the “out”-group, those who would prefer a lower tax rate from those who prefer to see  $t$  increase. For individuals with incomes  $y_s^{in}(t)$  and  $y_s^{out}(t)$ , the current tax rate  $t$  is then their favorite tax rate, *conditional* on them consuming, respectively, in and outside of the public sector.

### 5.3 Coalition structures in majority voting

The following result characterizes the possible coalition structures in a MVE that are compatible with Lemma 1 and positive income monotonicity (Assumption 9).

**Proposition 5.** *Suppose that  $\beta > 0$  and that Assumptions 7 to 9 hold. Suppose further that  $t^* > 0$  is an interior MVE where the median income earner consumes in the public sector (i.e.,  $y_{med} < \hat{y}(t^*)$ ). Then the distribution of political preferences at  $t^*$  is of either of the following types:*

- (A) “Ends-against-the-middle”: *Individuals at the lower and at the upper ends of the income distribution prefer a lower tax rate than  $t^*$ , while those in the middle of the income distribution prefer a higher tax rate:*

$$H_-^{in} \cup H_-^{out} = [\underline{y}, y_s^{in}(t^*)) \cup [\hat{y}(t^*), \bar{y}], \quad H_+^{in} = [y_s^{in}(t^*), \hat{y}(t^*)], \quad \text{and} \quad H_+^{out}(t^*) = \emptyset$$

for some  $y_s^{in}(t^*) < y_{med}$ .

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<sup>29</sup>We adopt the standard conventions that, for all  $y$  and  $y' > y$ , the intervals  $[y, y)$ ,  $(y, y]$ ,  $[y', y)$ ,  $(y', y)$  and  $[y', y]$  each represent the empty set.

(B) “Ends-against-the-ends”: Individuals in the lowest and in the lower upper part of the income distribution prefer a lower tax rate than  $t^*$ , while those at the highest end and in the lower middle part of the income distribution prefer a higher tax rate:

$$H_-^{in} \cup H_-^{out} = [\underline{y}, y_s^{in}(t^*)) \cup (\hat{y}(t^*), y_s^{out}(t^*)], \quad H_+^{in} \cup H_+^{out} = [y_s^{in}(t^*), \hat{y}(t^*)] \cup [y_s^{out}(t^*), \bar{y}]$$

for some  $y_s^{in}(t^*) < y_{med} < y_s^{out}(t^*)$ .

(C) “Median income earner”: Individuals at the lower end of the income distribution prefer the tax rate to be lower than  $t^*$ , while all other individuals prefer a higher tax rate:

$$H_-^{out} = \emptyset, \quad H_-^{in} = [\underline{y}, y_{med}), \quad \text{and} \quad H_+^{in} \cup H_+^{out} = [y_{med}, \bar{y}].$$

The “ends-against-the-middle” MVE in item (A) of Proposition 5 is well-known from Epple and Romano (1996b); it is the only type of equilibrium that can occur in the absence of status concerns. To see this, assume that  $\beta$  is zero. Then, at any interior equilibrium  $t^*$ , the group of individuals who opt out and prefer a marginal increase in the tax rate is empty ( $H_+^{out} = \emptyset$ ). The positive alignment of political preferences with incomes in (22) together with Lemma 6 then directly implies that the union of the highest and the lowest ends of the income distribution and the middle class must each constitute half of the population and balance one another in their preference for and against higher taxes in equilibrium. Clearly, by continuity arguments, this “ends-against-the-middle type is also included in the set of possible MVE under status concerns (think of  $\beta$  as being sufficiently low).<sup>30</sup>

According to Proposition 5, two other types of equilibria can emerge under status concerns. Item (B) describes a new equilibrium type that we call an *ends-against-the-ends* equilibrium. Here, status concerns are strong enough to override materialistic preferences for the most affluent non-users of public provision; for some (less rich) consumers outside the public sector, status concerns are still outweighed by their materialistic preference, i.e., both  $H_+^{out}$  and  $H_-^{out}$  have members. Politically, the most affluent in the population then join the richest among the individuals who consume in the public sector in their advocacy of more provision. This coalition is offset by individuals in the lower ranks of

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<sup>30</sup> In a limiting case,  $H_-^{in}$  can also be empty. Then  $h_+^{in} = h_-^{out} = 1/2$  and  $\hat{y} = y_{med}$ . At the expense of some notational clutter, this could still be modeled as a degenerate ends-against-the-middle equilibrium.

users and non-users of the publicly provided good who prefer less provision.

As a third possibility, Item (C) in Proposition 5 shows that a MVE with status concerns can be of the *median income earner*-type. Here, *everybody* outside the public sector prefers a higher tax rate ( $H_-^{out}$  is empty) and, in that, forms a coalition with the higher-income earners from within the public sector. Only the poor in the public sector object to tax increases.

The intuition for items (B) and (C) is as follows. Some richer individuals, though choosing private alternatives, may benefit from higher public provision due to its positive impact on their social image. Politically, these individuals will join the middle class in support of an expansion of the public sector. As the desire for social exclusivity is assumed to grow along the income ladder, this coalition of supporters comprises the richest individuals. For the not so-rich (i.e., the non-users closer to the critical income level) monetary concerns override status concerns; these people still coalesce with the poor. In sum, this gives rise to an *ends-against-the-ends* equilibrium. If status concerns are sufficiently strong among all non-users, everybody outside the public sector favors more public provision for the sake of additional status. With positive income monotonicity also in the private sector, a monotonic preference ordering over the whole income range results, and a classical median-income MVE is restored.

Status concerns can make rich individuals willing to support an expansion of the public sector, though they primarily rely on its private alternatives. Proposition 5 tells us *with whom* these individuals are forming political alliances. For goods like education, where status rents and income appear to be complementary – an assumption which would be even more plausible if the status gain from keeping the private sector socially exclusive is viewed as a social peer or congestion effect – the rich can be expected to ally with the middle class inside the public sector, breaking up their pecuniarily-driven coalition with the poor. In this sense, social status concerns result in a compression of votes. Political coalitions between the extreme ends of the income distribution, which are predicted in Epple and Romano (1996b) but are not often observed in reality, lose inevitability.

## 6 Existence and numerical examples in the continuous type model

In this section, we use numerical examples to show that the possible political coalitions identified in Proposition 5 indeed exist. Moreover, we also illustrate that the economy results from section 2 with a population of rich and poor survive in the model with a continuous distribution of incomes.

### 6.1 Existence of the political coalitions

The merit of Proposition 5 is to identify the possible political coalitions under social status concerns. It states that, for each type of political equilibrium, the existence of a certain decisive voter is necessary. However, the proposition does not provide sufficient conditions for the existence of such voters. The reason is that Lemma 6, leading up to Proposition 5, considers only local conditions in the neighborhood of a given tax rate. However, as preferences are not globally single-peaked, we must ensure that an equilibrium tax candidate does not only win against its immediate neighbors, but also against any other tax, including distant ones. Hence, it cannot be ruled out that no interior political equilibrium exists, nor that there is more than one tax rate satisfying the necessary conditions of a given coalition type. Furthermore, even if there is a unique interior equilibrium tax rate, this tax must also beat the no provision regime, as well a pooling situation in which everybody stays in the public sector. These issues already occur in a model without status, and even without status concerns, sufficient conditions for the existence of a MVE are hard to relate to the primitives of the model in continuous type model (see, e.g., Barbera and Moreno, 2011; Lülfsmann and Myers, 2011.)

In Appendix A.9, we provide numerical examples demonstrating that under status concerns, the set of potential political coalitions is richer than in the standard voting model and that the coalitions we have identified in Proposition 5 can indeed occur as political equilibria, including cases where richer individuals would prefer tax increases.

In the examples, the material utility function is again given by the one used for the graphical illustrations in the Section 2:

$$u(x, c) = \frac{1}{1 - \rho} (\alpha x^{1-\rho} + (1 - \alpha) c^{1-\rho}). \quad (23)$$

For the income distribution, we use a Weibull income distribution.<sup>31</sup> Throughout the examples, illustrating the different constellations, all parameters apart from the strength of status concerns,  $\beta$ , are fixed.

The results are illustrated in Figure 4. To understand the role of  $\beta$ , recall that in the absence of status concerns ( $\beta = 0$ ) the equilibrium is of the ends-against-the-middle type: everybody outside the public sector would prefer a lower provision level and the publicly provided good is consumed by a majority of individuals. *Ceteris paribus*, social status concerns ( $\beta > 0$ ) affect these features in several ways: Obviously, they make the outsider's position more attractive. Moreover, within the out-group, a subgroup of supporters of higher provision levels will (eventually) emerge while the group of opponents to public provision in the out-group shrinks. If status motives are aligned with incomes, this generates an ends-against-the-ends coalition structure. This corresponds to the change from scenario (A) to (B). If status concerns grow stronger, those who oppose higher provision levels will gradually disappear from the out-group. When everybody in the out-group favors more public provision, the coalition structure switches from the ends-against-the-ends type to the median-income type (case (C)), that puts high-income earners politically against low-income earners (which can never occur in the standard model).

In the examples, stronger status concerns imply higher equilibrium tax rates and, consistent with the idea of an increasing Laffer curve, higher public provision levels. This indicates that status concerns tend to drive up marginal willingnesses to pay for public provision. However, this illustration of the effects of status concerns on MVE features should be taken with some caution: the interaction between consumption utilities, the income distribution, and the strength of status concerns in a MVE does not allow for unambiguous comparative statics. Nevertheless, the example demonstrates that the strength of status motives alone can affect coalition structures and, at least for some parameter constellations, shape policy outcomes in an intuitively plausible way.

## 6.2 Economy results

In our two income type model, we identified necessary and sufficient conditions for certain “economy” results, keeping the political economy decidedly simple. Most centrally, we

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<sup>31</sup>To ensure that the support is bounded, we combine the Weibull distribution with a uniform distribution for incomes exceeding some threshold level.

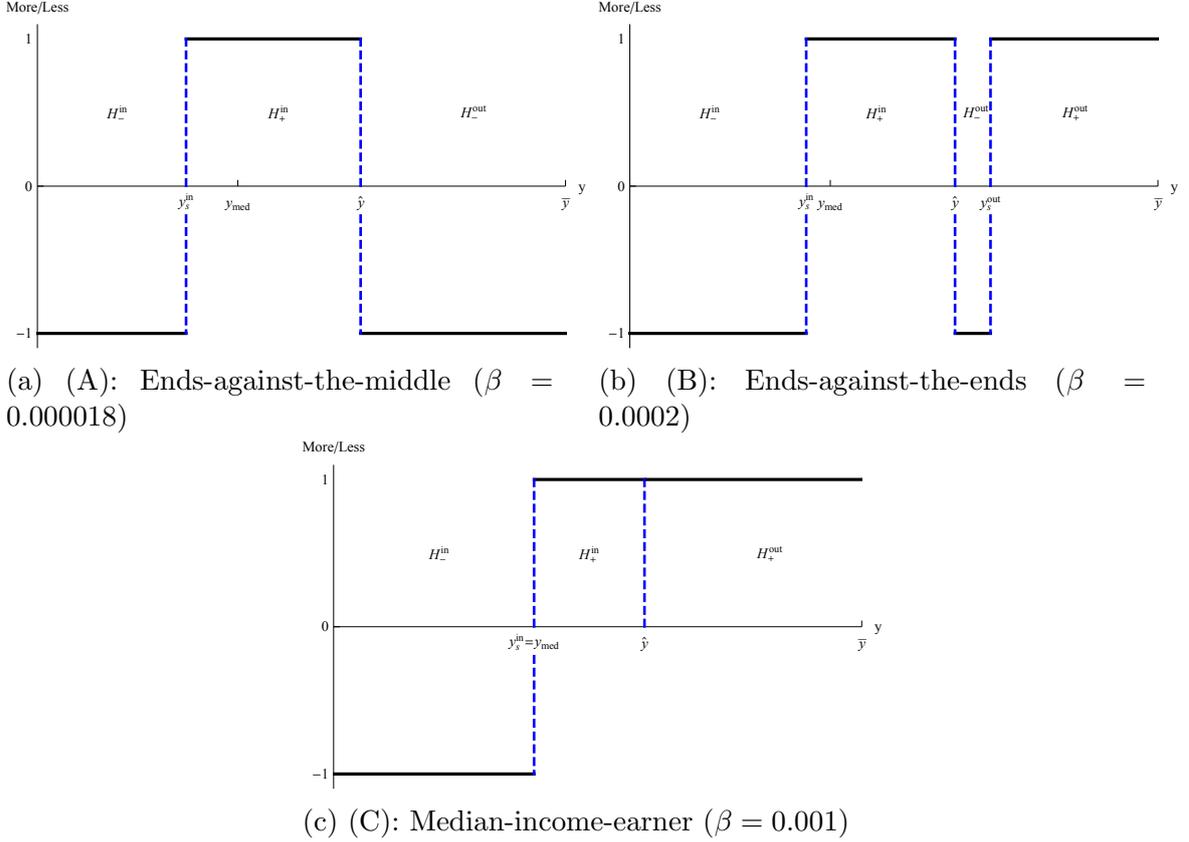


Figure 4: Equilibrium configurations in a numerical example. The vertical axis in each panel indicates whether the individual would prefer a higher (+1) or a lower tax rate (-1) than  $t^*$ . Political coalitions are given by  $H_+^{in} \cup H_+^{out}$  and  $H_-^{in} \cup H_-^{out}$ . Income level  $\hat{y}$  separates users outside and inside the public sector. At the jumps, political preferences change. E.g., in Panel (A), individuals with incomes smaller than  $y_s^{in} = 0.04$  or above  $\hat{y} = 2.56$  prefer a lower tax rate while individuals with incomes between  $y_s^{in}$  and  $\hat{y}$  (including  $y_{med}$ ) favor tax rates larger than  $t^*$ . In all panels, coalitions have measure 1/2 with respect to  $F$ .

showed that status concerns lead to dual provision in cases where dual provision equilibria fail to exist without status, in particular for relatively equal societies.<sup>32</sup> Moreover, with status concerns market quality can be lower than in the public sector, and there can be provision for minorities, provided that social status is sufficiently strong. In Appendix A.10, provide a detailed example replicating these two phenomena in the continuous type model. In this section, we briefly describe the examples to convey how that these economy results survive in a richer continuous type environment.

We use the framework as specified in Section 5. To transfer the spirit of the 2-type model to the model with continuous types, we assume that incomes are uniformly distributed on  $[y, \bar{y}] = [Y - \delta, Y + \delta]$  such that  $y_{med} = Y$ . Under this specification  $2\delta$  is the distance between the upper and the lower upper support of the income distribution. Therefore  $\delta$  can be considered the continuous type analogue of the inequality parameter  $\gamma$  from section 2. The material utility function is again given by the one used in the preceding section. In the example, we first analyze a situation in which there is no status ( $\beta = 0$ ) and income inequality is sufficiently low such that the richest person does not opt out at the most preferred tax rate,  $t^*(y_m, 1)$ , of the median income individual when everybody stays in:

$$V^{in}(t^*(y_m, 1); \bar{y}) - V^{out}(t^*(y_m, 1); \bar{y}) > 0. \quad (24)$$

In the example, this utility difference between the public and private sector is decreasing in  $\bar{y}$ , and we set  $\delta$  so low such that condition (24) is satisfied.

In this situation, a dual provision equilibrium cannot be sustained under the chosen parameters. The intuition is that if the richest person does not want to opt out at the median's most preferred pooling tax rate, then, by income sorting, the same applies for all incomes with  $y < \bar{y}$ . Hence, the tax rate  $t^*(y_m, 1)$  is compatible with pooling in the public sector. As incomes are uniform, the median income earner has mean income, so she is indifferent between the market and the situation where everyone pools in the public sector (mean income individuals do not profit from redistribution). Therefore,  $t^*(y_m, 1)$  cannot be beaten by a zero tax. If  $\beta = 0$ , the only second candidate for an

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<sup>32</sup>In the 2-type model, we can explicitly characterize equilibria outside the region where dual provision at the decisive voter's most preferred tax rate arises as the unique political equilibrium, and we can also show for which parameters which type of alternative equilibrium results. As this is of little interest for this paper, we concentrate on the dual provision equilibrium described here. Additional results are available upon request.

interior MVE is the ends-against-the-middle type. In the example we have chosen, this equilibrium loses against the median MVE candidate where everybody stays in the public sector. Consequently, there is no other interior MVE than the one given by  $t^*(y_m, 1)$ ; dual provision fails to exist without status concerns.

Now suppose that  $\beta > 0$  and sufficiently high. Then, a tax rate exists that is a candidate for the ends-against-the-end equilibrium. This tax rate then indeed wins against any other tax, including  $t^*(y_m, 1)$ , in pairwise comparisons (see Appendix A.10 for the details). We thus replicate the result that for low inequality—here defined as  $\delta$  being sufficiently low such that the richest person does not want to opt out at  $t^*(y_m, 1)$ —a dual provision system can arise if status concerns are sufficiently high (see Proposition 1).

We now turn to the second observation, that majority voting may lead to public provision although the public option is taken up only by a minority of the population. Using the same numerical example as the previous one with the only difference that  $\beta$  is now set ten times larger, we demonstrate that such a seemingly puzzling situation may generically occur under status concerns also in the continuous type model (for details see Appendix A.10). Interestingly, in the majority voting equilibrium we derive, the consumption level of  $x$  is lower than the publicly provided level for *everybody* who opts out from public provision, i.e. for the majority of the population. As shown by this example, the situations identified in Propositions 4 and 2 also occur in the continuous type case.

### 6.3 Further scenarios

Proposition 5 rests on two critical assumptions: the most preferred tax rates are increasing in income (Assumption 9) and the median income earner consumes the publicly provided option. For goods like (primary and secondary) schooling these assumptions are likely to hold jointly. For other publicly provided goods, the median income earner might consume outside the public sector and status concerns might be less pressing, the richer people get (think, e.g., of housing where motives to set oneself apart from occupants of social housing might be stronger with those closely above the critical income than with the really rich). Our framework yields predictions for these cases. For example, if all inequalities in Assumption 9 are reversed, the income stratification of political preferences reverses, too: poorer consumers of the publicly provided good are now less reluctant to support an expansion than richer ones, and among those who opt out of public provision, the will-

ingness to accept the tax hikes that lure others into the public sector is higher for the moderately rich than for the very rich. Exactly the same assortment of possible MVE configurations as in Proposition 5 can emerge, – including ends-against-the-middle and ends-against-the-ends equilibria. This is again in marked contrast to scenarios without status concerns, where only standard median income earner equilibria can occur if the willingness to pay for public provision decreases with income (see Epple and Romano, 1996b, Prop. 1).

Cases where the median income earner opts out of the public sector, but the willingness to pay for the publicly provided good increase with income in each sector (which might be plausible for nutrition) can also be readily handled: the potential coalition structures in a MVE can again be shown to come in exactly the same three types identified in Proposition 5. An ends-against-the-ends equilibrium also exhibits the same features as before: the upper end [lower end] in the public and private system are political allies in the quest for a higher [lower] tax rate. The end-against-the-middle equilibrium, however, strongly differs now: the rich and the poor ends still coalesce politically but they now favor an *expansion* of public provision (the middle class, who are now buying in the market, prefers cuts).

Generally, how the valuation for public services varies with income is crucial for the coalitions in a majority voting equilibrium. The technique in our paper helps to make predictions on the coalition structures that arise from any given distribution of voter preferences. This will be useful in empirical studies on voting over publicly provided goods.

## 7 Conclusion

Governments provide goods to their citizens that are at least partly private in nature: education, housing, transport, health services, etc. In democratic regimes, the provision of these goods is determined in a political process, balancing the votes for and against (a larger volume of) public provision. In this paper, we show that social motives, here exemplified by social status concerns, may substantially affect the political and economic properties of voting equilibria.

Status-concerned non-users of the public sector may be willing to subsidize public pro-

vision though they do not directly materially benefit from it. Status concerns, whether intrinsically motivated or purely instrumental, thus complement social motives such as altruism (Coate, 1995), concerns for equal opportunities (Gasparini and Pinto, 2006) or paternalistic preferences that help to explain why, for example, certain private goods are publicly provided although the majority does not take them up. Unlike status concerns, these other types of social preferences fail to explain, however, why private consumption levels are lower than public provision levels, as sometimes happens in reality. Our approach is the first to accommodate several puzzling observations of public provision in a single unified framework.

The social feedback effect we identified in this paper, i.e., that redistributive income taxation may increase or maintain the social status of the non-beneficiaries, applies for the political economy of the welfare state in general, including cash redistribution. The reason is that all redistributive mechanisms, whether cash or in-kind, partition the population into two groups – beneficiaries and net contributors. Belonging to either group sends socially informative signals about an underlying status-bearing personal characteristic such as income, a strong work ethic, social attractiveness as a partner etc. However, taking up or declining a publicly provided good – such as schooling, housing, foods stamps – is more openly visible than receiving (or not receiving) cash payments. So we think that motives of social status are particularly relevant for in-kind redistribution or for those types of social benefit payments where recipients can be easily identified and sorting along income lines is particularly strong.

Generally, allowing for voting to take place both over cash and in-kind redistribution would be a particularly interesting extension of our model. When individuals care about social status, richer people are likely to favor discriminatory in-kind programs while poorer people tend to advocate anonymous cash transfers. A promising question for future study is which welfare system mix will emerge in a political equilibrium.

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# Appendix

## A.1 Proof of Lemma 2

We first prove an auxiliary lemma.

**Lemma 7.** *If the poor are the majority,  $p_\ell > \frac{1}{2}$ , any separating political equilibrium  $(t, p_\ell)$  must be of one of the following types:*

$$(t, h^{in}) = (t^*(y_\ell, p_\ell), p_\ell),$$

$$(t, h^{in}) = (\hat{t}(y_h, p_\ell) - \epsilon, p_\ell) \text{ with } \epsilon \rightarrow 0 \text{ and } \hat{t}(y_h, p_\ell) < t^*(y_\ell, p_\ell),$$

$$(t, h^{in}) = (\hat{t}(y_\ell, p_\ell), p_\ell) \text{ with } \hat{t}(y_\ell, p_\ell) > t^*(y_\ell, p_\ell).$$

*Proof:* Consider first the case that a separating economy is incentive-compatible given the policy  $(t, \bar{x}) = (t^*(y_\ell, p_\ell), t^*(y_\ell, p_\ell)Y/p_\ell)$ . Then, by single-peakedness of  $V^{in}$ , every policy with  $t \neq t^*(y_\ell, p_\ell)$  that would also induce  $h^{in} = p_\ell$  would make the poor worse off. Now, consider the case that the economy  $(t^*(y_\ell, p_\ell), p_\ell)$  is not feasible, as the rich do not opt out at  $t^*(y_\ell, p_\ell)$ . If  $\hat{t}(y_h, p_\ell) < t^*(y_\ell, p_\ell)$ , all economies  $(t, p_\ell)$  with  $t \in [(\hat{t}(y_h, p_\ell), t^*(y_\ell, p_\ell))]$  are not incentive-compatible. By Assumption 2 (DMU), however,  $\hat{t}(y_\ell, p_\ell) < \hat{t}(y_h, p_\ell)$ . Therefore, there exist policies  $(t, \bar{x})$  with  $t \in (\hat{t}(y_\ell, p_\ell), \hat{t}(y_h, p_\ell))$  and  $\bar{x} = tY/p_\ell$  which will induce  $h^{in} = p_\ell$  as an equilibrium outcome. Among these policies, the poor will choose the one with the highest tax possible, as  $V^{in}(t, p_\ell; y_\ell)$  is strictly increasing in  $t$  for  $t < t^*(y_\ell, p_\ell)$ . Therefore,  $\hat{t}(y_h, p_\ell) - \epsilon$  is the only equilibrium candidate for  $h^{in} = p_\ell$  and  $t \leq t^*(y_\ell, p_\ell)$ . Next, consider the case in which  $t^*(y_\ell, p_\ell)$  is not feasible, as the poor opt out:  $\hat{t}(y_\ell, p_\ell) > t^*(y_\ell, p_\ell)$ . (This case is only possible under status  $(S > 0)$ .) Then, by DMU,  $\hat{t}(y_\ell, p_\ell) < \hat{t}(y_h, p_\ell)$ . As  $V^{in}$  is strictly decreasing in  $t$  to the right of  $t^*(y_\ell, p_\ell)$ ,  $\hat{t}(y_\ell, p_\ell)$  is the only candidate tax. ■

Lemma 7 states that, if the poor hold the majority, then there are three candidates for a separating political equilibrium. The first is where the poor enforce their most preferred tax,  $(t, h^{in}) = (t^*(y_\ell, p_\ell), p_\ell)$ , which is the poor's favorite separating political equilibrium. In the second type, the poor can only enforce a lower than their most preferred tax, namely those tax that just discourages the rich from staying in the public sector. In the third, the poor vote for a higher than their most preferred tax such that they are just

attracted by the public sector. The second case can only occur if the rich do not opt out at the most preferred tax of the poor, and if the poor prefer this candidate both over pooling in the public sector and over pooling in the market. The third equilibrium can only occur under status. But this necessitates a relatively high status utility from private sector consumption, so that the poor want to forgo the publicly alternative, even when it is tailored to them in a materially optimal manner.

We now prove Lemma 2.

Note that an individual's most preferred tax  $t^*(y, h^{in})$  solves  $\partial V^{in}(t, h^{in}; y)/\partial t = 0$ , or, equivalently,  $u_x/u_c = h^{in}y/Y$ . We can therefore think of choosing the most preferred tax for the poor as choosing the consumption bundle  $(x, c)$  that maximizes  $u(x, c)$  subject to the budget set  $c + h^{in}y_\ell/Y \cdot x \leq y_\ell$ . As  $h^{in}y_\ell/Y < 1$ , the implicit price of good  $x$  is smaller for the poor under public provision than under no provision  $(t, \bar{x}) = (0, 0)$ , and it is the lowest for  $h^{in} = p_\ell$ . By quasi-concavity of  $u(x, c)$ ,  $V^{in}(t^*(y_\ell, p_\ell), p_\ell; y_\ell) > V^{in}(t^*(y_\ell, 1), 1; y_\ell) > V^{out}(y_\ell)$ . By single-peakedness of  $V^{in}$ ,  $(t, h^{in}) = (t^*(y_\ell, p_\ell), p_\ell)$  also strictly dominates the remaining candidates for a separating equilibrium listed in Lemma 7. ■

## A.2 Proof of Proposition 2

First, note that at  $\gamma = \tilde{\gamma}$ , the equilibrium consumption levels of good  $x$  are  $\bar{x}$  for the poor and  $x^*$  for the rich, with  $x^* > \bar{x}$ . In contrast, consider  $\gamma = 0$ , where  $y_h = y_\ell = Y$ . As the rich consume  $x$  in the market, the price they pay for good  $x$  in units of good  $c$  is one. For the poor, consuming in the public sector, this price is  $p_\ell y_\ell/Y < 1$ . If good  $x$  is not a Giffen good, the rich consume a lower quantity than the poor,  $x^* < \bar{x}$  for  $\gamma = 0$ . Second, take the derivative of  $x^*(y_h(1 - t^*(y_\ell, p_\ell)))$  with respect to  $\gamma$  gives  $\partial x^*/\partial(y(1 - t)) [(1 - t^*)\partial y_h/\partial\gamma - y_h\partial t^*/\partial\gamma]$ . By normality of good  $x$  and as  $\partial t^*/\partial\gamma < 0$  from assumption 5, this expression is positive so that  $x^*$  increases in  $\gamma$ . Third, observe that  $\bar{x}$  decreases in  $\gamma$  within the separating equilibrium because by Assumption 5 the most preferred tax rate by the poor decreases in  $\gamma$ . The former arguments imply a critical threshold for income inequality  $\tilde{\tilde{\gamma}} < \tilde{\gamma}$ , implicitly defined by  $x^*(y_h(\tilde{\tilde{\gamma}})(1 - t^*(y_\ell(\tilde{\tilde{\gamma}}), p_\ell))) = t^*(y_\ell(\tilde{\tilde{\gamma}}), p_\ell)Y/p_\ell$ . Below this threshold level, the quality  $x^*$  consumed by the rich in the market will be lower than that in the public sector  $\bar{x}$ . According to Lemma 2 and

Proposition 1, the separating equilibrium at the poor's most preferred tax rate uniquely exists as  $\Delta^M(t^*(y_\ell, p_\ell), p_\ell; y_h) < S \leq \Delta^M(t^*(y_\ell, p_\ell), p_\ell; y_\ell)$  and  $\gamma < \tilde{\gamma}$ . ■

### A.3 Proof of Proposition 3

First, observe that if  $\gamma = 0$ ,  $S^0(y_h) < \Delta^M(y_h) = \Delta^M(y_\ell)$ : For  $\gamma = 0$  we have  $S^0(0) = v(Y) - v(Y(1 - t^*(Y, p_\ell)))$ . The material utility differential is  $\Delta^M(Y, t^*(Y)) = u(\frac{tY}{p_\ell}, Y(1 - t^*(Y, p_\ell))) - v(Y(1 - t^*(Y, p_\ell)))$ . Subtracting the latter from the former yields:  $S^0(0) - \Delta^M(Y, t^*(Y, p_\ell)) = v(Y) - u(\frac{tY}{p_\ell}, Y(1 - t^*(Y, p_\ell))) < 0$ . (This expression is negative as individuals with mean income would benefit from public provision in separating equilibrium (where the implicit price of good  $x$  is less than one. Therefore,  $S^0(0) < \Delta^M(Y, t^*(Y, p_\ell))$ ). By continuity, the same holds in a separating equilibrium in the presence of status concerns ( $S > 0$ ) with  $\gamma > 0$  but in the neighbourhood of  $\gamma = 0$ .

Define  $\bar{\gamma}$  as the (smallest)  $\gamma$  solving for  $S^0(y_h(\gamma)) = \Delta^M(y_h(\gamma))$ . In Figure 1, this is the inequality level such that the grey and the dashed line intersect. Such a critical level  $\bar{\gamma}$  exists, irrespective of whether  $S^0(y_h(\gamma))$  is decreasing or increasing for some intervals (which it may be). The reason is that, for  $\gamma = 0$ , we have  $S^0(y_h(\gamma)) < \Delta^M(y_h(\gamma))$ . At the other end, for  $\gamma^{max}$ , the poor have zero income, so they demand a zero quantity of good  $x$ , calling for a zero most preferred tax rate. For zero taxes,  $S^0(y_h) = 0$ . Therefore, at  $\gamma^{max}$ , we have  $S^0(y_h(\gamma)) > \Delta^M(y_h(\gamma))$ . ■

### A.4 Derivation of indirect preferences in the continuous type model

We will now derive the indirect preferences given in 16. Anticipating the decisions in Stage 3, an individual chooses  $a = out$  over  $a = in$  whenever the difference in status utility between the consumption options is large enough to compensate for differences in consumption utility, i.e., if:

$$\beta \cdot (S^{out} - S^{in}) > u(\bar{x}, y(1 - t)) - v(y(1 - t)). \quad (25)$$

For given status values  $S^{out}$  and  $S^{in}$  and policy  $(t, \bar{x})$ , condition (25) partitions the population into those who consume in the private system ( $a = out$ ) and of those who choose

the publicly provided level ( $a = in$ ). We denote these groups by

$$\begin{aligned}\tilde{H}^{out}(S^{out} - S^{in}, t, \bar{x}) &:= \{y \in \mathcal{Y} \mid \text{Condition (25) holds}\}, \\ \tilde{H}^{in}(S^{out} - S^{in}, t, \bar{x}) &:= \mathcal{Y} \setminus \tilde{H}^{out}(S^{out} - S^{in}, t, \bar{x}).\end{aligned}$$

We require that perceptions of status values are consistent with actions. Formally, at any policy  $(t, \bar{x})$ , status utilities  $(S^{out}, S^{in})$  must simultaneously satisfy:

$$S^{out} = \int_{y \in \tilde{H}^{out}(S^{out} - S^{in}, t, \bar{x})} y dF(y) \quad \text{and} \quad S^{in} = \int_{y \in \tilde{H}^{in}(S^{out} - S^{in}, t, \bar{x})} y dF(y). \quad (26)$$

Denote the sets of individuals in and outside of the public sector under consistent expectations by  $\tilde{H}^{in}(t, \bar{x})$  and  $\tilde{H}^{out}(t, \bar{x})$ . We assume that their measures are continuously differentiable in  $t$  and  $\bar{x}$ .

Substituting for  $H^{in}$  in the public budget constraint using  $\tilde{H}^{in}(t, \bar{x})$ , feasible policies must satisfy

$$t \cdot Y = \bar{x} \cdot \int_{y \in \tilde{H}^{in}(t, \bar{x})} dF(y). \quad (27)$$

By the Implicit Function Theorem, Eq. (27) defines the provision level  $\bar{x}$  as a continuously differentiable function of the tax rate  $t$ , i.e.,

$$\bar{x} = x(t). \quad (28)$$

Obviously,  $x(0) = 0$ . Without loss of generality, we assume that every positive tax rate  $t > 0$  that we consider goes along with positive public provision levels  $x(t) > 0$ . Moreover, we confine our analysis to the increasing segments of the Laffer curve. That is, a higher tax rate implies a higher provision level  $\frac{dx(t)}{dt} > 0$  for all  $t$ .

By (28), the policy space is one-dimensional, with the tax rate  $t$  as the remaining policy variable. Henceforth, we denote by

$$H^{in}(t) := \tilde{H}^{in}(t, x(t)) \quad \text{and} \quad H^{out}(t) := \tilde{H}^{out}(t, x(t))$$

the sets of individuals in and outside the public sector. At feasible policy  $(t, x(t))$ , the

status utilities of consuming in and outside the public sector are given by

$$S^{in}(t) := \mathbf{E}(y|y \in H^{in}(t)) \quad \text{and} \quad S^{out}(t) := \mathbf{E}(y|y \in H^{out}(t)). \quad (29)$$

Using these expressions to substitute for the status values in utility function (14) and using equation (28) to substitute for  $\bar{x}$  yields the indirect preferences over  $t$  in (16).

## A.5 Proof of Lemma 5

The fact that  $S^{out} > S^{in}$  can directly be seen from (19): individuals in the private system are uniformly richer than in the public sector. Next calculate:

$$\frac{dS^{out}}{dt} = \frac{d}{d\hat{y}} \left( \frac{1}{1 - F(\hat{y})} \int_{\hat{y}}^{\bar{y}} y f(y) dy \right) \cdot \frac{d\hat{y}}{dt} = \frac{f(\hat{y})}{1 - F(\hat{y})} \cdot (\mathbf{E}(y|y \geq \hat{y}) - \hat{y}) \cdot \frac{d\hat{y}}{dt} > 0,$$

since  $d\hat{y}/dt$  is positive by (18). Likewise, one shows that

$$\frac{dS^{in}}{dt} = \frac{f(\hat{y})}{F(\hat{y})} \cdot (\hat{y} - \mathbf{E}(y|y \leq \hat{y})) \cdot \frac{d\hat{y}}{dt} > 0.$$

This proves (20). ■

## A.6 Relation to primitives

Lemma 5 and the results that follow it build on observation (18) that a higher tax rate attracts more and richer individuals to the public sector. Underlying this observation is Assumption 7, which we phrased in terms of indirect utilities  $V^{in}(t, y)$  and  $V^{out}(t, y)$ . Preferences  $V^{in}$  and  $V^{out}$  in fact combine, in reduced form, the primitives of the model – consumption preferences ( $u$ ), status concerns ( $\beta$ ), the distribution function ( $F$ ) – and their interplay through (26) and (28). Given the importance of (18) it is, however, informative to trace (18) back to the primitives of the model in a more direct way.

For ease of exposition, take as given that every policy generates an income threshold,  $\hat{y}$ , that separates “poor” public sector users from “rich” private sector consumers.<sup>33</sup> We can then measure the (positive) status differential between private and public sector con-

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<sup>33</sup>Without status motives, such a separating income is guaranteed by Condition (30) below; see Epple and Romano (1996b, p. 300).

sumption by

$$\Delta(\hat{y}) := S^{out} - S^{in} = \mathbf{E}(y|y \geq \hat{y}) - \mathbf{E}(y|y \leq \hat{y}) > 0.$$

Given a tax rate  $t$ , the income threshold,  $\hat{y}$ , and the public provision level,  $\bar{x}$ , simultaneously satisfy the indifference condition of the individual with that income (i.e., (25) holds with equality) and the government's budget constraint (27):

$$u(\bar{x}, \hat{y}(1-t)) - v(\hat{y}(1-t)) - \beta \cdot \Delta(\hat{y}) = 0 \quad \text{and} \quad t \cdot Y - \bar{x} \cdot F(\hat{y}) = 0.$$

Applying Cramer's Rule yields the following analogue to (18):

$$\frac{d\hat{y}}{dt} = \frac{Y u_x + \hat{y} F(\hat{y}) [v' - u_c]}{\bar{x} F'(\hat{y}) u_x + F(\hat{y}) [(1-t)(v' - u_c) + \beta \Delta'(\hat{y})]}.$$

Since  $u_x > 0$ , sufficient conditions for  $d\hat{y}/dt > 0$  in terms of primitives are given by

$$v'((1-t)\hat{y}) \geq u_c(\bar{x}, (1-t)\hat{y}); \tag{30}$$

$$(1-t) \cdot v'((1-t)\hat{y}) + \beta \Delta'(\hat{y}) \geq (1-t) \cdot u_c(\bar{x}, (1-t)\hat{y}) \tag{31}$$

for all  $(t, \bar{x}, \hat{y})$ . Without status concerns (i.e., when  $\beta = 0$ ), Conditions (30) and (31) coincide. Condition (30) is also used in Epple and Romano (1996b). It implies that higher taxes (and, thus, greater public provision) attract previously slightly richer-than-marginal individuals into the public sector for the reason that a reduction in net income is more harmful to individuals who consume in the private sector than for those in the public sector. This then lets the indifferent income  $\hat{y}$  increase in  $t$ .

Status concerns ( $\beta > 0$ ) modify this story. Based on purely materialistic grounds, the indifferent income  $\hat{y}$  increases as a result of a higher tax rate. But an increased indifferent income also affects an individuals' social status: the status value of both the private and the public sector increases in  $\hat{y}$ . If the latter effect is sufficiently strong, the status differential  $\Delta$  decreases, making the public sector relatively more attractive. If the marginal status concern in the form of  $\beta$  is sufficiently strong, this would push the indifferent income downwards. The sign and magnitude of  $\Delta'(\hat{y})$  are unclear and depend on the shape of the income distribution  $F$ . Condition (31) precludes that status effects that would counteract the material incentives ( $\Delta' < 0$ ) dominate. The condition poses a joint requirement on material preferences, the status parameter, and the income distribution.

## A.7 Proof of Lemma 6

The sets  $H_-^{in}(t)$  through  $H_+^{out}(t)$  partition  $\mathcal{Y}$  by construction. Hence,  $h_-^{in} + h_-^{out} + h_+^{in} + h_+^{out} = 1$  for all  $t$ , where all measures vary continuously in  $t$  by the continuity of  $F$  and  $V$ . By the dual provision property and the first two items in Assumption 7, we have  $t > \hat{t}(\underline{y})$ . Any  $t > \hat{t}(\underline{y})$  with  $h_-^{out}(t) + h_-^{in}(t) > 1/2 > h_+^{out}(t) + h_+^{in}(t)$  can be defeated in a majority vote against a suitably chosen, slightly lower tax rate; any  $t > \hat{t}(\underline{y})$  with  $h_-^{out}(t) + h_-^{in}(t) < 1/2 < h_+^{out}(t) + h_+^{in}(t)$  would lose against a slightly higher tax rate. Hence, only tax rates such that  $h_-^{out}(t) + h_-^{in}(t) = h_+^{out}(t) + h_+^{in}(t) = 1/2$  can be MVE. ■

## A.8 Proof of Proposition 5

Suppose that the assumptions of Proposition 5 hold and that  $t^*$  is an interior MVE. Dual provision means that  $h_-^{out}(t^*) + h_+^{out}(t^*) > 0$  and  $h_-^{in}(t^*) + h_+^{in}(t^*) > 0$ . As, by assumption, the median income earner consumes in the public sector, so do all poorer individuals (this follows from Assumption 7). Hence,  $h_-^{in}(t^*) + h_+^{in}(t^*) \geq 1/2$ . As the sum of  $h_+^{out}(t^*)$  and  $h_-^{out}(t^*)$  is positive, at most one of them can be equal to zero. This gives rise to three possible cases:

(A) Only  $h_+^{out}(t^*)$  is zero. From Lemma 6,  $h_+^{in}(t^*) = 1/2$  and  $h_-^{in}(t^*) \geq 0$ .

- Suppose, first, that  $h_-^{in}(t^*) > 0$ . From (22), sets  $H_-^{in}(t^*)$ ,  $H_+^{in}(t^*)$ , and  $H_-^{out}(t^*)$  are ascending income brackets which, via Lemma 6, give rise a political coalition between the rich and the poor (both in favor of lower  $t$ ) against the middle class (in favor of higher  $t$ ).

Observe that  $H_-^{in}(t^*)$  and  $H_+^{in}(t^*)$  are separated by  $y_s^{in}$  with  $\underline{y} < y_s^{in}$ . At this income level,  $\frac{\partial}{\partial t} V^{in}(t^*, y_s^{in}) = 0$ , such that  $t^*$  is this individual's favorite policy. Since  $h_-^{out} > 0$  and  $h_-^{out} + h_-^{in} = 1/2$ , we must have  $h_-^{in} < 1/2$ . Hence,  $y_s^{in} < y_{med}$ , implying that  $\frac{\partial}{\partial t} V^{in}(t^*, y_{med}) > 0$ : the decisive voter has less than the median income, and the median income earner would prefer a higher tax rate than the one that prevails in the MVE.

- As a borderline case, reported in footnote 30, suppose that  $h_-^{in}(t^*) = 0$ . Then  $h_+^{in}(t^*) = h_-^{out}(t^*) = 1/2$  and  $y_{med} = \hat{y}(t^*)$ : precisely half of the population consume in the public and in the private system, and everybody in the pub-

lic [private] system prefers more [less] public provision. This case, which is captured by  $y_s^{in} < \underline{y}$ , is of limited interest, however.

- (B) Both  $h_-^{out}(t^*)$  and  $h_+^{out}(t^*)$  are non-zero. Then both  $h_-^{in}(t^*)$  and  $h_+^{in}(t^*)$  must be strictly positive, too. For example, if  $h_+^{in}(t^*)$  were zero, then  $h_+^{out}(t^*) + h_-^{out}(t^*) > 1/2$  from Lemma 6. Hence,  $h_-^{in}(t^*) < 1/2$ , contradicting via Assumption 7 that  $y_{med} \in H_-^{in}(t^*)$ . A similar argument rules out that  $h_-^{in}(t^*) = 0$ .

With income sorting (Assumption 9), the non-emptiness of all four groups  $H_-^{in}(t^*)$  to  $H_+^{out}(t^*)$  leads to political coalitions between the very rich and the middle class (both in favor of higher  $t$ ) and between the poor and the moderately rich (both for lower  $t$ ). In terms of (22), this is tantamount to  $\underline{y} < y_s^{in}(t^*) < \hat{y}(t^*) < y_s^{out}(t^*) < \bar{y}$ .

By assumption,  $\hat{y}(t^*) > y_{med}$ . Moreover, as  $h_-^{in} < 1/2$ , we get  $y_s^{in} < y_{med}$  by Assumption 9. Together, this implies that  $y_s^{in}(t^*) < y_{med} < y_s^{out}(t^*)$ , giving rise to two decisive voters, one inside and one outside the public sector.

- (C) Only  $h_-^{out}(t^*)$  is zero. By Lemma 6,  $h_-^{in}(t^*) = 1/2$  or, equivalently,  $H_-^{in} = [\underline{y}, y_{med}]$ . Combining Assumptions 7 and 9, this implies that everybody with income larger than  $y_{med}$  prefers a higher tax rate than  $t^*$ :  $H_+^{in}(t^*) \cup H_+^{out}(t^*) = [y_{med}, \bar{y}]$ . Hence, a median-income earner MVE results.

If  $H_+^{in} \neq \emptyset$ , then  $t^*$  is the most-preferred policy of the median-income earner.<sup>34</sup> ■

## A.9 Example for Proposition 5

Assume that consumption preferences are represented by the following utility function

$$u(x, c) = \frac{1}{1 - \rho} (\alpha x^{1-\rho} + (1 - \alpha) c^{1-\rho}), \quad (32)$$

which is the same than the one used for the graphical illustrations of the 2-type model. We set  $\alpha = 0.01$  and  $\rho = 1.5$ . Status utilities are defined as in (15). Incomes are distributed

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<sup>34</sup>In a limiting case,  $H_+^{in}$  might be empty. Then,  $h_-^{in}(t^*) = h_+^{out}(t^*) = 1/2$  and  $\hat{y}(t^*) = y_{med}$ : individuals with below-median incomes are in the public sector but would prefer a lower tax rate; individuals with above-median incomes are out and would prefer a higher tax rate. The MVE  $t^*$  is the median income earner's most preferred policy (in the sense that  $\frac{\partial}{\partial t} V^{in}(t^*, y_{med}) = 0 = \frac{\partial}{\partial t} V^{out}(t^*, y_{med})$ ), at which he is just indifferent between being inside or outside of public provision ( $V^{in}(t^*, y_{med}) = V^{out}(t^*, y_{med})$ ).

according to

$$F(y) = \begin{cases} 0 & y \leq \underline{y} \\ 1 - e^{-(y/\sigma)^\mu} & \underline{y} < y \leq y_a \\ 1 + e^{-(y_a/\sigma)^\mu} \frac{(y-\bar{y})}{(\bar{y}-y_a)} & y_a < y \leq \bar{y} \\ 1 & \text{otherwise.} \end{cases}$$

This piecewise distribution is Weibull on  $[\underline{y}, y_a)$  and uniform on  $[y_a, \bar{y}]$  (the piecewise specification ensures that the support of  $F$  is bounded). Setting  $\underline{y} = 0$ ,  $y_a = 15$ ,  $\mu = 0.35$  and  $\sigma = 0.37$ , this distribution is positively skewed with median  $y_{med} = 0.13$  and mean  $Y = 5.96$ . It can be verified that Assumptions 7 to 9 are satisfied.

Table 1 reports the features of the MVE if we sequentially increase the strength of status concerns, represented by  $\beta$ . In particular, the MVE type changes from ends-against-the-middle to ends-against-the-ends to median income earner.

$\beta$	$t^*$	$x(t^*)$	$\hat{y}$	MVE type	$y_s^{in}$	$y_s^{out}$
0.000018	0.008	0.05	2.56	ends-against-the-middle	0.04	-
0.0002	0.010	0.07	2.68	ends-against-the-ends	0.07	6.35
0.001	0.012	0.08	1.90	median income earner	0.13	-

Table 1: MVE for varying  $\beta$

The equilibrium structures are visualized in Figure 4 in the main text.

Note that in the example, equilibria gradually change from type (A) via (B) to (C) when the intensity of status concerns increases. In the supplementary appendix we verify that the  $t^*$  reported in Table 1 indeed constitute MVE: they win all binary majority comparisons against alternative feasible tax rates (including  $t = 0$ ).

## A.10 Examples for Section 6.2

Assume that consumption preferences are again represented by

$$u(x, c) = \frac{1}{1-\rho} (\alpha x^{1-\rho} + (1-\alpha) c^{1-\rho}). \quad (33)$$

Status utilities are defined as in (15). We assume that in the pooling situations where ev-

everybody stays in the public sector and where everybody opts out, each individual receives the same social status, equal to  $\beta \cdot Y$ .

Incomes are uniformly distributed on  $[y, \bar{y}] = [Y - \delta, Y + \delta]$  such that  $y_{med} = Y$ . We set  $\alpha = 0.125$ ,  $\rho = 1.01$ , and  $y_{med} = Y = 50$ .

For the first example in Section 6.2, we choose  $\delta = 50$ . When  $\beta$  is zero, the formula for the median's most preferred tax rate when everybody stays in the public sector is the same as in section 1 for  $h^{in} = 1$ :

$$t^*(y_m, 1) = \left( \frac{1 - \alpha^{1/\rho}}{\alpha} \frac{Y^{(\rho-1)/\rho}}{y_m} + 1 \right)^{-1} \quad (34)$$

Under the above parameters,  $t^*(y_m, 1) = 0.127$ . For  $\delta = 50$  and  $\beta = 0$ , the richest person with income  $\bar{y}$  stays in the public sector: her utility differential between public and private sector consumption is 0.046.

The tax rate  $t^* = 0.064$  is the only candidate for an interior MVE as it is the only one that satisfies the necessary conditions for an ends-against-the-middle equilibrium. However, it only gets 0.492 percent of the votes in a pairwise comparison with  $t = 0$  (no provision). Therefore, there is no interior separating MVE. As the market solution is weakly dominated by the most preferred tax of the median income voter,  $t^*(y_m, 1) = 0.127$ , is the only interior MVE.

$\beta$	$\delta$	$t^*$	$x(t^*)$	$\hat{y}$	MVE type	$y_s^{in}$	$y_s^{out}$
0.001	50	0.083	5.37	77.72	ends-against-the-middle	27.72	-

Table 2: MVE for  $\delta = 50$  and  $\beta = 0.001$ .

We now switch status concerns on and set  $\beta$  to 0.001. Then  $t^* = 0.083$  is the only interior candidate, which wins against any other separating tax, as well against the median's most preferred tax. The outcomes of this equilibrium are summarized in Table 2.

The second example in Section 6.2 is the same than just used, except that we now increase the status parameter to a ten times larger value  $\beta = 0.01$ . We show that this gives also an ends-against-the-middle structure, but now the decisive voter opts out. The structure of the interior MVE is visualized in panel (i) of Figure 5. The vertical axis depicts the sign of  $\partial V(t^*, y)/\partial t$  for  $y \in \mathcal{Y}$  and, thus, indicates whether the individual would prefer a higher (represented by value +1) or a lower tax rate (-1) than  $t^*$ . At the jumps, political

preferences change. The minus-group (which corresponds to  $H_-^{out}$ ) and the union of the plus-groups, corresponding to  $H_+^{in} \cup H_+^{out}$  form the political coalitions. Observe that  $H_-^{in}$  is empty here. In terms of the nomenclature in Proposition 5, the MVE is of the ends-against-the-middle type (A). However, it is now turned upside down: the ends (the rich and the poor) both favor tax increases.

	range	measure ( $h$ )
$H_-^{in}$	$\emptyset$	0
$H_+^{in}$	$[0, 4.59]$	0.046
$H_-^{out}$	$(4.59, 54.59]$	0.5
$H_+^{out}$	$(54.59, 100]$	0.454

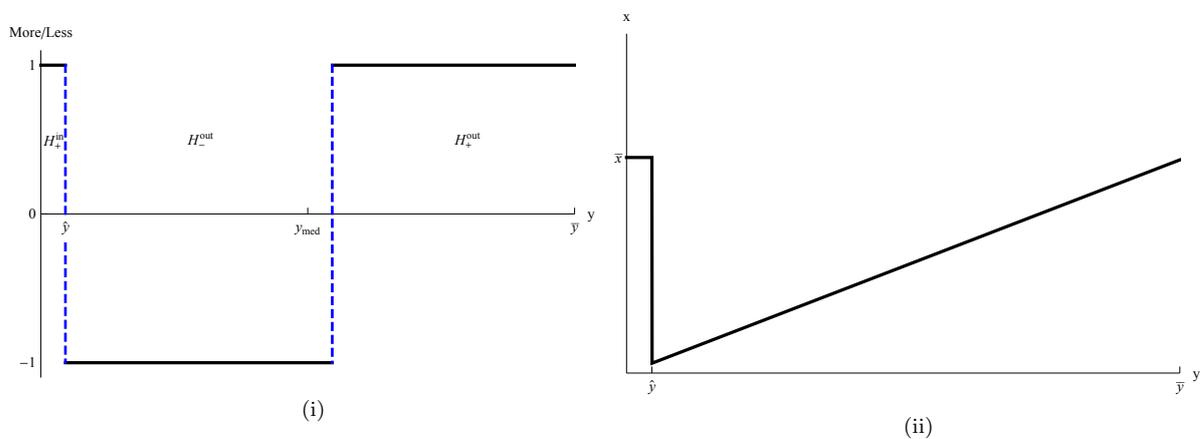
Table 3: Political preferences

Panel (ii) in Figure 5 depicts the consumption levels of  $x$  for all income types. This level equals  $\bar{x} = x(t^*)$  for those inside the public sector and  $x(y(1 - t^*))$  else. *As Figure 5 demonstrates, the MVE has two features that, under status concerns, can occur but never without:*

- The median income earner and, with him, a majority of individuals opt out of public supply at  $t^*$ .
- Everybody outside the public sector (including the median income earner) purchases less of good  $x$  than  $\bar{x} = x(t^*)$ .

The former case corresponds to the situation identified in Proposition 4, the latter to that in Proposition 2.

Figure 5: Majority opts out and private consumption is always lower than  $\bar{x}$

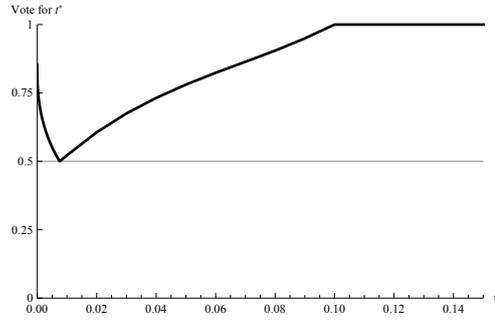


## Supplementary Appendix

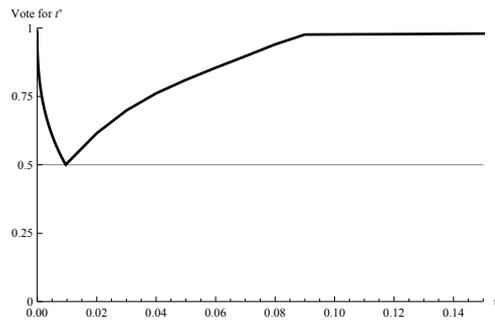
### B.1 Verification of MVE for Example A.9

To confirm that the tax rates  $t^*$  reported in the example of Appendix A.9 are indeed MVE, we let each of them run in pairwise majority comparison against all alternative feasible tax rates (including  $t = 0$ ). Panels (A) to (C) in Figure 6 plot the shares of individuals preferring  $t^*$  in pairwise comparison; for graphical reasons we only plot tax rates in a range from 0 to 0.15. As can be seen, the  $t^*$  always garner more than 50 percent of the popular vote and are, thus, indeed MVE.

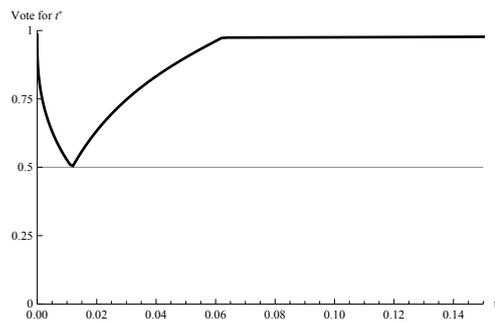
Figure 6: Vote shares for  $t^*$



(A):  $\beta = 0.000018$



(B):  $\beta = 0.0002$



(C):  $\beta = 0.001$