Self-Signaling and Voting for Redistribution*

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Abstract

There seems to be more to voting than policy. Nevertheless, models of voting tend to focus on aggregate policy preferences. I model voting for redistribution under uncertainty over future incomes with imperfect memory and anticipatory utility. Imperfect memory gives votes meanings as signals of future income prospects. Anticipatory utility motivates concern over the meanings of votes. Voting becomes self-signaling: Voting for low tax rate is consistent with the desirable belief of high future consumption. Voting and policy preferences diverge and voting does not aggregate policy preferences: fewer voters vote for redistribution than prefer redistribution. Higher income risk increases the value of self-signaling which decreases the demand for redistribution. If voters do not perceive themselves as pivotal a policy trap where a decisive coalition votes against its best interest may arise.

JEL classification: D31; D72; D83; D91
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1 Introduction

Voters seem to sometimes vote against their self-interest at least in the narrow sense of material utility. I show how voters wishing to expect high incomes choose apparently dominated actions in the context of voting for a redistributive policy. I model voting as a possibility for self-signaling or expressing desirable future outcomes: voting for low taxation identifies the voter with the party that supports low taxation and with its supporters who benefit from low taxation. Such an identification is consistent with the desirable belief of high future income and consumption.

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The question of why the poor do not expropriate the rich by voting for a high tax rate and large transfers is a subject of a large literature. While the focus of this literature has been in understanding why policy preferences in aggregate may not support redistribution, the question of why the poor do not *vote* for redistribution has received less attention. The distinction between policy preferences and voting is moot if all voters care about is the policy. However, if voting serves dual purpose, on one hand contributing to the popularity of the policy voted for but on the other hand expressing or affirming political identity, then voting and policy preferences diverge.

People seem to be willing to actions that correlate with, but do not cause good outcomes. Such diagnostic actions have been discussed by Nozick (1969) and experimentally studied by Quattrone and Tversky (1986), Sloman, Fernbach, and Hagmayer (2010), and Fernbach, Hagmayer, and Sloman (2014). Facing a choice where an underlying unknown state of the world is known to influence both the choice and a future outcome, the action taken may be interpreted as revealing information about the state of the world and, hence, about the forthcoming outcome. Such behavior has also been called self-signaling (Bodner & Prelec, 2003; Bernheim & Thomadsen, 2005; Bénabou & Tirole, 2004, 2006, 2009, 2011; Mijović-Prelec & Prelec, 2010; Grossman, 2015). If we remember our actions better than the conditions we had in taking those actions, we may condition our self-inference and thus expectations about future outcomes on the actions we took. Our actions then influence our beliefs.

While imperfect recall of past circumstances makes actions informative, the willingness to take diagnostic actions may arise from anticipatory utility. Expecting good outcomes inceases current anticipation. Anticipation then motivates us to take actions that are consistent with the expectations of good outcomes. The role of anticipation of future utility as a part of currently experienced utility has been discussed already by Bentham (1789) and Jevons (1905), experimentally studied by Löwenstein (1987) and formally modeled by e.g. Caplin and Leahy (2001), Bernheim and Thomadsen (2005), Brunnermeier and Parker (2005), and Bénabou (2008, 2013).

Voting for redistribution is potentially a diagnostic action: First, future incomes are uncertain. Second, since voters expecting higher incomes tend to demand less redistribution and more consumption goods, future incomes are associated both with our voting and the level of our future consumption. Third, anticipating high consumption is more desirable than anticipating low consumption. Furthermore, there seems to be more to voting than reporting policy preferences: an extensive literature in political science and political economics has studied the direct or expressive benefits of voting (Hillman, 2010; Hamlin & Jennings, 2011; Brennan & Brooks, 2013; Hamlin & Jennings, 2018).

I add two components, imperfect recall and anticipatory utility, to a model of voting for redistribution under uncertainty about future income. In the model, voters vote either for a low or high income tax rate. At the time of voting, voters know their current income and have expectations about how their incomes will evolve in future. However, due to imperfect recall, the memory of voters is malleable and after voting, voters form their expectations about future income partly based on their voting choice. This gives votes meanings as signals of future income prospects. After the election, and before the realization of future incomes, voters anticipate their future consumption. Anticipation creates an incentive for self-signaling: expectations of higher consumption lead to higher anticipatory utility. In equilibrium, voting for low taxation is associated with high income and voting for high taxation is associated with low income. Thus, recalling having voted for low taxation allows inference of more desirable beliefs than recalling having voted for high taxation. Expecting this at the time of voting, voters face a trade-off between the instrumental benefits of contributing to the popularity of preferred policy and the self-signaling benefits derived from the meanings of votes. There is more to voting than policy and voting and policy preferences diverge.

I show how self-signaling desirable mobility prospects limits the demand for redistribution: As voting and policy preferences diverge, voting does not aggregate policy preferences and there are fewer voters who vote for high taxes than prefer high taxes. I also study how the value of self-signaling depends on the distribution that generates mobility prospects. Deterioration of the prospects in the low end of the income distribution leads to incentives of "wanting to look away" to take refuge in focusing on the prospects of upward mobility. Such denial is facilitated by voting for low tax rate and identifying with the voters who benefit from low tax rate. On the other hand, as the prospects of being in the high end of the income distribution improve and the prizes with which the economy rewards the most successful individuals increase, voting to self-signal these high mobility prospects becomes more attractive. Combining these effects, I find that an increase in income risk decreases demand for redistribution.

Even if voting does not aggregate policy preferences and the policy preferred by minority gains the majority of votes, voters do not need to be voting against their self-interest. Voters' anticipation is a part of their utility. If a voter votes as if she was pivotal and votes for low tax, then she reveals that anticipation of high income brings her higher utility than more extensive redistribution. Focusing on voting, however, it is possible study voters who do not perceive themselves as pivotal. These voters underweight the consumption utility relative to the voters who vote as if they were pivotal. Thus, they may vote for the low tax rate even if, if decisive, they would vote for the high tax rate. If such voters form a decisive coalition, they face a collective action problem: they would be best off voting for high tax rate but it is individually rational to not face the reality and to identify with the low tax policy to enjoy anticipation. Thus, a policy trap, where a decisive coalition of voters votes against the high tax rate while collectively preferring to vote and induce the low tax rate, may arise.

I further show how such policy traps are more likely when voters value the meanings of their votes, do not perceive their votes as pivotal, and perceive the voters of different parties as very different. Thus, political campaigning that focuses on policy and on the importance of voting in determining policy makes policy traps less likely while political campaigning focusing on the political identification aspect of voting and frames voters of different parties in extreme ways makes policy traps more likely.

My exploration of these ideas proceeds as follows: The next section positions this work into the literature and highlights contributions. Section 3 lays out the model. The voting rules and their responses to changes in model parameters are studied in Section 4. Section 5 derives the relevant measure of individual demand for redistribution that can be aggregated in Section 6. Section 7 studies welfare and Section 8 concludes. All lemmata and proofs of propositions and lemmata are in the Appendix.

2 Related Literature

Voting for redistribution has been an object of formal modeling since the contributions of Romer (1975) and Meltzer and Richard (1981).[1] In the simplest model, below mean income voters vote for high redistribution and above mean voters vote for low redistribution. With a right-skewed income distribution, the decisive median voter is among the below mean income voters. The poor are thus in majority and, hence, in a position to expropriate the rich. Later work has attempted to explain what restricts the demand for redistribution among the below mean income voters. Explanations most closely related to this paper are prospects of upward mobility, biased beliefs and social identity.

In terms of the structure of the economy, polity and policy preferences, this paper relates to the models of income mobility (Hirschman & Rothschild, 1973; Bénabou & Ok, 2001) where voters vote for a redistributive policy that will apply to their future incomes. Currently poor voters may vote against redistribution in the expectation of upward income mobility. Bénabou and Ok (2001) show that a majority of voters with rational expectations caring only about their after tax income may, given, a strictly concave income transition function prefer low taxation. This restrictive class of income

[1] Harms and Zink (2003), Borck (2007), Alesina and Giuliano (2011), Acemoglu, Naidu, Restrepo, and Robinson (2015), Gallice (2018) and Bellani and Ursprung (2019) review this literature.

dynamics has lead to critique of this model as an explanation of the prospects of upward mobility hypothesis (Alesina & Giuliano, 2011), and, it has been suggested that overoptimism may be more plausible an explanation (Alesina, Glaeser, & Sacerdote, 2001; Alesina & Glaeser, 2004; Alesina & Giuliano, 2011). Indeed, the perceived and actual prospects of upward mobility have been observed to diverge (Alesina, Stantcheva, & Teso, 2018).

In terms of enriching the utility of voters to contain their beliefs, this paper relates to a recent public choice literature that has connected systematic biases in beliefs and voting. Minozzi (2013) models how endogeneous overoptimism over future income decreases the demand for redistribution. In this model, anticipation of future income motivates overly optimistic beliefs but optimism is restricted by its influence on voting behavior: too much optimism leads to economically suboptiomal choices in the voting booth. Minozzi's model takes thus the uncomfortable view that people condition their general hopes of future on their voting. Instead, I model voting as a tool for belief management conditioning voting on the hopes of future: voting serves the general outlook voters have for their future rather than the reverse.

In terms of the interpretation of voting as identification, closely related are also models of social identity. In Shayo (2009), voters choose a group identity prior to voting. Group identity manifests as internalization of the group status and status is modeled as the average payoff in group. If the status of the poor detoriate shifting identification from the poor to the broader group of nation may be attractive to the poor as this identification provides higher status. Such a shift in identification then decreases demand for redistribution. In Shayo (2009), identity is modeled as preference based: identity corresponds to preferences, identity is what is valued. Here, identity is modeled as belief based: identity is a belief about oneself.[2]

In all these models, preference or belief formation or identification occur prior to voting, policy preferences coincide with voting preferences, and the role of voting is solely to aggregate policy preferences. The act of voting itself is left implicit. That is, the approach to voting in the literature on redistributive preferences has been instrumental: Voters vote for the policy that they expect to leave them best off and they vote as if they were pivotal. Voting amounts to honestly reporting policy preferences.

Another approach to voting is expressive voting: voters rather than being motivated by inducing their preferred policy outcome are motivated by more direct benefits that flow from the act of casting a vote itself (Brennan & Lomasky, 1997; Brennan & Hamlin,

[2]There has been a shift in modeling status, esteem and identity from preference based models (Akerlof & Kranton, 2000; Shayo, 2009) to belief based models (Bernheim & Thomadsen, 2005; Bénabou & Tirole, 2006, 2011). For the distinction between preference based and belief based models of identity, see Charness and Chen (2020).

1998; Hamlin & Jennings, 2018). An often suggested source of expressive benefits is confirming or managing identity: Schuessler (2000) defines the content of expressive benefits to be the identification with the other voters making the same voting choices. Hillman (2010) defines expressive benefits arising from the self-interested confirmation of one's identity. Hamlin and Jennings (2011) pinpoint the expressive benefits to flow from the vote's "*symbolic or representational aspect, [...] from its meaning*" (p. 649).

Following Bernheim and Thomadsen (2005) and Bénabou and Tirole (2006, 2011), I model expectations or identity management as self-signaling. Bernheim and Thomadsen (2005) model the appeal of diagnostic actions as a signaling game between temporal selves with self-signaling motivated by anticipatory utility. In their model, actions correlate (in equilibrium) with some random variables of whose realizations agents know as they are choosing their actions but forget later on when anticipating the outcomes of these actions. Knowing that the actions will, at a later date, be used to infer about the underlying random variable that also correlates with the outcomes, agents are motivated to choose actions that lead to desired inferences. In the honor-stigma model of Bénabou and Tirole (2006), agents' choices are motivated by status which directly depends on observer's posterior belief of agent's type. In Bénabou and Tirole (2011), identity is modeled as agent's posterior belief about her own type and agents care about their identity directly or by anticipating the outcomes their believed type expects.

These models are signaling games with continuous sender type and binary signal with the optimal sender strategy characterized as a threshold rule. There is thus partial pooling and the type distribution determines the payoffs. A comparative static effect of interest is then to study how sender's signaling incentives and the demand for signals depend on the distribution of sender types. Such distributional comparative static effects have recently been studied by Adriani and Sonderegger (2019). They find that an increase in the dispersion of the type distribution can either decrease or increase the demand for signals depending on the signaling strategy: While the effect on signaling strategy is unambiguous, the change in type distribution changes the demand for signals mechanically and the resulting composition effect may either dampen or reinforce the effect of a change in signaling strategy. I extend their results by considering a population of senders that in addition to their private type are heterogeneous in an observable parameter. This results in heterogeneity in signaling strategies such that in the population of senders there are both negative and positive demand effects. I show how the ambiguous effects in such a population can aggregate to an unambiguous aggregate demand effect.

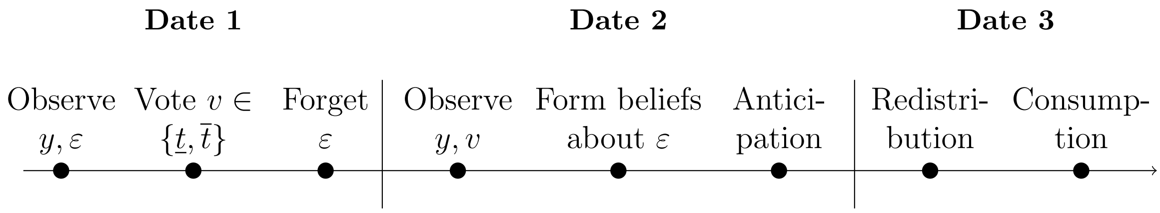

Figure 1: Timeline.

3 The Model

Consider a model of voting for redistributive policy to be applied in future under uncertainty about future income. Voting takes place at date 1. At date 2, voters anticipate their date 3 consumption. At date 3, future incomes realize, are redistributed, and consumed. The timeline is depicted in Figure 1.

3.1 Income Dynamics

At dates 1 and 2, a voter earns current income y distributed G with support Y. Each voter knows and can observe their current income in all dates. At date 3, voter's income changes by ε such that at date 3 the voter earns $y + \varepsilon$. These income shocks are independent across voters and represent increases in idiosyncratic productive ability such as career advancement or (un)successful entrepreneurial activity or more exogenous life events such as health problems or job loss. The process that generates the changes in incomes is represented by mean zero distribution F with support $[\underline{\varepsilon}, \bar{\varepsilon}]$ with $\underline{\varepsilon} \leq 0 \leq \bar{\varepsilon}$ and with continuously differentiable strictly log-concave density f. The zero prior expectations of income changes normalize aggregate income growth to zero. While the distribution F is known to voters only the first moment of distribution G is known to voters.

More generally, G is the distribution of the deterministic part of date 3 income: the transition function mapping current incomes to future incomes can more generally be defined as $\phi(y) + \varepsilon$, where ϕ is increasing. The distribution of current incomes y would then satisfy $\phi(y) \sim G$. If ϕ is concave it reduces the skewness of income distribution. As the analysis focuses on weakly right-skewed income distributions G, assuming that ϕ is an identity function is without loss of generality as long as y is distributed right-skewed enough for $\phi(y)$ to be distributed weakly right-skewed. Also, as noted by Bénabou and Ok (2001), with concave ϕ we have $\int \phi(y)dG(y) \leq \phi(\int y dG(y))$ and so a mean current income voter expects weakly above mean income in future. Thus, concavity of ϕ decreases the demand for redistribution and the demand for redistribution derived for linear ϕ is thus the upper bound in the class of concave transition functions.

Furthermore, with linear ϕ, none of the results here are driven by the mechanism studied by Bénabou and Ok (2001).

3.2 Information

Each voter perfectly observes her ε at date 1 before voting. With risk neutrality, the assumption of noiseless information at date 1 is without loss of generality as ε can be interpreted as the expected income change. However, a key assumption in the model is that voters have limited knowledge of their lifetime income when forming their future income and consumption expectations at date 2. This limited knowledge is modeled as imperfect information about ε at date 2. That is, voters' recall is imperfect and, after the election, they lose the information about their date-3-income changes ε.

This gain and loss of information captures two necessary characteristics of a rational choice theory of self-signaling. First, a voter who knows her (expected) income change, knows the true (expected) consequences of her vote. Such a voter thus knows the price of self-signaling and is able to trade material utility to utility from signaling.[3] The observability of ε at date 1 can be interpreted as voter's estimation of her idiosyncratic mobility prospects based on, say, stories or observations of upward or downward mobility of relatable people or early perceptions of abilities or skills relative to others, existing networks and connections or economic conditions. The accuracy of such an estimation reflects the rational voter's best efforts to assess the consequences of her voting. However, unbiased posterior expectation of ε at date 1 is without loss of generality. Biased information about ε would simply amount to the voter being wrong about the cost of self-signaling and experiencing unexpected consumption utility at date 3.

Second, if the voter remembered her ε at date 2, then voting would not be informative of ε and there could not be self-signaling. Imperfect recall of ε is thus an essential assumption in a model of self-signaling. Forgetting ε should be interpreted as malleability of beliefs and expectations: ε is voter's assessment of her future income expectations at one point in time and such an assessment is not verifiable at later time. Rather, when forming beliefs at date 2, voting provides a stronger signal than any recollections of past expectations of future incomes. Forgetting of ε may also be motivated since belief manipulation has benefits and beliefs can only be manipulated if there is imperfect recall. Recall of ε could be modelled as probabilistic as well, but as will be shown in Section 3.4, forgetting ε with certainty is without loss of generality.

[3]This is also the crux in Caplan's (Caplan, 2001a, 2001b) model of *rational irrationality* where a rational agent knows the price of her irrationality which depends on the true state of the world.

3.3 Polity and Policy Preferences

At date 1, two distinct policy platforms restricted to linear income tax rates with lump-sum transfers are proposed. One party proposes a low tax rate $\underline{t}$; the other a high tax rate $\bar{t}$ with $\underline{t} < \bar{t}$. Then all voters vote. The redistribution policy chosen will be in place at date 3. Voters may not perceive themselves as pivotal: By voting for $v \in \{\underline{t}, \bar{t}\}$ voter induces a perceived probability distribution over election outcomes $((\bar{t}, q(v)), (\underline{t}, 1 - q(v)))$ with $q(\bar{t}) > q(\underline{t})$ such that voting for high tax rate increases the perceived probability of the implementation of high tax rate. The degenerate specification $q(\bar{t}) = 1$, $q(\underline{t}) = 0$ nests the case where the voter perceives herself as decisive. The policy outcome is revealed immediately after the election.

Since the current income distribution G is unkown to voters, they cannot exactly predict the policy outcome in equilibrium. If G was known to voters, they could, knowing G, F, and the equilibrium voting strategies, correctly predict the equilibrium policy implying $q(\bar{t}) = q(\underline{t})$.[4] Thus, voters not knowing G merely ensures that the voters do not know the winner of the election.

At date 3, the income changes realize, income is redistributed and all disposable income is consumed. Saving is not allowed and if policy t is implemented risk neutral voters derive utility linearly from the consumption of their after-tax income:[5]

$$u(t, y, \varepsilon) = (1 - t)(y + \varepsilon) + t\bar{y}, \tag{1}$$

where the mean income at date 3

$$\bar{y} := \int_{y \in Y} \left(y + \int_{\underline{\varepsilon}}^{\bar{\varepsilon}} \varepsilon dF(\varepsilon) \right) dG(y) = \int_{y \in Y} y dG(y) \tag{2}$$

is the tax base.[6]

Casting vote v induces expected benefit over electoral outcomes

$$U(v, y, \varepsilon) = q(v)u(\bar{t}, y, \varepsilon) + (1 - q(v))u(\underline{t}, y, \varepsilon). \tag{3}$$

I do not model the electoral competition but take the policy platforms as exogenous. This deviates from the applications of the median voter theorem where the offered

[4]In the unique exception occurs when exactly half of the electorate votes for high tax rate, and the tie-breaking rule is to choose high tax rate, such that we have $q(\bar{t}) = 1$, $q(\underline{t}) = 0$ for voters voting for high tax rate.

[5]Risk aversion would induce a demand for redistribution in the form of insurance against downward mobility. To focus on the effects of self-signaling, risk neutrality is assumed.

[6]With exogenous income, taxation does not have distortionary effects and wastage of taxation would simply shift the demand for redistribution downwards and is ignored here for clarity.

platforms respond to voters' preferences and are driven toward the median voters' bliss points as a result of Downsian electoral competition (Black, 1948; Downs, 1957). First, in focusing on modeling voting, distinct policy platforms give voters a nontrivial choice. The announced policy platforms create the voting choice set $\{\underline{t}, \overline{t}\}$. Crucially here the set of policy platforms is also the set of possible signals for the voters. Converging electoral competition would collapse the set of possible signals into a singleton making self-signaling trivially uninformative in equilibrium. Thus, in Downsian equilibrium, voting cannot be informative of policy preferences. Second, an election with distinct policy platforms is not an unrealistic assumption as the Downsian electoral convergence is rarely observed in reality. The two tax rates can more generally be interpreted to refer to the general party programmes or ideologies of the two parties with respect to the desired extent of redistribution. In the absence of credible commitment to platforms these are the platforms voters expect the parties to implement if elected.

3.4 Voting Preferences

At date 2, voters experience a flow anticipatory utility when expecting their future consumption. The total utility of voter (y', ε') who votes for tax rate v is

$$V(v, y', \varepsilon') = sE[U(v, y', \varepsilon)|v, y'] + \delta U(v, y', \varepsilon'), \tag{4}$$

where $\delta > 0$ weights consumption and $s \geq 0$ is the preference parameter measuring the value of anticipation. The flow consumption utilities of dates 1 and 2 are dropped as exogenous additive terms. The latter also means that we could, without loss of generality, allow the voter's income to change at the date 2 as well if this income change is not informative of the income change at date 3. This is natural if we interpret date 2 and the anticipatory utility to flow immediately after voting while the future date 3 is further away in the voter's timeline.

The income expectations at date 2 are conditional on the voting choice v and not on the date-3-income change ε. Voting works as a self-signaling device: the exact motive of the vote, the expected date-3-income change ε, is not recalled and expectations are conditioned on the vote v instead. At date 1, voters fully know their types and, hence, their date-3 income. They, however, also know that their date-2 inference and, hence, anticipation is based on their voting choice but not on their current information about expected income change ε. That is, their anticipatory emotions at date 2 depend on their voting. This gives voting power as a tool for belief management.

Voters' recall of ε could be probabilistic as well, but the boundary case of always forgetting ε is without loss of generality. To see this, suppose voters forget ε only with probability ν. That is, with probability $1-\nu$, date 1 information is recalled and date 2 anticipation conditions on the date 1 information about ε. The total utility of voter (y', ε') who votes for tax rate v is then

$$V(v, y', \varepsilon') = \nu s E[U(v, y', \varepsilon)|v, y'] + [(1-\nu)s\delta]U(v, y', \varepsilon'). \tag{5}$$

Thus, the parameters s and δ in (4) capture the possibility of probabilistic recall in the sense that higher probability forgetting is equivalent to a decrease in s relative to δ.

4 Voting Behavior

Imperfect recall and self-signaling are modeled as a signaling game between the voter's temporal selves and each voter's voting behavior emerges as an equilibrium of such a game. I characterize the voting rules that the equilibria in the within voter signaling games imply and study how voting is affected by anticipation and the distribution of income shocks.

4.1 Voting Rule

The meanings of votes are determined by who votes for what and who votes for what is, in addition to economic interests, determined by the meanings of votes. Such interaction between voting behavior and meanings of votes is captured by Perfect Bayesian Equilibrium. Off-equilibrium-path beliefs are restricted by the divinity criterion D1 (Banks & Sobel, 1987; Cho & Kreps, 1987). Thus, off-equilibrium-path beliefs are assigned such that the deviator is believed to be the voter with the highest deviation payoff. Intuitively, for low income voters, a vote for low tax rate is a very favorable signal of high upward mobility and, for a high income voter, a vote for a high tax rate is a very menacing signal of downward mobility.

Let $\mathcal{M}_+$ denote the equilibrium meaning of a vote for low taxation and $\mathcal{M}_-$ the equilibrium meaning of a vote for high taxation. Given these meanings of votes the expected utility difference between voting for low taxation and high taxation $V(\underline{t}, y, \varepsilon) - V(\bar{t}, y, \varepsilon)$ is

$$s\left[(1-\underline{\tau})\mathcal{M}_+ - (1-\overline{\tau})\mathcal{M}_- - (\overline{\tau}-\underline{\tau})(\bar{y}-y)\right] - \delta(\overline{\tau}-\underline{\tau})(\bar{y}-y-\varepsilon), \tag{6}$$

where $\underline{\tau} := q(\underline{t})\bar{t} + (1-q(\underline{t}))\underline{t}$ is the expected tax rate having voted for low tax rate $\underline{t}$ and $\overline{\tau} := q(\bar{t})\bar{t} + (1-q(\bar{t}))\underline{t}$ is the expected tax rate having voted for high tax rate $\bar{t}$.

For each income y, voting behavior is described by a mapping from the set of potential income changes $[\underline{\varepsilon}, \overline{\varepsilon}]$ to the set of possible votes $\{\underline{t}, \overline{t}\}$. The expected utility difference (6) is clearly strictly increasing in ε. Hence, we focus on finding monotonic mappings such that the binary choices can be characterized by thresholds $\varepsilon^*(y)$ such that expected income changes $\varepsilon < \varepsilon^*(y)$ map to $\overline{t}$ and expected income changes $\varepsilon \geq \varepsilon^*(y)$ map to $\underline{t}$. These voting strategies determine the meanings of votes as $\mathcal{M}_+(\varepsilon') := E[\varepsilon|\varepsilon \geq \varepsilon']$ for $\varepsilon' \in [\underline{\varepsilon}, \overline{\varepsilon})$ and $\mathcal{M}_-(\varepsilon') := E[\varepsilon|\varepsilon < \varepsilon']$ for $\varepsilon' \in (\underline{\varepsilon}, \overline{\varepsilon}]$. To implement D1, define $\mathcal{M}_+(\overline{\varepsilon}) := \overline{\varepsilon}$ and $\mathcal{M}_-(\underline{\varepsilon}) := \underline{\varepsilon}$. These meanings arise as the voters, under uncertainty about their future incomes, form their expectations about future consumption and look back to their voting knowing that it is generally the voters with good prospects that vote for low taxation and vice versa. These meanings thus arise due to imperfect recall of ε.

Write the marginal type's expected utility difference between voting for low taxation and high taxation as

$$\Psi(\varepsilon; y) := s[(1-\underline{\tau})\mathcal{M}_+(\varepsilon) - (1-\overline{\tau})\mathcal{M}_-(\varepsilon)] + \delta(\overline{\tau} - \underline{\tau})\varepsilon - (s+\delta)(\overline{\tau} - \underline{\tau})(\bar{y} - y). \quad (7)$$

In an interior equilibrium, the marginal type is indifferent and for all current incomes y the equilibrium threshold $\varepsilon^*(y)$ is defined by $\Psi(\varepsilon^*(y); y) = 0$.

Assumption 1. $\delta(1-\underline{\tau}) > (s+\delta)(1-\overline{\tau})$.

Assume Assumption 1 throughout the text unless otherwise mentioned. Assumption 1 is sufficient to ensure that Ψ is increasing as shown by Lemma 2 and thus that for all y, $\varepsilon^*(y)$ is unique. Assumption 1 sets limits to how strong the signaling concerns are relative to economic concerns. Since $q(\overline{t}) > q(\underline{t})$ we have $\overline{\tau} > \underline{\tau}$ and there are positive values of s such that Assumption 1 holds.

Proposition 1 (Voting Behavior). *For all y, there exists a unique equilibrium characterized by a threshold $\varepsilon^*(y)$ such that voters with $\varepsilon \geq \varepsilon^*(y)$ vote for low tax rate $\underline{t}$ and voters with $\varepsilon < \varepsilon^*(y)$ vote for high tax rate $\overline{t}$. For voters with income $y > y^H$, $\varepsilon^*(y) := \underline{\varepsilon}$, and they always vote for low taxation; for voters with income $y < y^L$, $\varepsilon^*(y) := \overline{\varepsilon}$, and they always vote for high taxation; for voters with income $y \in [y^L, y^H]$, $\varepsilon^*(y)$ is defined by $\Psi(\varepsilon^*(y); y) = 0$, where*

$$y^L := \bar{y} - \frac{\overline{\varepsilon}}{s+\delta}\left(\delta + s\frac{(1-\underline{\tau})}{(\overline{\tau}-\underline{\tau})}\right) \quad \text{and} \quad y^H := \bar{y} + \frac{|\underline{\varepsilon}|}{s+\delta}\left(\delta - s\frac{(1-\overline{\tau})}{(\overline{\tau}-\underline{\tau})}\right), \quad (8)$$

where $y^L < \bar{y}$ always and $\bar{y} < y^H$ if and only if Assumption 1 holds. The threshold income change $\varepsilon^*(y)$ decreases in y on $[y^L, y^H]$ and is constant otherwise.

The voting rule partitions the electorate into two groups: the group of voters with high future incomes and the group of voters with low future incomes. A voter's consumption expectations are based on her vote and on the consumption expectations of voters who vote like her. If she votes for high taxation, a consistent belief with this action is to that she is among those voters who will benefit from high taxation and high transfers, that is, among those voters who expect low incomes. If she votes for low taxation, a belief consistent with this behavior is that she will be among the voters who benefit from low taxation, that is, among those voters with high future incomes and consumption.

Since future beliefs are influenced by current actions, current actions provide a way to manage future expectations. Clearly, the types expecting above mean incomes at date 1 vote for low taxation as it is in their interest to do so both with respect to consumption and anticipatory utility. The voters expecting below mean incomes face a trade-off: voting for high redistribution will later on result in inference of low income and consumption expectations which brings little utility in anticipation. On the other hand, high redistribution is in their economic interest. Voting for low redistribution allows the low income types to infer at date 2 that they are going to have high consumption which brings them more anticipation relative to voting for high taxation. However, by voting for low redistribution the low income types contribute to the popularity of a policy that is not in their economic interest. The threshold $\varepsilon^*(y)$ determines the lower bound for the expected income changes for which self-signaling concerns dominate the economic concerns. Whenever the expected income change is below $\varepsilon^*(y)$, the potential economic loss in the form of lower taxation outweights any signaling benefits.

Voters with incomes high enough relative to their possibilities of downward mobility always vote for low taxation. Voters with incomes low enough relative to their possibilities of upward mobility always vote for high taxation. These voters who pool on either of the voting choice have no uncertainty regarding whether they will be better off with low or high taxation at date 3.

Proposition 1 establishes a correlation between voting for redistribution and mobility prospects: those who vote for low redistribution expect higher future incomes than those who vote for high redistribution. A correlation with self-reported demand for redistribution and mobility prospects has been documented, for instance, by Ravallion and Lokshin (2000), Corneo (2001), Corneo and Grüner (2002), and Alesina and La Ferrara (2005). These studies use a theory of instrumental voting to interpret the causality to run from mobility prospects to demand for redistribution. In contrast, Proposition 1 suggests that there are theoretical reasons to interpret the causality to run to the other direction as well: Voting may influence the perceived mobility prospects.

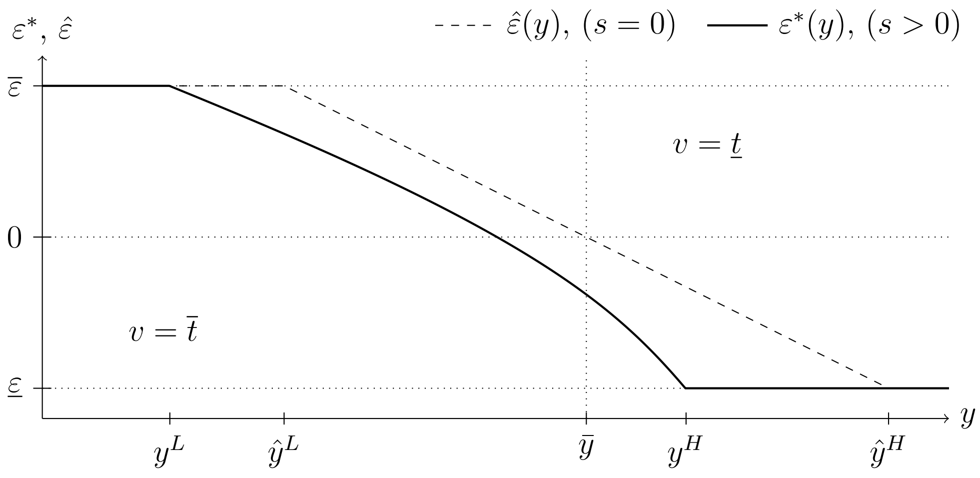

Figure 2: The threshold expected change in income as a function of current income.

4.2 Anticipation

With anticipatory utility, the income shock threshold required to vote for low taxation is strictly lower than in the case of no anticipation:

Proposition 2. *Assume $\underline{\varepsilon} < 0 < \overline{\varepsilon}$. For $s = 0$, $\varepsilon^*(y) = \hat{\varepsilon}(y) := \bar{y} - y$, $y^L = \hat{y}^L := \bar{y} - \overline{\varepsilon}$ and $y^H = \hat{y}^H := \bar{y} - \underline{\varepsilon}$. For $s > 0$, $\varepsilon^*(y) \in [\underline{\varepsilon}, \hat{\varepsilon}(y))$, $y^H < \hat{y}^H$ and $y^L < \hat{y}^L$. An increase in s strictly decreases the threshold ε^* for $y \in [y^L, y^H]$ and has no effect otherwise, decreases y^H, and decreases y^L.*

Anticipatory utility creates the demand for self-signaling. Without anticipatory utility, voting preferences coincide with policy preferences. With anticipatory utility, self-signaling motives of voting shift the threshold voting rule downward and some voters who prefer high redistribution vote for low redistribution. The value of self-signaling increases in the value of anticipation and higher value of anticipation decreases the threshold income shock that determines the vote. Also, the more a voter values anticipation, the lower are the pooling thresholds. Figure 2 visualises: The dashed line depicts the voting strategy in the absence of anticipatory concerns $\hat{\varepsilon}$. The thick solid line depicts the threshold as a function of income in the presence of anticipation ε^*. The voters $(y, \varepsilon) \in \{(y, \varepsilon) : \varepsilon^*(y) < \varepsilon < \hat{\varepsilon}(y)\}$ between the two lines are motivated by self-signaling concerns to change their vote or party affiliation from high tax rate to low tax rate. Thus, these voters choose apparently or economically dominated actions and thus seem to vote against their best interest.

Imperfect recall is necessary for the voting rule to depend on anticipation. With perfect recall, the relative payoff from voting for low taxation rather than high taxation is, $-(s+\delta)(\overline{\tau} - \underline{\tau})(\bar{y} - y - \varepsilon)$, producing the exact same voting rule $\hat{\varepsilon}$ as the case without anticipation.

4.3 Income Risk

The economic environment that defines a voter's economic opportunities, mobility and the degree of risk is represented by the distribution of income shocks F. This distribution does not need to represent the actual possibilities for income mobility but may be more loosely interpreted as measuring the perceived possibilities for income mobility. Thus, allowing heterogeneity, the measure of economic opportunities F can, for instance, be interpreted as being an outcome of learning (Piketty, 1995), individual histories (Alesina & Giuliano, 2011; Giuliano & Spilimbergo, 2014) or perceptions of economic fortunes of others (Hirschman & Rothschild, 1973). A comparative static effect of interest is that of an increase in income risk. Top incomes have increased (Atkinson, Piketty, & Saez, 2011; Piketty & Saez, 2014) whereas the risks in the low end of income distribution have increased (Kalleberg, 2003).

To study the changes in income risk, scale the date-3-income shock ε by factor $\sigma \in \mathbb{R}_{>0}$ such that the income change $\sigma\varepsilon$ is generated by

$$\sigma\varepsilon \sim F\left(\frac{\varepsilon}{\sigma}\right), \quad \sigma\varepsilon \in [\sigma\underline{\varepsilon}, \sigma\overline{\varepsilon}].$$

An increase in income risk is then defined as an increase in σ. Restricting the changes in the distribution to within the scale-family does not, in any way, restrict the original distribution. Proposition 3 states the effect of an increase in risk on voting rule.

Proposition 3. *Assume $\underline{\varepsilon} < 0 < \overline{\varepsilon}$. If and only if $s > 0$, an increase in income risk σ strictly decreases the threshold $\varepsilon^*(y)$ for $y \in [y^L, y^H]$ and has no effect otherwise. An increase in income risk decreases y^L, and increases y^H for all $s \geq 0$.*

The effect of income risk on the voting strategies for a discrete change in σ is depicted in Figure 3. Proposition 3 can be understood as two separate effects: a decrease in $\mathcal{M}_-$ and an increase in $\mathcal{M}_+$. First, as the left tail of future income distribution grows longer and fatter the prospects of downward mobility become more menacing. Anxiety about these increased risks increases the value of expressing good prospects and makes self-signaling more attractive. The deteriorating prospects of downward mobility makes the voters want to look away and focus more on the prospects of upward mobility. Identifying with the voters who prefer the low tax rate achieves this.

This mechanism provides an explanation for the *negative exposure effect* first empirically documented by Luttmer (2001). He finds that an increase in the welfare recipiency rate in a survey respondent's area decreases her support for welfare spending. Sands (2017) randomizes passersby's exposure to poverty before asking for a support for a tax for the wealthy and identifies a causal link between such exposure and decreased support for redistribution. Proposition 3 suggests that the perceived increased likelihood of low incomes motivates identification and behavior consistent with the belief of not needing to rely on welfare oneself. Stronger identification with the party that supports low welfare and lower demand for redistribution results.

The effect of increasing lower tail risk also proposes an explanation for the diverging policy preferences of the middle class and the poor. This has previously been explained as a growing social distance between the middle class and the poor (Lupu & Pontusson, 2011). This social affinity hypothesis suggests that the middle class is willing to support redistribution when they are socially close to the beneficiaries of redistribution. An increasing social distance between the middle class and the poor then decreases the support for redistribution in the middle class. The mechanism here does not rely on other-regarding preferences but is an affective reaction of "wanting to look away" as the economic outcomes of the poor deteriorate. By giving support for low taxation, the middle class voter identifies herself with the more desirable economic opportunities of upward mobility and distances herself from the outcomes of the poor.

Second, as the right tail of future income distribution grows longer and fatter the prospects of upward mobility become more lucrative and the anticipation of these possibilities becomes more attractive making signaling good prospects more valuable. When the expected incomes in the group of voters who vote for low taxation increase identification with this group becomes more attractive. Such a mechanism has gained evidence in laboratory: Mijović-Prelec and Prelec (2010) and Coutts (2019) find that the larger the prizes rewarded if an event occurs, the more optimistic subjects are about the occurence of the event. In the experiement of Mijović-Prelec and Prelec (2010), the optimism was mediated by increased attempt to self-signal.

Also note how, by Proposition 1, with no income mobility, without risk, that is, for $\underline{\varepsilon} = \overline{\varepsilon} = 0$, we have $\bar{y} = y^L = y^H$. That is, voters with above mean income always vote for low taxation and voters with below mean income always vote for high taxation reproducing the static benchmark model.

5 Demand for Redistribution

I now characterize the demand for redistribution of a voter with income y given the process that generates income mobility F. This measure of demand for redistribution can be interpreted either as the ex ante probability of a voter voting for high redistribution before the realization of income shock ε or, with an infinite number of voters, as the share of voters with income y that vote for high redistribution.

The voting of a voter with income y emerges as the equilibrium-path behavior of the

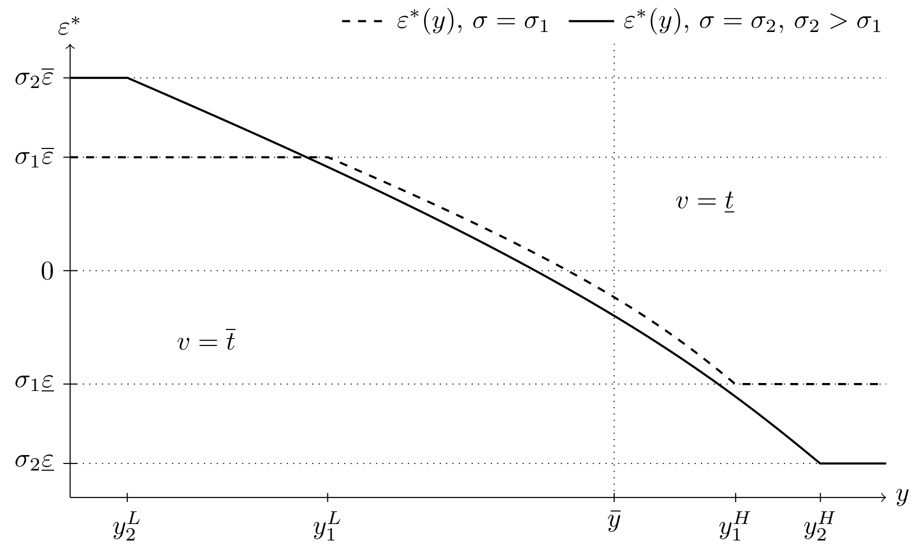

Figure 3: The threshold expected change in income as a function of current income.

within voter signaling game studied in Section 4. A voter with income y votes for high taxation if and only if an income expectation below the threshold $\varepsilon^*(y)$ realizes. Thus, the probability that a voter with income y votes for high tax rate is $Pr[\varepsilon < \varepsilon^*(y)] = F(\varepsilon^*(y))$. Define the demand for redistribution h for a voter with income y as

$$h(y) \coloneqq F(\varepsilon^*(y)). \tag{9}$$

For voters with $y \leq y^L$, $F(\varepsilon^*(y)) = F(\overline{\varepsilon}) = 1$, for voters with $y \geq y^H$, $F(\varepsilon^*(y)) = F(\underline{\varepsilon}) = 0$, and for voters with $y \in (y^L, y^H)$, $F(\varepsilon^*(y)) \in (0, 1)$. In the absence of income mobility, $\underline{\varepsilon} = \overline{\varepsilon} = 0$, we have $y^L = y^H = \bar{y}$ and the demand for redistribution is 1 for $y < \bar{y}$ and 0 for $y > \bar{y}$. The expression of the demand for redistribution (9) thus neatly captures how income mobility decreases the correlation between current income and demand for redistribution.

As F is increasing, all comparative static effects of demand for redistribution that keep F fixed inherit their signs from the corresponding effects on the voting rules. Thus, voter's demand for redistribution is decreasing in current income y by Proposition 1 and in the value of anticipation s by Proposition 2.

In contrast, in case of changes in the distribution of income shocks F there are also composition effects. The vote share that the high tax rate receives depends, in addition to the distribution of income, on the distribution of income prospects among the voters. The interim comparative statics results studied in the previous section do not take into account that as the distribution of date-3-income shocks changes, the realized income prospects in the electorate change as well shifting the demand for redistribution also in the absence of behavioral effects. Looking at Figure 3, when we scale F with σ_2 instead of $\sigma_1 < \sigma_2$ there are new types of voters with $\varepsilon \in [\sigma_1\underline{\varepsilon}, \sigma_2\underline{\varepsilon}]$ and $\varepsilon \in [\sigma_1\overline{\varepsilon}, \sigma_2\overline{\varepsilon}]$ whose contributions to demand for redistribution we have to take into account.

To take this compositional change in the electorate's expected income dynamics into account, let

$$h(y, \sigma) := F\left(\frac{\varepsilon^*(y)}{\sigma}\right) \tag{10}$$

denote the demand for redistribution of a voter with income y given the scaling σ of income shocks. The total effect of a change in income risk on the demand for redistribution consists of a mechanical effect caused by a change in the composition of future incomes and a behavioral effect of each voter type changing her voting behavior. This decomposition can be written as:

$$\frac{\partial}{\partial\sigma}h(y,\sigma) = \frac{d}{d\sigma}F\left(\frac{\varepsilon^*}{\sigma}\right) = \underbrace{f\left(\frac{\varepsilon^*}{\sigma}\right)\frac{1}{\sigma}\frac{\partial\varepsilon^*}{\partial\sigma}}_{\text{Self-signaling effect}} - \underbrace{f\left(\frac{\varepsilon^*}{\sigma}\right)\frac{1}{\sigma}\frac{\varepsilon^*}{\sigma}}_{\text{Composition effect}}. \tag{11}$$

Clearly, the self-signaling effect in (11) is always negative as $\partial\varepsilon^*/\partial\sigma < 0$ by Proposition 3. However, as the threshold ε^* may be positive or negative, the composition effect in (11) maybe be positive or negative. Specifically, as ε^* is large and positive for low income voters, it seems that (11) is unambiguously negative for low income voters. However, for high income voters ε^* is small and negative and thus the sign of (11) is ambiguous.

Formally, evaluating, without loss of generality, (11) at $\sigma = 1$, and noting that, $\Psi_\sigma + \Psi'\varepsilon^* = \Psi(\varepsilon^*(y), \bar{y}) = \Psi_y(\bar{y} - y)$, where details of the first equality are shown in Appendix and the second inequality follows from the definition of $\varepsilon^*(y)$, we have

$$\begin{aligned} f(\varepsilon^*)\left(\frac{\partial\varepsilon^*}{\partial\sigma} - \varepsilon^*\right) &= f(\varepsilon^*)\left(-\frac{\Psi_\sigma + \Psi'\varepsilon^*}{\Psi'}\right) = -f(\varepsilon^*)\frac{\Psi(\varepsilon^*;\bar{y})}{\Psi'} \\ &= -f(\varepsilon^*(y))\frac{\Psi_y}{\Psi'}(\bar{y} - y) = (\bar{y} - y)\frac{d}{dy}F(\varepsilon^*(y)). \end{aligned} \tag{12}$$

Thus, the effect is proportional to the income effect and the sign of the effect changes at $y = \bar{y}$. Proposition 4 states the effect of an increase in income risk on the individual demand for redistribution.

Proposition 4. *The demand for redistribution $h(y)$ strictly decreases in income risk for all $y \in [y^L, \bar{y})$ and strictly increases in income risk for all $y \in (\bar{y}, y^H]$ and has no effect otherwise.*[7]

[7]Note that $\bar{y} < y^H$, i.e. $(\bar{y}, y^H]$ is non-empty if and only if Assumption 1 holds.

For voters with below mean current income, self-signaling effect dominates the composition effect and their demand for redistribution decreases in income risk. For voters with above mean current income the new real prospects of downward mobility dominate the self-signaling effect and their demand for redistribution increases in income risk.[8]

It's noteworthy that an increase in income risk has an effect on the demand for redistribution also in the absence of anticipatory concerns. The composition effect alone changes the mobility prospects such that the demand changes by $-(\bar{y}-y)f(\bar{y}-y)$. An increased mobility makes it relatively more likely for below mean income voters to expect above mean incomes and above mean income voters to expect below mean incomes. Intuitively, keeping the threshold ε^* fixed, as σ approaches infinity, the demand for redistribution approaches $F(0)$ for all incomes. When income mobility is high enough, only future income matters when voting for redistribution. The nature of the composition effect is thus not to increase or decrease the demand for distribution but to reduce the correlation between current income and voting.

6 Aggregate Demand for Redistribution

The aggregate demand for high redistribution relative to low redistribution is defined as the sum over the individual demands for high redistribution relative to low redistribution. Equivalently, this is the probability that a randomly drawn voter (ε, y) votes for high redistribution. Let $H(\tilde{\varepsilon}) = \int_{y\in Y} F(\tilde{\varepsilon}(y))dG(y)$ be the fraction of voters voting for high redistribution given voting rule $\tilde{\varepsilon}$. The equilibrium aggregate demand for redistribution is

$$H := \int_{y\in Y} h(y)dG(y) = \int_{y\in Y} F(\varepsilon^*(y))dG(y) = \int_{\underline{\varepsilon}}^{\overline{\varepsilon}} G(y^*(\varepsilon))dF(\varepsilon), \tag{13}$$

where $y^* = (\varepsilon^*)^{-1}$ is a threshold on current income such that given an income shock ε voters with current income $y < y^*(\varepsilon)$ vote for high tax rate and otherwise they vote for low tax rate.[9] Thus for each ε, $G(y^*(\varepsilon))$ is the fraction of voters voting for high redistribution. In the absence of income mobility, $h(y)$ is either 0 or 1, and we have $y^*(\varepsilon) = \bar{y}$. The aggregate demand for redistribution is thus $G(\bar{y})$. Hence, the familiar results apply: if the income distribution is right skewed, median income is less than

[8] Proposition 4 is similar to Proposition 6 in Adriani and Sonderegger (2019). Here the cost of sending the favorable signal is endogenized in terms of current income. For voters with current income above mean, sending the favorable signal is intrinsically beneficial for the mean type $\varepsilon = 0$ and signaling demand effect is negative. For voters with current income below mean, sending the favorable signal is costly for the mean type $\varepsilon = 0$ and signaling demand effect is positive.

[9] More formally, since ε^*, by its definition, is not one-to-one at boundaries $\underline{\varepsilon}$ and $\overline{\varepsilon}$, define y^* as the inverse of ε^* on $\varepsilon \in (\underline{\varepsilon}, \overline{\varepsilon})$, $y^*(\overline{\varepsilon}) = y^L$, and $y^*(\underline{\varepsilon}) = y^H$.

mean income and $G(\bar{y}) > \frac{1}{2}$, that is, more than half of the voters vote for high tax rate.

For $s = 0$, and with income mobility, we have $y^*(\varepsilon) = \bar{y} - \varepsilon$ but the income threshold of voting for low taxation y^* still averages to mean income $\bar{y}$ in the electorate. How this affects the demand for redistribution is discussed below. For $s > 0$, $y^*(\varepsilon) < \bar{y} - \varepsilon$, for all ε, that is, the income threshold for voting for low tax rate shifts downwards. This decreases the aggregate demand for redistribution. As the demand for redistribution decreases in the value of anticipation s for all income levels, aggregate demand for redistribution decreases in s.

For $s = 0$, the voting preferences (4) coincide with the policy preferences. Thus, when $s > 0$, a fraction $H(\hat{\varepsilon})$ of the electorate prefers the high tax rate but only a fraction $H(\varepsilon^*) < H(\hat{\varepsilon})$ of the electorate votes for the high tax rate. With self-signaling concerns, voting does not aggregate policy preferences. Votes favoring redistribution fall short of the aggregate policy preference for redistribution and this limits the demand of redistribution. Moreover, if the coalition of voters $\{(y, \varepsilon) : \varepsilon^*(y) < \varepsilon < \hat{\varepsilon}(y)\}$ is decisive, that is, if $H(\varepsilon^*) < \frac{1}{2} < H(\hat{\varepsilon})$, then the policy preferred by minority gains majority of votes.

6.1 Income Risk

The effect of income risk on the demand for redistribution at each income level is ambiguous: some voters decrease while others increase their demand for redistribution. Hence, the interesting question is whether the sign of the aggregate demand effect can be determined.

Note first that, as shown in Lemma 4, the effect of an increase in income risk on aggregate demand for redistribution can be written as

$$\frac{d}{d\sigma} \int_{y \in Y} h(y, \sigma) dG(y) = \int_{y^L}^{y^H} \frac{d}{d\sigma} h(y, \sigma) dG(y). \tag{14}$$

The aggregate demand effect is thus the mean effect among the voters whose voting strategy is separating.

Note second that right-skewed current income distributions, where right skew is defined as mean exceeding median, weight the negative demand effects of below mean income voters heavier than symmetric distributions. Thus, considering only symmetric distributions gives us an upper bound of the aggregate demand effect in the class of weakly right-skewed income distributions.

Note third that, if the distribution of current incomes is skewed, an increase in income risk may change aggregate demand solely due to the composition effect. To see this, let $s = 0$ and consider some small amount of mobility $|\underline{\varepsilon}| = \overline{\varepsilon} = \varepsilon' > 0$. Now, if G is strictly unimodal and right-skewed such that its mode is strictly smaller than its mean then there is a ε'-neighborhood around its mean such that on this neighborhood the density of G is strictly decreasing. This means that G is strictly concave on ε'-neighborhood around $\bar{y}$ and thus by Jensen's inequality

$$H = \int_{-\varepsilon'}^{\varepsilon'} G(\bar{y} - \varepsilon) dF(\varepsilon) < G\left(\int_{-\varepsilon'}^{\varepsilon'} (\bar{y} - \varepsilon) dF(\varepsilon)\right) = G(\bar{y}), \tag{15}$$

where $G(\bar{y})$, as discussed above, is the demand for redistribution in the absence of income mobility. Hence, income mobility alone may decrease the aggregate demand for redistribution when the distribution of current incomes is right-skewed.[10] Intuitively, when there are more voters below mean income than above mean income, there are more voters to whom income mobility makes above mean future incomes possible than there are voters to whom income mobility makes below mean future incomes possible. If G is uniform, however, then G is affine and we have

$$\int_{-\varepsilon'}^{\varepsilon'} G(\bar{y} - \varepsilon) dF(\varepsilon) = G\left(\int_{-\varepsilon'}^{\varepsilon'} (\bar{y} - \varepsilon) dF(\varepsilon)\right) = G(\bar{y}), \tag{16}$$

and income risk has no effect on aggregate demand for redistribution without anticipatory concerns. Proposition 5 shows that with anticipatory concerns, aggregate demand for redistribution is nevertheless decreasing in income risk even when G is uniform.

Proposition 5. *Let G be uniform. Then the aggregate demand for redistribution H decreases in income risk σ.*

Income mobility has no effect on the aggregate demand for redistribution in the absence of anticipation also if F and G are symmetric, that is, the equality in (16) holds if both F and G are symmetric (see Lemma 5). Intuitively, when F and G are symmetric and there are no anticipatory concerns there is an equal measure of voters $(\hat{y}^L, \bar{y})$ on whose voting an increase in income risk has a negative effect as there are voters $(\bar{y}, \hat{y}^H)$ on whose voting an increase in income risk has a positive effect. As s increases, however, $\hat{y}^L$ and $\hat{y}^H$ decrease and thus the interval of voters with negative demand effects increases while the interval of voters with positive demand effects decreases. As s increases the interval (y^L, y^H) where voters separate in their voting strategies moves left. The aggregate demand effect of income risk (14), on the other hand, is the mean

[10]Note that the aggregate demand effect does not need to be monotone in ε': as noted above, $h \to F(0)$ and thus $H \to F(0)$ as $\varepsilon' \to \infty$. If $F(0) > G(\bar{y})$, then the aggregate demand for redistribution at the limit of infinite income mobility is larger than in the absence of income mobility.

effect among the voters whose voting strategy is separating. Proposition 6 considers a case where F and G are symmetric.

Proposition 6. *Let F be uniform with support $[-\bar{\varepsilon}, \bar{\varepsilon}]$ and G symmetric. Then the aggregate demand for redistribution H decreases in income risk σ.*

Proposition 4 concludes that as income risk, that is, the dispersion of F, increases, the demand for redistribution may either increase or decrease depending on income: for high income voters to whom sending the favorable signal of high expected future income is, on average, not costly, the demand for these favorable signals decreases; for low income voters to whom sending the favorable signals is, on average, costly, the demand for these favorable signals increases. Alternatively, the ambiguity of the demand effects can be stated in terms of signaling strategies: for voters with $\varepsilon^* < \varepsilon^*(\bar{y})$ the demand for favorable signals decreases as income risk increases and for voters with $\varepsilon^* > \varepsilon^*(\bar{y})$ the demand for favorable signals increases as income risk increases.

Propositions 5 and 6, however, show that, for a large class of distributions F and G, the aggregate demand effect in a population with heterogeneity in signaling strategy, that is, in threshold ε^*, is unambiguous. This finding adds to the results of Adriani and Sonderegger (2019). They study how the demand for favorable signals responds to an increase in the dispersion of sender type distribution in a population of senders that is heterogeneous in their private type. However, often the senders are heterogeneous in an observable dimension such as direct signaling cost as well. Here such a dimension is the current income y. This makes the population of senders heterogenous in their signaling strategies ε^* such that there are both negative and positive signaling demand effects in the population. Propositions 5 and 6 show how the self-signaling effects can dominate the composition effects such that the aggregate effect is unambiguous.

Thus, when voters express their desires about their future incomes when voting an increase in income risk can decrease the aggregate demand for redistribution. Intuitively, the decomposition effects tend to cancel out resulting in no changes in the aggregate demand for redistribution while the self-signaling effects tend to increase the weight on negative income risk effects and decrease weight on positive income risk effects. This results in a decrease in the aggregate demand for redistribution.

This result relates to the literature that aims to understand why the positive relationship between income inequality and redistribution emerging from the simple models of redistribution (Meltzer & Richard, 1981) is often not observed in the data across countries (Alesina & Glaeser, 2004; Lindert, 2004) or within countries (Georgiadis & Manning, 2012; Rehm, Hacker, & Schlesinger, 2012; Korpi & Palme, 2003; Cavaillé & Trump, 2015). As income inequality has increased (Atkinson et al., 2011; Piketty &

Saez, 2014) the demand for redistribution has not followed or has decreased (Georgiadis & Manning, 2012; Rehm et al., 2012; Korpi & Palme, 2003; Cavaillé & Trump, 2015).

7 Welfare

The voters $(y, \varepsilon) \in \{(y, \varepsilon) : \varepsilon^*(y) < \varepsilon < \hat{\varepsilon}(y)\}$ take actions that do not maximize their consumption. However, such narrow definition of voters' best interest ignores their anticipatory utility. In assessing the welfare properties of voting behavior, we should take the enjoyment from anticipation into account. Are the voters $(y, \varepsilon) \in \{(y, \varepsilon) : \varepsilon^*(y) < \varepsilon < \hat{\varepsilon}(y)\}$ better off capturing more anticipation to themselves despite incurring losses in consumption? This, of course, depends on the policy outcome which is not determined here. However, it is clear that if the policy outcome is still high taxation, that is, if $H(\varepsilon^*) > \frac{1}{2}$, then these voters are better off as they do not incur the economic cost of their self-signaling. Thus, consider the case $H(\varepsilon^*) < \frac{1}{2}$ where the policy outcome is low taxation. Would these voters have been better off voting for high taxation if voting for high tax rate induced high tax policy?

Proposition 7. *If and only if $q(\bar{t}) - q(\underline{t}) < 1$ there exists a threshold $\varepsilon^{**} \in (\varepsilon^*, \hat{\varepsilon})$ such that the coalition of voters $\{(y, \varepsilon) : \varepsilon^*(y) < \varepsilon < \varepsilon^{**}(y)\}$, if decisive, that is, if $H(\varepsilon^*) < \frac{1}{2} < H(\varepsilon^{**})$, would be better off voting for high tax rate but votes for low tax rate. For all y, $\varepsilon^{**}(y) - \varepsilon^*(y)$ is increasing in s and σ.*

If voters perceived their pivotality $q(\bar{t}) - q(\underline{t})$ to be low there might be enough voters preferring both voting for high tax rate and high tax rate as a policy to form a coalition to induce a high tax policy. If this coalition of voters is decisive, that is if $H(\varepsilon^*) < \frac{1}{2} < H(\varepsilon^{**})$, then these voters would be able to improve their payoffs with a collective action of voting for high tax rate. However, they perceive the probability that their individual votes have an effect on policy to be small and thus face a collective action problem in a policy trap where it is individually rational to vote for low tax rate. Thus, if voters do not perceive themselves as pivotal a policy trap where a decisive coalition of voters votes against its best interest may arise.

Suppose on contrary that the voters perceive themselves to be pivotal such that $\varepsilon^{**} = \varepsilon^*$ and that $H(\varepsilon^*) < \frac{1}{2} < H(\hat{\varepsilon})$, that is, the coalition of voters $\{(y, \varepsilon) : \varepsilon^*(y) < \varepsilon < \hat{\varepsilon}(y)\}$ is decisive. While this coalition of voters prefers the high tax rate to be implemented it votes for the low tax rate. However, these voters would not be better off if they voted for low tax rate and thus are not voting against their interest. Hence, the role of pivotality is crucial since there may exist a decisive coalition of voters voting against their best interest if and only if $q(\bar{t}) - q(\underline{t}) < 1$, that is, voters do not perceive their votes to be fully pivotal.

Thus, when voters perceive themselves as pivotal, a policy preferred by minority may win the election, but the decisive voters are making the best choices for themselves. Any policy intervention aiming to influence their voting may decrease their welfare. However, if the voters do not perceive themselves as fully pivotal, it is possible that the decisive voters are trapped in a collective action problem. The latter is also more likely to happen when the perceived pivotality $q(\bar{t}) - q(\underline{t})$ is lower, when the weight on the meanings of votes s is larger and when σ is perceived larger. Again, since a change in σ also changes the fraction of voters within interval $(\varepsilon^*, \varepsilon^{**})$, an increase in $\varepsilon^{**} - \varepsilon^*$ does not imply an increase in the fraction of voters within $(\varepsilon^*, \varepsilon^{**})$. However, changes in the perceptions about σ do not have composition effects.

Political campaigning that emphasizes the policy and the importance of voting in determining the policy makes policy traps less likely. Political campaigning that emphasizes the meanings of votes and political identity by making s larger and that frames the voters of different parties in extreme ways increasing the perception of σ makes policy traps more likely. A policy maker aiming to alleviate the possibility of policy traps may thus encourage political campaning focused on policy issues and discourage political campaigning focusing on identity of voters.

8 Conclusion

There is a large literature aiming to understand what limits the demand for redistribution in democracies. However, this literature's focus is on asking why the aggregate policy preferences do not support redistribution. Instead, I focus on voting: why does the electorate not vote for redistribution? I add two components, anticipatory utility and imperfect recall, into a model of voting for redistribution under uncertainty of future income. With these two components, votes gain meanings that the voters care about: voting for low tax rate identifies the voter with the voters who benefit from low taxes and is thus consistent with the desirable expectation of a high future income and consumption. At the same time, the policy concerns in the form of consumption of after-tax income restrict self-signaling. This dual purpose of voting makes voting and policy preferences diverge and voting does not aggregate policy preferences. Not all voters who prefer high redistribution vote for high redistribution. Votes favoring redistribution fall short of the aggregate policy preference for redistribution. This limits the demand for redistribution.

This framework of voting as self-signaling can be interpreted as a hybrid model of instrumental and expressive voting. The problematic characteristic of expressive voting literature has been its ad-hoc -style nonconsequentalist operationalisations of expressive benefits in the from of various exogenous utility flows that voting might bring. Many (e.g. Green and Shapiro (1994), Mueller et al. (2003) (p. 329) and Bellani and Ursprung (2019)) have argued that exogenous expressive benefits do not constitute a proper theory and are rather rationalizations than explanations of behavior. On one hand, such a model lacks predictive content. In particular, exogeneity of expressive benefits robs the model from the possibilities of studying how value of expressive voting changes in changing political and economic environments. On the other hand, looking for the "deeper reasons" (Dowding, 2005) of expressive benefits brings the idea of expressive voting closer to the core of rational choice theory where benefits of actions flow from their consequences.

Self-signaling provides a way of endogenizing expressive benefits. One source of such intrinsic benefits may be identification with parties, policies, coalitions or fellow voters. I model such identification as self-signaling: Voting for certain policies is compatible with the desirable belief of being the kind of voter who benefits from these policies. The comparative statics results demonstrate how such endogenous expressive benefits react to changes in economic environment and so mediate these changes to voting behavior. While in this paper voters wish to express prospects of upward mobility, different issues in political agenda may give rise to various expressive concerns. If certain policies are viewed, say, as more altruistic, more moral, more patriotic or more nationalistic, than others, then voters may express these preferences, qualities or values in their voting as well. This may lead to policy traps and inefficient voting outcomes. Such adverse outcomes are more likely when political campaigning focuses on voters' identities rather than policies and frames the supporters of different parties in extreme ways.

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A Lemmata

Lemma 1 (Proposition 1 (16a), (16b), Heckman and Honoré (1990))**.** *If ε has density f with f log-concave, then for $\varepsilon \in (\underline{\varepsilon}, \overline{\varepsilon})$ $\mathcal{M}'_{+}(\varepsilon) \in [0,1]$ and $\mathcal{M}'_{-}(\varepsilon) \in [0,1]$. The unit intervals are open if f is strictly log-concave.*

Proof. See Heckman and Honoré (1990). $\square$

Lemma 2. *Suppose Assumption 1 holds. Then $\Psi' := \frac{d}{d\varepsilon}\Psi(\varepsilon; y) > 0$.*

Proof. $\frac{d}{d\varepsilon}\Psi(\varepsilon; y) = s(1-\underline{\tau})\mathcal{M}'_{+}(\varepsilon) - s(1-\overline{\tau})\mathcal{M}'_{-}(\varepsilon) + \delta(\overline{\tau} - \underline{\tau}) > -s(1-\overline{\tau}) + \delta(\overline{\tau} - \underline{\tau}) > 0 \iff \delta(1-\underline{\tau}) > (s+\delta)(1-\overline{\tau})$, where the first inequality follows from strict log-concavity of f and Lemma 1. $\square$

Lemma 3. *Let ε have density f with f a nondegenerate zero mean log-concave density and $\varepsilon \in [\underline{\varepsilon}, \overline{\varepsilon}]$ and $\sigma \in \mathbb{R}_{>0}$. Then for $\varepsilon' \in (\underline{\varepsilon}, \overline{\varepsilon})$*

$$\text{(i)}\ \frac{\partial}{\partial \sigma} E[\sigma\varepsilon | \sigma\varepsilon > \varepsilon'] \geq 0, \quad \text{and} \quad \text{(ii)} \frac{\partial}{\partial \sigma} E[\sigma\varepsilon | \sigma\varepsilon < \varepsilon'] \leq 0.$$

The inequalities are strict if f is strictly log-concave.

Proof. Note as a corollary to Lemma 1 that for $\varepsilon' \in (\underline{\varepsilon}, \overline{\varepsilon})$

$$\mathcal{M}_{+}(\varepsilon') > E[\varepsilon] = 0 \quad \text{and} \quad \mathcal{M}_{-}(\varepsilon') < E[\varepsilon] = 0. \tag{17}$$

Part (i).

$$\begin{aligned}
\frac{\partial}{\partial \sigma} E[\sigma\varepsilon | \sigma\varepsilon > \varepsilon'] &= \frac{\partial}{\partial \sigma}\big(\sigma E\left[\varepsilon | \varepsilon > \frac{\varepsilon'}{\sigma}\right]\big) \\
&= E\left[\varepsilon | \varepsilon > \frac{\varepsilon'}{\sigma}\right] + \sigma \frac{\partial}{\partial \sigma} E\left[\varepsilon | \varepsilon > \frac{\varepsilon'}{\sigma}\right] \\
&= E\left[\varepsilon | \varepsilon > \frac{\varepsilon'}{\sigma}\right] + \sigma \frac{\partial}{\partial \frac{\varepsilon'}{\sigma}} E\left[\varepsilon | \varepsilon > \frac{\varepsilon'}{\sigma}\right] \frac{\partial}{\partial \sigma}\frac{\varepsilon'}{\sigma} \\
&= E\left[\varepsilon | \varepsilon > \frac{\varepsilon'}{\sigma}\right] + \sigma \frac{\partial}{\partial \frac{\varepsilon'}{\sigma}} E\left[\varepsilon | \varepsilon > \frac{\varepsilon'}{\sigma}\right] \left(-\frac{\varepsilon'}{\sigma^2}\right) \\
&= E\left[\varepsilon | \varepsilon > \frac{\varepsilon'}{\sigma}\right] - \frac{\partial}{\partial \frac{\varepsilon'}{\sigma}} E\left[\varepsilon | \varepsilon > \frac{\varepsilon'}{\sigma}\right] \frac{\varepsilon'}{\sigma} \\
&= E[\varepsilon | \varepsilon > \tilde{\varepsilon}'] - \frac{\partial}{\partial \tilde{\varepsilon}'} E[\varepsilon | \varepsilon > \tilde{\varepsilon}']\tilde{\varepsilon}' \quad \text{where } \tilde{\varepsilon}' = \frac{\varepsilon'}{\sigma} \\
&= \mathcal{M}_{+}(\tilde{\varepsilon}') - \tilde{\varepsilon}'\mathcal{M}'_{+}(\tilde{\varepsilon}').
\end{aligned} \tag{18}$$

First note that if $\tilde{\varepsilon}' \leq 0$, then by Lemma 1 and (17), (18) is strictly positive. Second, if $\tilde{\varepsilon}' > 0$ we have

$$\mathcal{M}_{+}(\tilde{\varepsilon}') - \tilde{\varepsilon}'\mathcal{M}'_{+}(\tilde{\varepsilon}') > \tilde{\varepsilon}' - \tilde{\varepsilon}'\mathcal{M}'_{+}(\tilde{\varepsilon}') = \tilde{\varepsilon}'\left[1 - \mathcal{M}'_{+}(\tilde{\varepsilon}')\right] \geq 0,$$

where the last inequality follows from Lemma 1 and is strict if f is stricly log-concave. The first inequality follows from the non-degeneracy of f.

Part (ii).

$$\begin{aligned}
\frac{\partial}{\partial\sigma}E[\sigma\varepsilon|\sigma\varepsilon<\varepsilon'] &= \frac{\partial}{\partial\sigma}\big(\sigma E\left[\varepsilon|\varepsilon<\frac{\varepsilon'}{\sigma}\right]\big) \\
&= E\left[\varepsilon|\varepsilon<\frac{\varepsilon'}{\sigma}\right]+\sigma\frac{\partial}{\partial\sigma}E\left[\varepsilon|\varepsilon<\frac{\varepsilon}{\sigma}\right] \\
&= E\left[\varepsilon|\varepsilon<\frac{\varepsilon'}{\sigma}\right]+\sigma\frac{\partial}{\partial\frac{\varepsilon'}{\sigma}}E\left[\varepsilon|\varepsilon<\frac{\varepsilon'}{\sigma}\right]\frac{\partial}{\partial\sigma}\frac{\varepsilon'}{\sigma} \\
&= E\left[\varepsilon|\varepsilon<\frac{\varepsilon'}{\sigma}\right]+\sigma\frac{\partial}{\partial\frac{\varepsilon'}{\sigma}}E\left[\varepsilon|\varepsilon<\frac{\varepsilon'}{\sigma}\right]\left(-\frac{\varepsilon'}{\sigma^2}\right) \\
&= E\left[\varepsilon|\varepsilon<\frac{\varepsilon'}{\sigma}\right]-\frac{\partial}{\partial\frac{\varepsilon'}{\sigma}}E\left[\varepsilon|\varepsilon<\frac{\varepsilon'}{\sigma}\right]\frac{\varepsilon'}{\sigma} \\
&= E[\varepsilon|\varepsilon<\tilde{\varepsilon}']-\frac{\partial}{\partial\tilde{\varepsilon}'}E[\varepsilon|\varepsilon<\tilde{\varepsilon}']\tilde{\varepsilon}' \quad \text{where } \tilde{\varepsilon}'=\frac{\varepsilon'}{\sigma} \\
&= \mathcal{M}_-(\tilde{\varepsilon}')-\tilde{\varepsilon}'\mathcal{M}_-'(\tilde{\varepsilon}'). \qquad (19)
\end{aligned}$$

First note that if $\tilde{\varepsilon}'\geq 0$, then by Lemma 1 and (17), (19) is strictly negative. Second, if $\tilde{\varepsilon}'<0$ we have

$$\mathcal{M}_-(\tilde{\varepsilon}')-\tilde{\varepsilon}'\mathcal{M}_-'(\tilde{\varepsilon}')<\tilde{\varepsilon}'-\tilde{\varepsilon}'\mathcal{M}_-'(\tilde{\varepsilon}')=\tilde{\varepsilon}'\left[1-\mathcal{M}_-'(\tilde{\varepsilon}')\right]\leq 0,$$

where the last inequality follows from Lemma 1 and is strict if f is stricly log-concave. The first inequality follows from the non-degeneracy of f. □

Lemma 4.

$$\frac{d}{d\sigma}\int_{y\in Y}h(y,\sigma)dG(y)=\int_{y^L}^{y^H}\frac{d}{d\sigma}h(y,\sigma)dG(y).$$

Proof.

$$\frac{d}{d\sigma}\int_{y\in Y} h(y,\sigma)dG(y)$$

$$\begin{aligned}
=&\frac{d}{d\sigma}\left[\int_{-\infty}^{y^L} h(y,\sigma)dG(y)+\int_{y^L}^{y^H} h(y,\sigma)dG(y)+\int_{y^H}^{\infty} h(y,\sigma)dG(y)\right]\\
=&\frac{d}{d\sigma}\left[\int_{-\infty}^{y^L} dG(y)+\int_{y^L}^{y^H} h(y,\sigma)dG(y)\right]\\
=&\frac{d}{d\sigma}G(y^L)+\frac{d}{d\sigma}\left[h(y^H,\sigma)G(y^H)-h(y^L,\sigma)G(y^L)-\int_{y^L}^{y^H} G(y)dh(y,\sigma)\right]\\
=&G(y^H)\frac{d}{d\sigma}h(y^H,\sigma)-G(y^L)\frac{d}{d\sigma}h(y^L,\sigma)-\frac{d}{d\sigma}\int_{y^L}^{y^H} G(y)\frac{\partial}{\partial y}h(y,\sigma)dy\\
=&G(y^H)\frac{d}{d\sigma}h(y^H,\sigma)-G(y^L)\frac{d}{d\sigma}h(y^L,\sigma)\\
&-G(y^H)\frac{\partial}{\partial y}h(y^H,\sigma)\frac{dy_H}{d\sigma}+G(y^L)\frac{\partial}{\partial y}h(y^L,\sigma)\frac{dy_L}{d\sigma}-\int_{y^L}^{y^H} G(y)\frac{\partial^2}{\partial y\partial\sigma}h(y,\sigma)dy\\
=&G(y^H)\frac{\partial}{\partial\sigma}h(y^H,\sigma)-G(y^L)\frac{\partial}{\partial\sigma}h(y^L,\sigma)-\int_{y^L}^{y^H} G(y)d\frac{\partial}{\partial\sigma}h(y,\sigma)\\
=&\int_{y^L}^{y^H} \frac{\partial}{\partial\sigma}h(y,\sigma)dG(y),
\end{aligned}$$

where the second equality follows from (9), where $h(y^L,\sigma)=F(\varepsilon^*(y^L))=F(\overline{\varepsilon})=1$ and $h(y^H,\sigma)=F(\varepsilon^*(y^H))=F(\underline{\varepsilon})=0$ and where the derivatives of h with respect to the boundaries of integration y^L and y^H exist as defined in Propositions 1 and 2, and where $\frac{\partial}{\partial\sigma}h(y,\sigma)$ is continuous on $[y^L,y^H]$ in y and σ by Proposition 4 □

Lemma 5. *Suppose F and G are symmetric. Then*

$$\int_{\underline{\varepsilon}}^{\overline{\varepsilon}} G(\bar{y}-\varepsilon)dF(\varepsilon)=G(\bar{y}).$$

Proof. Since F is symmetric, we can let $\underline{\varepsilon}=-\varepsilon'$ and $\overline{\varepsilon}=\varepsilon'$. Then

$$\begin{aligned}
\int_{-\varepsilon'}^{\varepsilon'} G(\bar{y}-\varepsilon)dF(\varepsilon)&=\int_{-\varepsilon'}^{0} G(\bar{y}-\varepsilon)dF(\varepsilon)+\int_{0}^{\varepsilon'} G(\bar{y}-\varepsilon)dF(\varepsilon)\\
&=\int_{-\varepsilon'}^{0} G(\bar{y}-\varepsilon)dF(\varepsilon)-\int_{0}^{-\varepsilon'} G(\bar{y}+\varepsilon)f(-\varepsilon)d\varepsilon\\
&=\int_{-\varepsilon'}^{0} G(\bar{y}-\varepsilon)dF(\varepsilon)+\int_{-\varepsilon'}^{0} [1-G(\bar{y}-\varepsilon)]f(\varepsilon)d\varepsilon\\
&=\int_{-\varepsilon'}^{0} f(\varepsilon)d\varepsilon=\frac{1}{2}=G(\bar{y}),
\end{aligned}$$

where $f(-\varepsilon) = f(\varepsilon)$, $G(\bar{y}+\varepsilon) = 1 - G(\bar{y}-\varepsilon)$, and $G(\bar{y}) = \frac{1}{2}$ by symmetry. $\square$

B Proofs of Propositions

Proof of Proposition 1. First, find the voters that always vote for low taxation. Let $\varepsilon^*(y) = \underline{\varepsilon}$. Since these voters know they would have voted for low taxation for all ε voting does not convey any information and they expect an income change according to prior such that $\mathcal{M}_+(\underline{\varepsilon}) = 0$. Deviation to voting for high tax rate is most profitable to the voter with worst income prospects and so the off-equilibrium-path belief is $\mathcal{M}_- = \underline{\varepsilon}$. Pooling requires that (7) is positive for all $\varepsilon \in [\underline{\varepsilon}, \overline{\varepsilon}]$ which, since (7) is increasing in ε and given the beliefs $\mathcal{M}_+(\underline{\varepsilon}) = 0$ and $\mathcal{M}_- = \underline{\varepsilon}$, is true if and only if $\Psi(\underline{\varepsilon}; y) \geq 0$. This is equivalent to

$$y \geq y^H := \bar{y} + \frac{|\underline{\varepsilon}|}{s+\delta}\left(\delta - s\frac{(1-\overline{\tau})}{(\overline{\tau}-\underline{\tau})}\right). \tag{20}$$

Since Ψ is increasing, if $\Psi(\underline{\varepsilon}) \geq 0$ there are no $\varepsilon' \neq \underline{\varepsilon}$ such that $\Psi(\varepsilon') = 0$ and so this equilibrium is unique. Note that, $y^H > \bar{y}$ if and only if Assumption 1 holds.

Second, find the voters that always vote for high taxation. Let $\varepsilon^*(y) = \overline{\varepsilon}$. Since these voters know they would have voted for high taxation for all ε voting does not convey any information and they expect an income change according to prior such that $\mathcal{M}_-(\overline{\varepsilon}) = 0$. Deviation to voting for low tax rate is most profitable to the voter with the best income propsects and so the off-equilibrium-path belief is $\mathcal{M}_+ = \overline{\varepsilon}$. Pooling requires that (7) is negative for all $\varepsilon \in [\underline{\varepsilon}, \overline{\varepsilon}]$ which, since (7) is increasing in ε and given the beliefs $\mathcal{M}_-(\overline{\varepsilon}) = 0$ and $\mathcal{M}_+ = \overline{\varepsilon}$, is true if and only if $\Psi(\overline{\varepsilon}; y) \leq 0$. This is equivalent to

$$y \leq y^L := \bar{y} - \frac{\overline{\varepsilon}}{s+\delta}\left(\delta + s\frac{(1-\underline{\tau})}{(\overline{\tau}-\underline{\tau})}\right). \tag{21}$$

Since Ψ is increasing, if $\Psi(\overline{\varepsilon}) \leq 0$ there are no $\varepsilon' \neq \overline{\varepsilon}$ such that $\Psi(\varepsilon') = 0$ and so this equilibrium is unique.

Third, find the voters whose vote depends on the income change they expect. Suppose now $y \in (y_L, y_H)$. Then $\Psi(\underline{\varepsilon}; y) < 0$ and $\Psi(\overline{\varepsilon}; y) > 0$ and as Ψ is continuous and strictly increasing there exists unique threshold $\varepsilon^*(y) \in (\underline{\varepsilon}, \overline{\varepsilon})$ such that $\Psi(\varepsilon^*(y); y) = 0$ and such that for all $\varepsilon < \varepsilon^*(y)$ we have $\Psi(\varepsilon^*(y); y) < 0$ and thus a vote for high tax rate is preferred and for all $\varepsilon > \varepsilon^*(y)$ we have $\Psi(\varepsilon^*(y); y) > 0$ and thus a vote for low tax rate is preferred.

To show that $\varepsilon^*(y)$ decreases in y, note that for $y < y^L$, $\varepsilon^*(y) = \overline{\varepsilon}$ and for $y > y^H$, $\varepsilon^*(y) = \underline{\varepsilon}$ and that $\varepsilon^*(y)$ approaches $\overline{\varepsilon}$ when y approaches y^L from the right and $\varepsilon^*(y)$ approaches $\underline{\varepsilon}$ when y approaches y^H from the left. Consider $y \in (y^L, y^H)$. Totally differentiate $\Psi(\varepsilon^*(y); y) = 0$ and rearrange to get

$$\frac{d\varepsilon^*(y)}{dy} = -\frac{\Psi_y}{\Psi'} < 0, \tag{22}$$

where $\Psi_y = (s+\delta)(\overline{\tau} - \underline{\tau}) > 0$ and, by Lemma 2, $\Psi' > 0$. Define the derivative at y^L to be the right derivative at that point and the derivative at y^H to be the left derivative at that point. Both these derivatives are negative as the derivative on (y^L, y^H) is negative. With these derivatives at the boundaries and by Implicit Function Theorem, $\varepsilon^*(y)$ is continuously differentiable with respect to y on $[y^L, y^H]$. □

Proof of Proposition 2. With $s = 0$, $\Psi(\varepsilon; y) = -\delta(\overline{\tau} - \underline{\tau})(\bar{y} - y - \varepsilon)$, which is positive whenever $y + \varepsilon > \bar{y}$. Let $\hat{\varepsilon}(y) := \bar{y} - y$. Also, the income threshold for pooling on voting for low taxation becomes $\hat{y}^H := y^H = \bar{y} + |\underline{\varepsilon}|$, that is, the expected future income is never below mean, and the income threshold for pooling on voting for high taxation becomes $\hat{y}^L := y^L = \bar{y} - \overline{\varepsilon}$, that is, the expected future income is never above the mean.

For $s > 0$, show that $\Psi(\varepsilon'; y) = 0$ cannot hold for any $\varepsilon' \geq \hat{\varepsilon}(y)$. Since by Lemma 2, Ψ is increasing it is enough to show that $\Psi(\hat{\varepsilon}(y); y) > 0$. We have

$$\begin{aligned}
\Psi(\hat{\varepsilon}(y); y) =& s[(1 - \underline{\tau})\mathcal{M}_+(\hat{\varepsilon}(y)) - (1 - \overline{\tau})\mathcal{M}_-(\hat{\varepsilon}(y)) - (\overline{\tau} - \underline{\tau})(\bar{y} - y)] \\
>& s[(1 - \underline{\tau})\hat{\varepsilon}(y) - (1 - \overline{\tau})\hat{\varepsilon}(y) - (\overline{\tau} - \underline{\tau})(\bar{y} - y)] \\
=& s(\overline{\tau} - \underline{\tau})(\hat{\varepsilon}(y) - (\bar{y} - y)) = 0,
\end{aligned}$$

where $s > 0$ and where the inequality follows from $\varepsilon' < \mathcal{M}_+(\varepsilon')$ and $\varepsilon' > \mathcal{M}_-(\varepsilon')$ for non-degenerate F. Hence, $\varepsilon^*(y) < \hat{\varepsilon}(y)$.

The income threshold required to always vote for low taxation decreases in s:

$$\frac{\partial y^H(s)}{\partial s} = -\frac{|\underline{\varepsilon}|\delta}{(s+\delta)^2}\left(1 + \frac{(1 - \overline{\tau})}{(\overline{\tau} - \underline{\tau})}\right) < 0.$$

The income threshold required to always vote for high taxation decreases in s:

$$\frac{\partial y^L(s)}{\partial s} = -\frac{\overline{\varepsilon}\delta}{(s+\delta)^2}\left(\frac{(1 - \underline{\tau})}{(\overline{\tau} - \underline{\tau})} - 1\right) < 0,$$

since

$$\frac{(1 - \underline{\tau})}{(\overline{\tau} - \underline{\tau})} > \frac{(\overline{\tau} - \underline{\tau})}{(\overline{\tau} - \underline{\tau})} = 1.$$

Consider an interior equilibrium $\varepsilon^*(y) \in (\underline{\varepsilon}, \overline{\varepsilon})$. Total differentiation of $\Psi(\varepsilon^*(y)) = 0$ with respect to s yields

$$\frac{\partial\varepsilon^*(y)}{\partial s} = -\frac{\Psi_s}{\Psi'} < 0, \tag{23}$$

where $\Psi' > 0$ by Lemma 2. Define the derivative at $\varepsilon^*(y^L) = \overline{\varepsilon}$ to be the right derivative and at $\varepsilon^*(y^H) = \underline{\varepsilon}$ to be the left derivative. It remains to show that $\Psi_s > 0$. The threshold $\varepsilon^*(y)$ satisfies $\Psi(\varepsilon^*(y); y) = 0$, that is,

$$\begin{aligned} &s[(1-\underline{\tau})\mathcal{M}_+(\varepsilon^*(y)) - (1-\overline{\tau})\mathcal{M}_-(\varepsilon^*(y)) - (\overline{\tau}-\underline{\tau})(\bar{y}-y)] \\ &\quad = \delta(\overline{\tau}-\underline{\tau})(\bar{y}-y-\varepsilon^*(y)). \end{aligned} \tag{24}$$

Now suppose $\Psi_s \leq 0$. If $s > 0$, this implies that the left-hand side of (24) is weakly negative. That is,

$$\begin{aligned} 0 &\geq (1-\underline{\tau})\mathcal{M}_+(\varepsilon^*(y)) - (1-\overline{\tau})\mathcal{M}_-(\varepsilon^*(y)) - (\overline{\tau}-\underline{\tau})(\bar{y}-y) \\ &> (1-\underline{\tau})\varepsilon^*(y) - (1-\overline{\tau})\varepsilon^*(y) - (\overline{\tau}-\underline{\tau})(\bar{y}-y) \\ &= (\overline{\tau}-\underline{\tau})(\varepsilon^*(y) - \bar{y} + y), \end{aligned}$$

where the second inequality follows from the fact that $\varepsilon' < \mathcal{M}_+(\varepsilon')$ and $\varepsilon' > \mathcal{M}_-(\varepsilon')$ for non-degenerate F. We thus have $(\overline{\tau}-\underline{\tau})(\varepsilon^*(y) - \bar{y} + y) < 0$ implying $\bar{y} - y - \varepsilon^*(y) > 0$ and thus the right hand side of (24) is strictly positive. Thus, weak negativity of the left-hand side of (24) implies strict positivity of the right hand side of (24) violating the equilibrium condition $\Psi(\varepsilon^*(y); y) = 0$. Since $\Psi_s \leq 0$ gives us a contradiction, we must have $\Psi_s > 0$ whenever $\varepsilon^*(y) \in (\underline{\varepsilon}, \overline{\varepsilon})$. $\square$

Proof of Proposition 3. For $\varepsilon^*(y) \in (\underline{\varepsilon}, \overline{\varepsilon})$, total differentiation of $\Psi(\varepsilon^*(y)) = 0$ with respect to σ yields,

$$\frac{\partial \varepsilon^*(y)}{\partial \sigma} = -\frac{\Psi_\sigma}{\Psi'} < 0 \tag{25}$$

where $\Psi' > 0$ by Lemma 2 and

$$\Psi_\sigma = s\big[(1-\underline{\tau})\frac{\partial}{\partial \sigma}E[\sigma\varepsilon | \sigma\varepsilon > \varepsilon^*(y)] - (1-\overline{\tau})\frac{\partial}{\partial \sigma}E[\sigma\varepsilon | \sigma\varepsilon < \varepsilon^*(y)]\big] > 0, \tag{26}$$

where $\frac{\partial}{\partial \sigma}E[\sigma\varepsilon | \sigma\varepsilon > \varepsilon^*(y)] > 0$ and $\frac{\partial}{\partial \sigma}E[\sigma\varepsilon | \sigma\varepsilon < \varepsilon^*(y)] < 0$ follow from Lemma 3 and strict log-concavity of f. Define the derivative at $\varepsilon^*(y^L) = \overline{\varepsilon}$ to be the right derivative and at $\varepsilon^*(y^H) = \underline{\varepsilon}$ to be the left derivative. With these derivatives at the boundaries and by Implicit Function Theorem, $\varepsilon^*(y)$ is continuously differentiable with respect to σ on $[y^L, y^H]$. Clearly, for $s = 0$, $\Psi_\sigma = 0$. For the thresholds y^L and y^H we have

$$\frac{\partial y^H}{\partial \sigma} = \frac{|\underline{\varepsilon}|}{s+\delta}\left(\delta - s\frac{(1-\overline{\tau})}{(\overline{\tau}-\underline{\tau})}\right) > 0$$

since if and only if Assumption 1 holds the term in the parenthesis is strictly positive and

$$\frac{\partial y^L}{\partial \sigma} = -\frac{\overline{\varepsilon}}{s+\delta}\left(\delta + s\frac{(1-\underline{\tau})}{(\overline{\tau}-\underline{\tau})}\right) < 0.$$

□

Proof of Proposition 4. First note that

$$\frac{\partial}{\partial \sigma}h(y,\sigma) = \frac{d}{d\sigma}F(\frac{\varepsilon^*(y)}{\sigma}) = f\left(\frac{\varepsilon^*(y)}{\sigma}\right)\frac{d}{d\sigma}\left(\frac{\varepsilon^*(y)}{\sigma}\right) = f\left(\frac{\varepsilon^*(y)}{\sigma}\right)\frac{1}{\sigma}\left(\frac{\partial \varepsilon^*(y)}{\partial \sigma} - \frac{\varepsilon^*(y)}{\sigma}\right).$$

Evaluating this without loss of generality at $\sigma = 1$ and noting that

$$\begin{aligned}\Psi_\sigma =& s\big[(1-\underline{\tau})\frac{\partial}{\partial \sigma}E[\sigma\varepsilon|\sigma\varepsilon > \varepsilon^*] - (1-\overline{\tau})\frac{\partial}{\partial \sigma}E[\sigma\varepsilon|\sigma\varepsilon < \varepsilon^*]\big]\\ =& s\big[(1-\underline{\tau})[\mathcal{M}_+(\varepsilon^*) - \varepsilon^*\mathcal{M}'_+(\varepsilon^*)] - (1-\overline{\tau})[\mathcal{M}_-(\varepsilon^*) - \varepsilon^*\mathcal{M}'_-(\varepsilon^*)]\big]\\ =& s\big[(1-\underline{\tau})\mathcal{M}_+(\varepsilon^*) - (1-\overline{\tau})\mathcal{M}_-(\varepsilon^*)\big] - s\big[(1-\underline{\tau})\mathcal{M}'_+(\varepsilon^*) - (1-\overline{\tau})\mathcal{M}'_-(\varepsilon^*)\big]\varepsilon^*\end{aligned}$$

and so

$$\Psi_\sigma + \Psi'\varepsilon^* = s\big[(1-\underline{\tau})\mathcal{M}_+(\varepsilon^*) - (1-\overline{\tau})\mathcal{M}_-(\varepsilon^*)\big] + \delta(\overline{\tau}-\underline{\tau})\varepsilon^* = \Psi(\varepsilon^*;\bar{y})$$

and thus we have

$$\frac{\partial \varepsilon^*}{\partial \sigma} - \varepsilon^* = -\frac{\Psi_\sigma}{\Psi'} - \frac{\Psi'\varepsilon^*}{\Psi'} = -\frac{\Psi_\sigma + \Psi'\varepsilon^*}{\Psi'} = -\frac{\Psi(\varepsilon^*(y);\bar{y})}{\Psi'} \tag{27}$$

and so

$$\frac{\partial}{\partial \sigma}h(y,\sigma) = f(\varepsilon^*(y))\left(\frac{\partial \varepsilon^*(y)}{\partial \sigma} - \varepsilon^*(y)\right) = -f(\varepsilon^*(y))\frac{\Psi(\varepsilon^*(y);\bar{y})}{\Psi'}. \tag{28}$$

Now, Ψ is increasing and ε^* is decreasing and so $\Psi(\varepsilon^*(y);\bar{y})$ is decreasing in y and by definition of ε^*, $\Psi(\varepsilon^*(\bar{y});\bar{y}) = 0$. Assumption 1 ensures that $y^L < \bar{y} < y^H$ and so $\Psi(\varepsilon^*(y^H);\bar{y}) < 0 < \Psi(\varepsilon^*(y^L);\bar{y})$. For voters with $y \in [y^L,\bar{y})$ we have $\Psi(\varepsilon^*(y);\bar{y}) > 0$ and thus $\frac{\partial}{\partial\sigma}h(y,\sigma) < 0$; for voters with $y \in (\bar{y}, y^H]$ we have $\Psi(\varepsilon^*(y);\bar{y}) < 0$ and thus $\frac{\partial}{\partial\sigma}h(y,\sigma) > 0$; for voters with $y = \bar{y}$ we have $\Psi(\varepsilon^*(y);\bar{y}) = 0$ and thus $\frac{\partial}{\partial\sigma}h(y,\sigma) = 0$, where $\frac{\partial}{\partial\sigma}h(y,\sigma)$ is continuous on $[y^L, y^H]$ in y and σ as f is continuous and, by Proposition 3, ε^* is continuously differentiable on $[y^L, y^H]$. □

Proof of Proposition 5. Let G be uniform. Then by Lemma 4, the effect of an increase in income risk on aggregate demand for redistribution is

$$\frac{d}{d\sigma}\int_{y\in Y} h(y,\sigma)dG(y) \propto \int_{y^L}^{y^H} (\bar{y}-y)\frac{d}{dy}F(\varepsilon^*(y))dy$$
$$= -\int_{y^L}^{y^H} (\bar{y}-y)\frac{d}{dy}[1-F(\varepsilon^*(y))]dy,$$

where $1-F(\varepsilon^*(y)) = Pr[y^*(\varepsilon) \le y]$ is the distribution of y^* in the electorate. Since y^*, as its inverse ε^*, is decreasing in s for all ε and increase in s moves the distribution of y^* to the left in the sense of first order stochastic dominance. Thus,

$$-\int_{y^L}^{y^H} (\bar{y}-y)\frac{d}{dy}[1-F(\varepsilon^*(y))]dy \le -\int_{y^L}^{y^H} (\bar{y}-y)\frac{d}{dy}[1-F(\hat{\varepsilon}(y))]dy$$
$$= -\int_{y^L}^{y^H} (\bar{y}-y)f(\bar{y}-y)dy,$$

where the inequality follows from first order stochastic dominance: First note that $\frac{d}{dy}[1-F(\varepsilon^*(y))]$ is a density on $[y_L, y_H]$: it is clearly non-negative as $[1-F(\varepsilon^*(y))]$ is increasing in y. Noting that $\varepsilon^*(y^H) = \underline{\varepsilon}$ and $\varepsilon^*(y^L) = \bar{\varepsilon}$, it also integrates to 1: $\int_{y^L}^{y^H} \frac{d}{dy}[1-F(\varepsilon^*(y))]dy = F(\bar{\varepsilon}) = 1$. Similarly, $\frac{d}{dy}[1-F(\hat{\varepsilon}(y))]$ is a density on $[y_L, y_H]$. Second, by Proposition 2, $\varepsilon^*(y) \le \hat{\varepsilon}(y)$ for $s \ge 0$ with equality at $s = 0$ and thus $1-F(\varepsilon^*(y)) \ge 1-F(\hat{\varepsilon}(y))$. Hence $\frac{d}{dy}[1-F(\hat{\varepsilon}(y))]$ first order stochastically dominates $\frac{d}{dy}[1-F(\varepsilon^*(y))]$. Next, substitution by $\varepsilon = \bar{y}-y$ such that $d\varepsilon = -dy$ gives

$$\int_{\bar{y}-y^L}^{\bar{y}-y^H} \varepsilon f(\varepsilon)d\varepsilon = -\int_{\bar{y}-y^H}^{\bar{y}-y^L} \varepsilon f(\varepsilon)d\varepsilon \propto -\frac{\int_{\bar{y}-y^H}^{\bar{y}-y^L} \varepsilon f(\varepsilon)d\varepsilon}{F(\bar{y}-y^L)-F(\bar{y}-y_H)}$$
$$= -E[\varepsilon|\bar{y}-y^H \le \varepsilon \le \bar{y}-y^L] \le 0. \tag{29}$$

To show that the weak inequality holds in (29), let $e(s) := E[\varepsilon|\bar{y}-y^H(s) \le \varepsilon \le \bar{y}-y^L(s)]$. For $s = 0$ we have

$$e(0) = E[\varepsilon|\underline{\varepsilon} \le \varepsilon \le \bar{\varepsilon}] = E[\varepsilon] = 0.$$

Also, $e(s)$ is increasing in s:

$$\frac{d}{ds}e(s) = \frac{de}{d(\bar{y}-y^L)}\frac{d}{ds}(\bar{y}-y^L) + \frac{de}{d(\bar{y}-y^H)}\frac{d}{ds}(\bar{y}-y^H) > 0,$$

since $\frac{dy^L}{ds} < 0$ and $\frac{dy^H}{ds} < 0$ by Proposition 2. Thus, for $s > 0$, $e(s) > 0$. Hence, the inequality in (29) is equality for $s = 0$ and strict inequality for $s > 0$ and so the aggregate demand for redistribution strictly decreases in income risk if and only if $s > 0$. □

Proof of Proposition 6. Let F be uniform, $\varepsilon \sim U(-\bar{\varepsilon}, \bar{\varepsilon})$ and G symmetric. The threshold ε^* is now defined by

$$s\left[\frac{1}{2}(\overline{\tau} - \underline{\tau})\varepsilon^* + \frac{1}{2}\bar{\varepsilon}(2 - \underline{\tau} - \overline{\tau}) - (\overline{\tau} - \underline{\tau})(\bar{y} - y)\right] - \delta(\overline{\tau} - \underline{\tau})(\bar{y} - y - \varepsilon^*) = 0$$

and has a closed form solution

$$\varepsilon^*(y) = \frac{(s+\delta)(\overline{\tau} - \underline{\tau})(\bar{y} - y) - \frac{1}{2}s(2 - \underline{\tau} - \overline{\tau})\bar{\varepsilon}}{(\overline{\tau} - \underline{\tau})\left(\frac{1}{2}s + \delta\right)} = \frac{1}{\Psi'}(\Psi_y(\bar{y} - y) - \Psi_\sigma)$$

with $\Psi_y = (s+\delta)(\overline{\tau} - \underline{\tau}) > 0$ and $\Psi' = (\overline{\tau} - \underline{\tau})(\frac{1}{2}s + \delta) > 0$ independent of y. We thus have

$$\frac{\partial \varepsilon^*}{\partial \sigma} - \varepsilon^* = -\frac{\Psi_\sigma}{\Psi'} - \frac{1}{\Psi'}(\Psi_y(\bar{y} - y) - \Psi_\sigma) = -\frac{\Psi_y}{\Psi'}(\bar{y} - y)$$

and hence, the effect of an increase in income risk on aggregate demand is proportional to a strictly positive factor to

$$\begin{aligned}
\int_{y^L}^{y^H} \left(\frac{\partial \varepsilon^*}{\partial \sigma} - \varepsilon^*\right) dG(y) &= -\frac{\Psi_y}{\Psi'} \int_{y^L}^{y^H} (\bar{y} - y) dG(y) \\
&= -\frac{\Psi_y}{\Psi'} \left(\bar{y}[G(y^H) - G(y^L)] - \int_{y^L}^{y^H} y dG(y)\right) \\
&\propto -\frac{\Psi_y}{\Psi'} \left(\bar{y} - \frac{\int_{y^L}^{y^H} y dG(y)}{G(y^H) - G(y^L)}\right) \\
&= -\frac{\Psi_y}{\Psi'} \left(\bar{y} - E[y | y^L \leq y \leq y^H]\right) \leq 0. \qquad (30)
\end{aligned}$$

To show that the weak inequality holds in (30), let $e(s) := E[y | y^L(s) \leq y \leq y^H(s)]$. For $s = 0$, for symmetric G, we have

$$e(0) = E[y | \bar{y} - \bar{\varepsilon} \leq y \leq \bar{y} + \bar{\varepsilon}] = \bar{y}.$$

Also, $e(s)$ is decreasing in s:

$$\frac{d}{ds} e(s) = \frac{de}{dy^L}\frac{dy^L}{ds} + \frac{de}{dy^H}\frac{dy^H}{ds} < 0.$$

since $\frac{dy^L}{ds} < 0$ and $\frac{dy^H}{ds} < 0$ by Proposition 2 and $\frac{de}{dy^L} > 0$ and $\frac{de}{dy^H} > 0$. Thus, for $s > 0$, $e(s) < \bar{y}$. Hence, the inequality in (30) is equality for $s = 0$ and strict inequality for $s > 0$ and so the aggregate demand for redistribution strictly decreases in income risk if and only if $s > 0$. □

Proof of Proposition 7. If a voter votes for t and t is implemented the voter's utility flows sum to

$$\delta u(t,\varepsilon,y)+sE[U(t,\varepsilon,y)|t,y]. \tag{31}$$

Thus, the marginal voter ε^{**} who is indifferent between voting for low tax rate and high tax rate in terms of this experienced utility satisfies

$$s[(1-\underline{\tau})\mathcal{M}_+(\varepsilon^{**})-(1-\overline{\tau})\mathcal{M}_-(\varepsilon^{**})+(\overline{\tau}-\underline{\tau})(\bar{y}-y)]-\delta(\bar{t}-\underline{t})(\bar{y}-y-\varepsilon^{**})=0. \tag{32}$$

Since $(\overline{\tau}-\underline{\tau})=(q(\bar{t})-q(\underline{t}))(\bar{t}-\underline{t})$ we have $\varepsilon^*<\varepsilon^{**}<\hat{\varepsilon}$ whenever $q(\bar{t})-q(\underline{t})<1$. Thus, for voters with $\varepsilon\in(\varepsilon^*,\varepsilon^{**})$ the left-hand side of (32) is negative and they would thus be better off if they voted for high tax rate and high tax rate was implemented. For $q(\bar{t})-q(\underline{t})=1$ the left hand side of (32) is $\Psi(\varepsilon^{**})$ and we have $\varepsilon^{**}=\varepsilon^*$. Also since $(\overline{\tau}-\underline{\tau})<(\bar{t}-\underline{t})$, ε^{**} is less responsive to changes in s and σ than ε^*. Thus, the $\varepsilon^{**}-\varepsilon^*$ increases in s and σ. $\square$