Self-Signaling and Voting for Redistribution *

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November 2022
Preliminary
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Abstract

I model voting for redistribution with imperfect memory, anticipatory utility, and uncertainty over future incomes. Imperfect memory together with uncertainty makes voting diagnostic of future incomes giving votes a meaning independent of their contribution to the popularity of policies. Anticipatory utility motivates concern over the meanings of votes leading to self-signaling: Voting for low taxation is consistent with the desirable belief of high future consumption. This limits the demand for redistribution. Higher income risk increases the value of self-signaling leading to a decrease in the demand for redistribution. The divergence of voting and policy preferences leads to collective action problems and policy traps when the voters do not perceive themselves as decisive.

JEL classification: D31; D72; D83; D91
Keywords: self-signaling, anticipation, redistribution, voting

1 Introduction

Voters seem to sometimes vote against their self-interest at least in the narrow sense of material utility. I show how voters with uncertainty about their future incomes wishing to expect high incomes can 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 consumption.

The question of why the poor do not expropriate the rich by voting for a high taxation and large transfers is a subject of a large literature. While the focus of this literature has been in aiming to understand why policy preferences in aggregate may

*I thank Toke Aidt, Luna Bellani, Frank Bohn, Allan Drazen, Florian Dorn, Susanne Goldlücke, Panu Poutvaara, Konstantinos Theocharopoulos, Janne Tukiainen and many other participants at workshops and conferences for valuable comments and discussions.

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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 to be implemented. 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 the distinction between policy preferences and voting gains importance.

Already Nozick (1969) noted the willingness of people to choose actions that are merely diagnostic of good outcomes. 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. Later, such behavior has been called self-signaling: if we remember our actions better than the exact motives we had in taking these actions, we may condition our self-inference and thus expectations about future outcomes on the actions we took rather than on the exact motives of these actions. Actions we take, then, influence our future beliefs.An important motive of belief management, on the other hand, is anticipation. Expecting good outcomes inceases current anticipation. The role of anticipation of future utility as a part of currently experienced utility was already highlighted by Bentham (1789) and Jevons (1905) (Löwenstein, 1987).

I implement these ideas in the context of a canonical model in public choice theory: voting for a linear income tax rate with equal lump-sum transfers. Voting for redistribution is potentially a diagnostic action: There is considerable amount of uncertainty about lifetime incomes. Also, lifetime incomes are associated both with our voting and the level of our future consumption. Furthermore, anticipation high consumption is more desirable than anticipating low consumption.

In the model, voters can 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, the memory of voters is malleable and after voting, voters form their expectations about future income partly based on their voting choice. After the election, and before the realization of income changes, voters anticipate their future consumption. Anticipation creates an incentive for belief manipulation: expectations of higher consumption lead to higher anticipatory utility. In equilibrium, voting for low taxation is associated with high income and vice versa: 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.

I show how self-signaling desirable mobility prospects limits the demand for redistribution. 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 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 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.

Self-signaling clearly interferes with preference aggregation making the normative properties of the model of interest. Bayesian beliefs always average to the prior and self-signaling is thus a zero-sum game merely reallocating anticipation. Thus, for any income level, welfare maximizing voting ignores anticipation. Individually rational voting, however, does not ignore anticipation and diverges from the social optimum. Also while there are voters expecting below mean incomes for whom utility from anticipation of high future incomes outweight the loss in consumption due to less redistribution, if the voters do not perceive themselves as pivotal there are also voters who would have been better off if they had voted for high tax rate and, maybe due to this collective effort, the high tax rate was implemented. These latter type of voters are clearly voting against their self-interest but face a collective action problem where it is individually rational to not face the reality but to enjoy anticipation.

My exploration of these ideas proceeds as follows: The next section positions the work in the literature. Section 3 lays out the model of voting for redistribution under uncertainty about future incomes. The individual 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

[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.

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 concave income transition function with skewed income shocks, prefer low taxation. This restrictive class of income 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 suboptional 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. Shifting identification from the poor to the broader group of nation may be attractive to the poor if the status of the poor detoriate as this identification provides a new enhanced 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, in line with Bénabou and Tirole (2011) 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. Expressive voting departs from

[2]For the distinction between preference based and belief based models of identity, see Charness and Chen (2020).

the so called paradox of voting: people incur costs when voting in large elections even if their vote is unlikely to matter. Hence, the thinking goes, voters must have some other than instrumental reasons for voting. The idea of expressive voting is that 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, 1998; Hamlin & Jennings, 2018).

The content of these direct expressive benefits of voting has, however, remained unclear. 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.

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). That our actions influence our identity or our perceptions of who we are follows from the inherent uncertainty of who we are (Baumeister, 1998) and how we form our self-knowledge by observing our own behavior (Bem, 1967). These cognitive possibilities for identity management combined with a motivation for identity management give rise to self-signaling.

Self-signaling is the idea that if we remember our actions better than the exact motives we had in taking these actions, we may condition our self-inference and thus expectations about future outcomes on the actions we took rather than on the exact motives of these actions (Baumeister, 1998; Bénabou & Tirole, 2004; Mijović-Prelec & Prelec, 2010; Bénabou & Tirole, 2011). Thus, if when acting we know that we will later on base our expectations on our actions and if we value these expectations, this self-signaling function of our actions becomes a concern in choosing our actions. Here, voting is seen as such a strategy as a part of the voter's overall belief management: To hold on to the desirable beliefs and worldview, voting has to be consistent with these beliefs and views.

The model of voting here is built on the framework of Bernheim and Thomadsen (2005). They propose to model the appeal of diagnostic actions as a signaling game between temporal selves with self-signaling motivated by anticipatory utility. In their setting, actions correlate (in equilibrium) with some random variables of whose realiza-

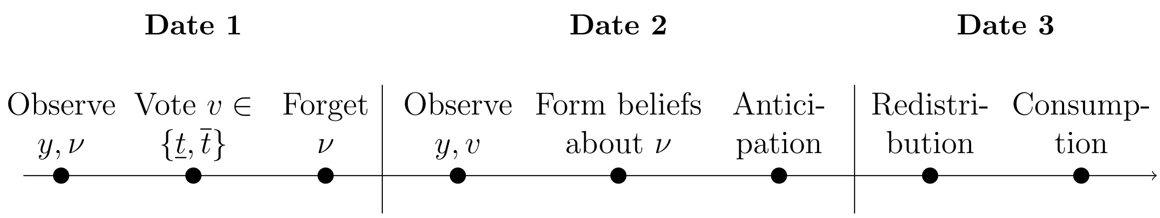

Figure 1: Timeline.

tions agents know (in expectation) as they are choosing their actions but forget later on when anticipating the outcomes of these actions. Knowing that the actions will, in the later date, be used to infer about the underlying random variable that also correlates with the outcomes, agents are motivated to choose actions that allow desirable inferences. The analysis of the model further draws from the analyses of signaling models of Bénabou and Tirole (2006) and Adriani and Sonderegger (2019).

3 The Model

Consider a model of voting for redistributive policy to be applied in future under uncertainty about future income. Voting over linear income tax with lump sum transfers occurs 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. The current income is known to everyone and can be observed anytime. At date 3, voter's income changes by ν. 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 $[\underline{\nu}, \overline{\nu}]$ with $\underline{\nu} \leq 0 \leq \overline{\nu}$ and with continuously differentiable strictly log-concave density f. The zero prior expectations of income changes normalize aggregate income growth to zero.

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 defined as $\phi(y) + \nu$, 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 effect studied Bénabou and Ok (2001).

3.2 Information

Each voter perfectly observes her ν at date 1 before voting. With risk neutrality, the assumption of noiseless information at date 1 is without loss of generality as ν can be interpreted as the posterior expectation of 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 ν at date 2. That is, voters' recall is imperfect and, after the election, they lose the information about their date-3-income changes ν.

This gain and loss of information captures two necessary characteristics of a rational choice theory of self-signaling: First, a voter that 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 ν at date 1 can be interpreted 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.[4]

Second, if the voter remembered her ν, then voting would not be informative of ν and there could not be self-signaling. At date 2, with uncertainty about future incomes but knowledge of the votes cast, voter's income expectations are based on her voting behavior. This forgetting may be motivated since belief manipulation has benefits and beliefs can only be manipulated if there is imperfect recall.

3.3 Polity and Policy Preferences

At date 0, 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 $\underline{t} < \bar{t}$. Voters may not perceive themselves as pivotal: Voting for $v \in \{\underline{t}, \bar{t}\}$ voter induces a perceived probability distribution over election outcomes

[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.

[4]Unbiased signals are without loss of generality as well: any model of incomplete information requires some priors as initial conditions. Unbiased expectations are a natural starting point. However, nothing in the model requires the priors to be unbiased.

$((\bar{t}, q(v)), (\underline{t}, 1 - q(v)))$ 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. The redistribution policy chosen will be in place at date 3.

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]

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

where the mean income at date 3

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

is the tax base.[6]

Casting vote v induces expected benefit over electoral outcomes

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

I do not model the electoral competition and take the policy platforms as exogenous. This deviates from the applications of the median voter theorem where the offered 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 $\{\underline{t}, \bar{t}\}$. 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. Also, Bénabou and Ok (2001), the seminal formalization of prospects of upward mobility, takes platforms as exogeneous. 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.

[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.

3.4 Voting Preferences

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

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

where $\delta > 0$ weights consumption and $s \geq 0$ is the preference parameter measuring the value of anticipation.[7] The flow consumption utilities of dates 1 and 2 are dropped as exogenous additive terms.

The income expectations at date 2 are conditional on the voting choice v and not on the date-3-income change ν. Voting works as a self-signaling device: the exact motive of the vote, the expected date-3-income change ν, 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 ν. That is, their anticipatory emotions at date 2 depend on their voting. This gives voting power as a tool for belief management.

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 in 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 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.

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 the meanings of votes the

[7] Replacing anticipatory utility with an ego- or self-esteem utility modeled as an increasing function of pre-tax earnings would yield qualitatively similar results. Pre-tax earnings can then also be seen as a proxy for social class and the ego-utility term as the benefit of identifying with this social class.

expected utility difference between voting for low taxation and high taxation $V(\underline{t}, y, \nu) - V(\bar{t}, y, \nu)$ is

$$s\left[(1-\underline{\tau})\mathcal{M}_{+} - (1-\overline{\tau})\mathcal{M}_{-} - (\overline{\tau}-\underline{\tau})(\bar{y}-y)\right] - \delta(\overline{\tau}-\underline{\tau})(\bar{y}-y-\nu), \tag{5}$$

where $\underline{\tau} \coloneqq q(\underline{t})\bar{t} + (1-q(\underline{t}))\underline{t}$ is the expected tax rate having voted for low tax rate $\underline{t}$ and $\overline{\tau} \coloneqq q(\bar{t})\bar{t} + (1-q(\bar{t}))\underline{t}$ 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 $[\underline{\nu}, \overline{\nu}]$ to the set of possible votes $\{\underline{t}, \bar{t}\}$. The expected utility difference (5) is clearly strictly increasing in ν. Hence, we focus on finding monotonic mappings such that the binary choices can be characterized by thresholds $\nu^*(y)$ such that expected income changes $\nu < \nu^*(y)$ map to $\bar{t}$ and expected income changes $\nu \geq \nu^*(y)$ map to $\underline{t}$. These voting strategies determine the meanings of votes as $\mathcal{M}_{+}(\nu') \coloneqq E[\nu|\nu \geq \nu']$ for $\nu' \in [\underline{\nu}, \overline{\nu})$ and $\mathcal{M}_{-}(\nu') \coloneqq E[\nu|\nu < \nu']$ for $\nu' \in (\underline{\nu}, \overline{\nu}]$. To implement D1, define $\mathcal{M}_{+}(\overline{\nu}) \coloneqq \overline{\nu}$ and $\mathcal{M}_{-}(\underline{\nu}) \coloneqq \underline{\nu}$. 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 ν.

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

$$\Psi(\nu; y) \coloneqq s[(1-\underline{\tau})\mathcal{M}_{+}(\nu) - (1-\overline{\tau})\mathcal{M}_{-}(\nu)] + \delta(\overline{\tau}-\underline{\tau})\nu - (s+\delta)(\overline{\tau}-\underline{\tau})(\bar{y}-y). \tag{6}$$

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

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 Ψ is increasing as shown by Lemma 2 and thus that for all y, $\nu^*(y)$ is unique. It sets limits to how strong the signaling concerns are relative to economic concerns. Since $q(\bar{t}) > q(\underline{t})$ we have $\overline{\tau} > \underline{\tau}$ and there are positive values of s such that Assumption 1 holds. On the other hand, all results hold for all $s > 0$ and, hence, this assumption is not restrictive.

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

$\nu^*(y)$ is defined by $\Psi(\nu^*(y); y) = 0$, where

$$y^L := \bar{y} - \frac{\overline{\nu}}{s+\delta}\left(\delta + s\frac{(1-\underline{\tau})}{(\overline{\tau}-\underline{\tau})}\right) \quad \text{and} \quad y^H := \bar{y} + \frac{|\underline{\nu}|}{s+\delta}\left(\delta - s\frac{(1-\overline{\tau})}{(\overline{\tau}-\underline{\tau})}\right), \tag{7}$$

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

Other voters' voting is captured by the threshold that endogenously partitions the electorate into two groups: The group of high income voters and the group of low income voters. 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 believe she is among those voters who will benefit from high taxation and high transfers, i.e. 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, i.e. 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 voting of those expecting below mean incomes is more nuanced: If the low income types vote for high redistribution they will later on infer from their voting that they are going to have low income and low consumption which brings little utility in the form of 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. On the other hand, 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 $\nu^*(y)$ 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 $\nu^*(y)$, 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.

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

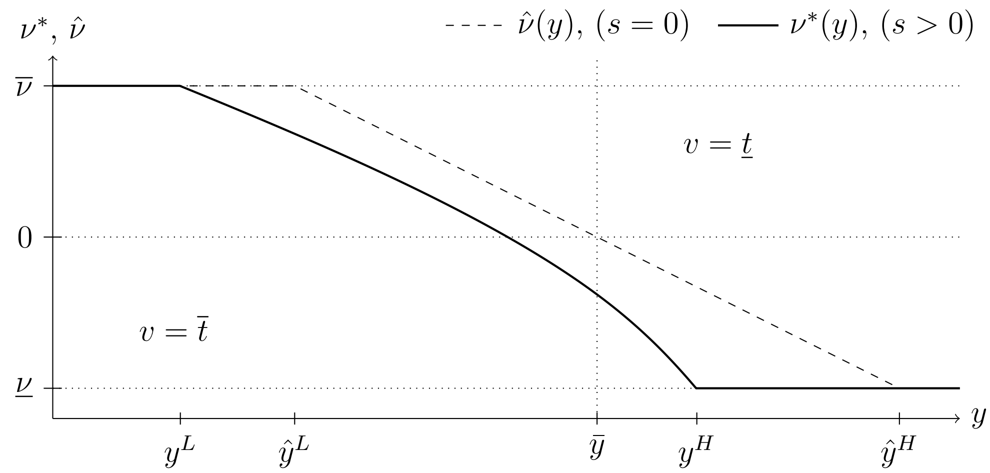

Figure 2: The threshold expected change in income as a function of current income.

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.

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 (Anticipation). *For $s = 0$, $\nu^*(y) = \hat{\nu}(y) := \bar{y} - y$, $y^L = \hat{y}^L := \bar{y} - \overline{\nu}$ and $y^H = \hat{y}^H := \bar{y} - \underline{\nu}$. For $s > 0$, $\nu^*(y) \in [\underline{\nu}, \hat{\nu}(y))$, $y^H < \hat{y}^H$ and $y^L < \hat{y}^L$. An increase in s strictly decreases the threshold ν^* 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 decrease the demand for redistribution. The value of self-signaling increases in the value of anticipation and higher valuation 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. Utility from anticipation and resulting self-signaling motives shifts the thresholds downward.

The thick line depicts the threshold as a function of income in the presence of anticipation. The voters between the two lines, i.e. the voters with $\nu \in (\nu^*(y), \hat{\nu}(y))$ are motivated by the 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.

4.3 Income Risk

The economic environment that defines a voter's economic opportunities 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 change ν by factor $\sigma \in \mathbb{R}_{>0}$ such that the income change $\sigma\nu$ is generated by

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

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. Also, no assumptions whatsoever have been invoked about symmetry of the distribution so the results apply to skewed distributions as well. The only requirement is that f is strictly log-concave. Proposition 5 formalizes the effect of an increase in risk on voting rule.

Proposition 3 (**Income risk**). *If and only if $s > 0$ an increase in income risk σ strictly decreases the threshold $\nu^*(y)$ 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 $s \geq 0$.*

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 incraese 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, with no income mobility, without risk: $\underline{\nu} = \overline{\nu} = 0$, 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 either be interpreted as the ex ante probability of a voter voting for high redistribution before the realization of date 1 signal about future income mobility ν or, with

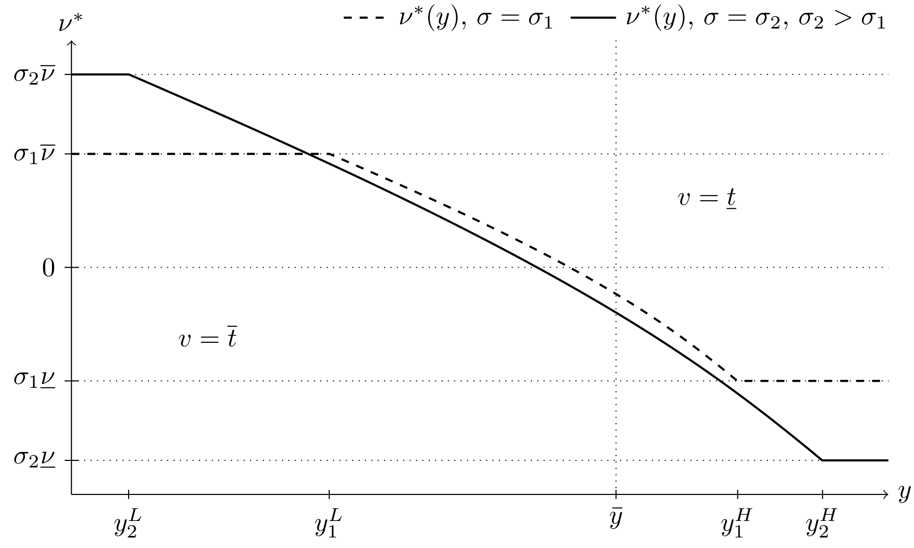

Figure 3: The threshold expected change in income as a function of current income.

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

$$h(y) \coloneqq F(\nu^*(y)). \tag{8}$$

For voters with $y \leq y^L$, $F(\nu^*(y)) = F(\overline{\nu}) = 1$, for voters with $y \geq y^H$, $F(\nu^*(y)) = F(\underline{\nu}) = 0$, and for voters with $y \in (y^L, y^H)$, $F(\nu^*(y)) \in (0,1)$. In the absence of income mobility, $\underline{\nu} = \overline{\nu} = 0$, 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 (8) 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 economic environment F, it is not only the perceptions of risk that change but the real income prospects as well. The vote share of 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 static 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. Here, we take this compositional change in the electorate's expected income dynamics into account. Let

$$h(y, \sigma) := F\left(\frac{\nu^*(y)}{\sigma}\right) \tag{9}$$

denote the demand for redistribution of a voter with income y given the scaled income shocks $\sigma\nu$.

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:

$$\frac{\partial}{\partial\sigma} h(y, \sigma) = \frac{d}{d\sigma} F\left(\frac{\nu^*}{\sigma}\right) = \underbrace{f\left(\frac{\nu^*}{\sigma}\right)\frac{1}{\sigma}\frac{\partial\nu^*}{\partial\sigma}}_{\text{Self-signaling effect}} - \underbrace{f\left(\frac{\nu^*}{\sigma}\right)\frac{1}{\sigma}\frac{\nu^*}{\sigma}}_{\text{Composition effect}}. \tag{10}$$

Without loss of generality, evaluating (10) at $\sigma = 1$, and noting that, $\Psi_\sigma + \Psi'\nu^* = \Psi(\nu^*(y), \bar{y}) = \Psi_y(\bar{y} - y)$, where details of the first equality are shown in Appendix and the second inequality follows from the definition of $\nu^*(y)$, we have

$$\begin{aligned} f(\nu^*)\left(\frac{\partial\nu^*}{\partial\sigma} - \nu^*\right) &= f(\nu^*)\left(-\frac{\Psi_\sigma + \Psi'\nu^*}{\Psi'}\right) = -f(\nu^*)\frac{\Psi(\nu^*; \bar{y})}{\Psi'} \\ &= -f(\nu^*(y))\frac{\Psi_y}{\Psi'}(\bar{y} - y) = (\bar{y} - y)\frac{d}{dy}F(\nu^*(y)). \end{aligned} \tag{11}$$

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

Proposition 4 (Income risk II). *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.*[8]

For voters with below mean current income, self-signaling effect dominates the composition effect and they reduce their demand for redistribution. For voters with above mean current income the new real prospects of downward mobility dominate the self-signaling effect and they increase their demand for redistribution.

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

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

above mean incomes and above mean income voters to expect below mean incomes. Intuitively, keeping the threshold ν^* fixed, as σ approaches infinity, the demand for redistribution approaches $F(0) = \frac{1}{2}$ 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 correlation between current income and voting.

6 Aggregate Demand

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 or, equivalently, as the probability that a randomly drawn voter (ν, y) votes for high redistribution:

$$H := \int_{y \in Y} h(y) dG(y) = \int_{y \in Y} F(\nu^*(y)) dG(y) = \int_{\underline{\nu}}^{\overline{\nu}} G(y^*(\nu)) dF(\nu), \tag{12}$$

where $y^* = (\nu^*)^{-1}$ is a threshold on current income such that given an income shock ν voters with current income $y < y^*(\nu)$ vote for high tax rate and otherwise they vote for low tax rate.[9] Studying aggregate demand for redistribution using a voting rule defined with respect to current income is for some of the following arguments more instructive and also facilitates comparisons to literature on redistributive voting where voting strategies are often defined as a function of current income. For $s = 0$ and in the absence of income mobility, we have $y^*(\nu) = \bar{y}$. With income mobility, we have $y^*(\nu) = \bar{y} - \nu$ but the income threshold of voting for low taxation y^* still averages to mean income $\bar{y}$ in the electorate. However, for $s > 0$, $y^*(\nu) < \bar{y} - \nu$, for all ν, that is, the income threshold for voting for low tax rate shifts downwards decreasing the aggregate demand for redistribution.

6.1 Income Inequality

In the absence of income mobility, $h(y)$ is either 0 or 1, $y^* = \bar{y}$ and the aggregate demand for redistribution is $G(\bar{y})$. Thus, the familiar results apply: if the income distribution is right-skewed, median income is less than mean income and $G(\bar{y}) > \frac{1}{2}$, that is, more than half of the voters vote for high tax rate. The demand for redistribution also increases in the mass of voters below mean income.

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

With income mobility, but in the absence of anticipation, we have

$$H = \int_{y \in Y} F(\bar{y} - y) dG(y). \tag{13}$$

Income mobility now interacts with the changes in the distribution of current incomes and second order stochastic transformations of the income distribution G can either increase or decrease the demand for redistribution depending on the shape of F. The presence of income mobility confounds the relationship between income inequality and demand for redistribution and that without further specifying the distributions of income and income shocks there is not much we can say about this relationship.

6.2 Income Risk

As the demand for redistribution decreases in the value of anticipation s for all income levels, aggregate demand for redistribution decreases in s. However, the effect with respect to risk is at the individual level ambiguous. Thus, the interesting question is whether and under what conditions we can determine the effect on aggregate demand for redistribution.

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, I only consider symmetric current income distributions. This gives us an upper bound of the aggregate demand effect in the class of weakly right-skewed income distributions.

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

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

where $G(\bar{y})$, as discussed above, is the demand for redistribution in the absence of income mobility. Thus, the composition effect alone decreases the aggregate demand for redistribution when the distribution of current incomes is right-skewed. If G is uniform, however, then G is affine and we have

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

and income risk has no effect on aggregate demand for redistribution without anticipatory concerns. Example 1 shows that with anticipatory concerns, aggregate demand for redistribution is decreasing in income risk.

Example 1. Let G be uniform. Then by (14), the effect of an increase in income risk on aggregate demand for redistribution is

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

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

$$\begin{aligned}-\int_{y^L}^{y^H} (\bar{y}-y)\frac{d}{dy}[1-F(\nu^*(y))]dy &\leq -\int_{y^L}^{y^H} (\bar{y}-y)\frac{d}{dy}[1-F(\hat{\nu}(y))]dy \\ &= -\int_{y^L}^{y^H} (\bar{y}-y)f(\bar{y}-y)dy,\end{aligned}$$

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

$$\begin{aligned}\int_{\bar{y}-y^L}^{\bar{y}-y^H}\nu f(\nu)d\nu = -\int_{\bar{y}-y^H}^{\bar{y}-y^L}\nu f(\nu)d\nu &\propto -\frac{\int_{\bar{y}-y^H}^{\bar{y}-y^L}\nu f(\nu)d\nu}{F(\bar{y}-y^L)-F(\bar{y}-y_H)} \\ &= -E[\nu|\bar{y}-y^H\leq\nu\leq\bar{y}-y^L]\leq 0.\end{aligned}\tag{17}$$

To show that the weak inequality holds in (17), let $\varepsilon(s) := E[\nu|\bar{y}-y^H(s)\leq\nu\leq$

$\bar{y} - y^L(s)]$. For $s = 0$ we have

$$\varepsilon(0) = E[\nu|\underline{\nu} \leq \nu \leq \overline{\nu}] = E[\nu] = 0.$$

Also, $\varepsilon(s)$ is increasing in s:

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

since $\frac{dy^L}{ds} < 0$ and $\frac{dy^H}{ds} < 0$ by Proposition 2. Thus, for $s > 0$, $\varepsilon(s) > 0$. Hence, the inequality in (17) 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 $s > 0$.

The equality in (16) also holds in case both F and G are symmetric. Intuitively, when G and F 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 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, the set of voters with negative demand effect increases while the set of voters with positive demand effects decreases. Example 2 considers a case where F and G are symmetric.

Example 2. Let F be uniform, $\nu \sim U(-\overline{\nu}, \overline{\nu})$ and G symmetric. The threshold ν^* is now defined by

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

and has a closed form solution

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

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

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

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

$$
\begin{aligned}
\int_{y^L}^{y^H}\left(\frac{\partial\nu^*}{\partial\sigma}-\nu^*\right)dG(y) &= -\frac{\Psi_y}{\Psi'}\int_{y^L}^{y^H}(\bar{y}-y)dG(y)\\
&= -\frac{\Psi_y}{\Psi'}\left(\bar{y}[G(y^H)-G(y^L)]-\int_{y^L}^{y^H} ydG(y)\right)\\
&\propto -\frac{\Psi_y}{\Psi'}\left(\bar{y}-\frac{\int_{y^L}^{y^H} ydG(y)}{G(y^H)-G(y^L)}\right)\\
&= -\frac{\Psi_y}{\Psi'}\left(\bar{y}-E[y|y^L\le y\le y^H]\right)\le 0.
\end{aligned}
\tag{18}
$$

To show that the weak inequality holds in (18), let $e(s) := E[y|y^L(s) \le y \le y^H(s)]$. For $s = 0$, for symmetric G, we have

$$e(0) = E[y|\bar{y}-\overline{\nu} \le y \le \bar{y}+\overline{\nu}] = \bar{y}.$$

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 (18) 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 $s > 0$.

Thus, when voters express their desires about their future incomes when voting an increase in income risk decreases 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 political economy 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).

Examples 1 and 2 also provide an explanation for the correlation between income mobility and demand for redistribution. High income mobility, both upwards and downwards, creates a room for anxiety and anticipation and thus a need for belief management. Here, one such tool is voting and voting for low tax rate reduces feelings of anxiety and supports feelings of anticipation.

7 Welfare

The voters with $\nu \in (\nu^*(y), \hat{\nu}(y))$ are taking actions that do not maximize their consumption. However, such narrow definition of voters' best interest ignores their anticipatory utility. In assessing the normative properties of voting behavior, we should take the enjoyment from anticipation into account.

Let

$$W(\tilde{\nu}; y) = \int_{\underline{\nu}}^{\tilde{\nu}} \Big(\delta U(\bar{t}, \nu, y) + sE[U(\bar{t}, \nu', y)|\nu' < \tilde{\nu}]\Big) dF(\nu) + \int_{\tilde{\nu}}^{\overline{\nu}} \Big(\delta U(\underline{t}, \nu, y) + sE[U(\underline{t}, \nu', y)|\nu' > \tilde{\nu}]\Big) dF(\nu)$$

be the welfare of voters with income y as a function of their voting strategy $\tilde{\nu}$ or the expected payoff of a voter with income y before the realization of ν given voting rule $\tilde{\nu}$.

Proposition 5. *For all y, for all $s \geq 0$ the welfare maximizing voting strategy is $\hat{\nu}(y)$.*

As voters with weak income prospects attempt to pool with the voters expecting high incomes they, while increasing their anticipatory utility, decrease the prospects of everyone else in the pool of low tax voters. Bayesian beliefs always average to prior across states of the world and so self-signaling only reallocates anticipation. On the other hand, voters realizing mobility prospects yielding below mean incomes would benefit from higher tax rate.

Self-signaling distorts voting without yielding aggregate gains in anticipation. But are the voters $\nu \in (\nu^*(y), \hat{\nu}(y))$ 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 remains high taxation then these voters are better off as they do not incur the economic cost of their self-signaling. Thus we focus on the case 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 6. *If and only if $q(\bar{t}) - q(\underline{t}) < 1$ there exists a threshold $\nu^{**} \in (\nu^*, \hat{\nu})$ such that there are voters with $\nu \in (\nu^*, \nu^{**})$ who vote for low tax rate but would prefer to vote for high tax rate if that lead to the implementation of high tax rate.*

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. This group of voters is decisive and would be able to improve their payoffs with a collective action of voting for high tax rate if $\int_{y \in Y} F(\nu^*(y))g(y)dy < \frac{1}{2} < \int_{y \in Y} F(\nu^{**}(y))g(y)$. However, they perceive the probability of their votes having 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.

8 Conclusion

Public choice models of voting generally and models of voting for redistribution specifically have mainly focused on preference aggregation usually leaving voting itself implicit. This simplification has been justified by supposing that the voters vote for instrumental reasons: they only care about the policy to be implemented how their vote contributes to the popularity of different policies. If this is the case, their votes reflect their policy preferences. However, due to the low probability of a single vote making a difference in election, votes may not be disciplined by direct consequences and voting may be closer to a stated preference than a revealed preference. If instrumental concerns are the only concerns of voters the tight correspondence between policy preferences and votes still follows from rational action. However, if voting for certain policies or parties has any intrinsic benefits voting may diverge from policy preferences. 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.

I add imperfect memory and anticipation to a model of voting for redistribution under uncertainty about future incomes. Voting for low taxation is compatible with the desirable anticipation of high future consumption. At the same time, the standard instrumental concerns in the form of consumption of after-tax income restrict self-signaling. The value of self-signaling depends on the distribution of economic possibilities in the economy. Higher income risk in the form of larger spread in the possible future income changes leads to higher anticipatory utility differential between the two voting choices. This increases the value of self-signaling. Hence, the model generates the prediction that pre-tax income risk in incomes decreases the demand for redistribution. The mechanism proposed may help understand why the demand for redistribution has not increased and may even have declined (Georgiadis & Manning, 2012) in the times of increasing income inequality driven especially by the top income shares (Piketty & Saez, 2014) and increasing income risk in the lower end of income distribution (e.g. Kalleberg (2003)).

Self-signaling when voting can be interpreted as a model of expressive voting. The intuitive appeal of the idea of expressive voting is strong. This makes it somewhat surprising that expressive voting has stayed in the periphery of public choice. The not so appealing characteristics 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. The self-signaling framework provides one way of endogenizing expressive benefits. Self-signaling say nationalistic, moral and altruistic characteristics instead or in addition to high future consumption are potential extensions.

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A Lemmata

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

Proof. See Heckman and Honoré (1990). □

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

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

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

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

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

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

$$\mathcal{M}_+(\nu') > E[\nu] = 0 \quad \text{and} \quad \mathcal{M}_-(\nu') < E[\nu] = 0. \tag{19}$$

Part (i).

$$\begin{aligned}
\frac{\partial}{\partial\sigma} E[\sigma\nu|\sigma\nu > \nu'] &= \frac{\partial}{\partial\sigma}\big(\sigma E\left[\nu|\nu > \frac{\nu'}{\sigma}\right]\big) \\
&= E\left[\nu|\nu > \frac{\nu'}{\sigma}\right] + \sigma\frac{\partial}{\partial\sigma} E\left[\nu|\nu > \frac{\nu'}{\sigma}\right] \\
&= E\left[\nu|\nu > \frac{\nu'}{\sigma}\right] + \sigma\frac{\partial}{\partial\frac{\nu'}{\sigma}} E\left[\nu|\nu > \frac{\nu'}{\sigma}\right]\frac{\partial}{\partial\sigma}\frac{\nu'}{\sigma} \\
&= E\left[\nu|\nu > \frac{\nu'}{\sigma}\right] + \sigma\frac{\partial}{\partial\frac{\nu'}{\sigma}} E\left[\nu|\nu > \frac{\nu'}{\sigma}\right]\left(-\frac{\nu'}{\sigma^2}\right) \\
&= E\left[\nu|\nu > \frac{\nu'}{\sigma}\right] - \frac{\partial}{\partial\frac{\nu'}{\sigma}} E\left[\nu|\nu > \frac{\nu'}{\sigma}\right]\frac{\nu'}{\sigma} \\
&= E[\nu|\nu > \tilde{\nu}'] - \frac{\partial}{\partial\tilde{\nu}'} E[\nu|\nu > \tilde{\nu}']\tilde{\nu}' \quad \text{where } \tilde{\nu}^* = \frac{\nu'}{\sigma} \\
&= \mathcal{M}_+(\tilde{\nu}') - \tilde{\nu}'\mathcal{M}'_+(\tilde{\nu}').
\end{aligned} \tag{20}$$

First note that if $\tilde{\nu}' \leq 0$, then by Lemma 1 and (19), (20) is strictly positive. Second, if $\tilde{\nu}' > 0$ we have

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

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).

$$
\begin{aligned}
\frac{\partial}{\partial\sigma}E[\sigma\nu|\sigma\nu<\nu'] &= \frac{\partial}{\partial\sigma}\big(\sigma E\left[\nu|\nu<\frac{\nu'}{\sigma}\right]\big) \\
&= E\left[\nu|\nu<\frac{\nu'}{\sigma}\right]+\sigma\frac{\partial}{\partial\sigma}E\left[\nu|\nu<\frac{\nu}{\sigma}\right] \\
&= E\left[\nu|\nu<\frac{\nu'}{\sigma}\right]+\sigma\frac{\partial}{\partial\frac{\nu'}{\sigma}}E\left[\nu|\nu<\frac{\nu'}{\sigma}\right]\frac{\partial}{\partial\sigma}\frac{\nu_i^*}{\sigma} \\
&= E\left[\nu|\nu<\frac{\nu'}{\sigma}\right]+\sigma\frac{\partial}{\partial\frac{\nu'}{\sigma}}E\left[\nu|\nu<\frac{\nu'}{\sigma}\right]\left(-\frac{\nu'}{\sigma^2}\right) \\
&= E\left[\nu|\nu<\frac{\nu'}{\sigma}\right]-\frac{\partial}{\partial\frac{\nu'}{\sigma}}E\left[\nu|\nu<\frac{\nu'}{\sigma}\right]\frac{\nu'}{\sigma} \\
&= E[\nu|\nu<\tilde{\nu}']-\frac{\partial}{\partial\tilde{\nu}'}E[\nu|\nu<\tilde{\nu}']\tilde{\nu}' \quad \text{where } \tilde{\nu}'=\frac{\nu'}{\sigma} \\
&= \mathcal{M}_-(\tilde{\nu}')-\tilde{\nu}'\mathcal{M}_-'(\tilde{\nu}').
\end{aligned} \tag{21}
$$

First note that if $\tilde{\nu}'\geq 0$, then by Lemma 1 and (19), (21) is strictly negative. Second, if $\tilde{\nu}'<0$ we have

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

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.

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

where the second equality follows from (8), where $h(y^L,\sigma)=F(\nu^*(y^L))=F(\overline{\nu})=1$ and $h(y^H,\sigma)=F(\nu^*(y^H))=F(\underline{\nu})=0$ 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 $\square$

B Proofs of Propositions

Proof of Proposition 1. First, find the voters that always vote for low taxation. Let $\nu^*(y)=\underline{\nu}$. Since these voters know they would have voted for low taxation for all ν voting does not convey any information and they expect an income change according to prior such that $\mathcal{M}_+(\underline{\nu})=0$. 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 $\mathcal{M}_-=\underline{\nu}$. Pooling requires that (5) is positive for all $\nu\in[\underline{\nu},\overline{\nu}]$ which, since (5) is increasing in ν given the beliefs $\mathcal{M}_+(\underline{\nu})=0$ and $\mathcal{M}_-=\underline{\nu}$ is true if and only if $\Psi(\underline{\nu};y)\geq 0$. This is equivalent to

$$y\geq y^H:=\bar{y}+\frac{|\underline{\nu}|}{s+\delta}\left(\delta-s\frac{(1-\overline{\tau})}{(\overline{\tau}-\underline{\tau})}\right). \tag{22}$$

Since Ψ is increasing, if $\Psi(\underline{\nu}) \geq 0$ there are no $\nu' \neq \underline{\nu}$ such that $\Psi(\nu') = 0$ 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 $\nu^*(y) = \overline{\nu}$. Since these voters know they would have voted for high taxation for all ν voting does not convey any information and they expect an income change according to prior such that $\mathcal{M}_-(\overline{\nu}) = 0$. 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 $\mathcal{M}_+ = \overline{\nu}$. Pooling requires that (5) is negative for all $\nu \in [\underline{\nu}, \overline{\nu}]$ which, since (5) is increasing in ν given the beliefs $\mathcal{M}_-(\overline{\nu}) = 0$ and $\mathcal{M}_+ = \overline{\nu}$ is true if and only if $\Psi(\overline{\nu}; y) \leq 0$. This is equivalent to

$$y \leq y^L := \bar{y} - \frac{\overline{\nu}}{s+\delta}\left(\delta + s\frac{(1-\underline{\tau})}{(\overline{\tau}-\underline{\tau})}\right). \tag{23}$$

Since Ψ is increasing, if $\Psi(\overline{\nu}) \leq 0$ there are no $\nu' \neq \overline{\nu}$ such that $\Psi(\nu') = 0$ 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 $\Psi(\underline{\nu}; y) < 0$ and $\Psi(\overline{\nu}; y) > 0$ and as Ψ is continuous and strictly increasing there exists unique threshold $\nu^*(y) \in (\underline{\nu}, \overline{\nu})$ such that $\Psi(\nu^*(y); y) = 0$ and such that for all $\nu < \nu^*(y)$ we have $\Psi(\nu^*(y); y) < 0$ and thus a vote for high tax rate is preferred and for all $\nu > \nu^*(y)$ we have $\Psi(\nu^*(y); y) > 0$ and thus a vote for low tax rate is preferred.

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

$$\frac{d\nu^*(y)}{dy} = -\frac{\Psi_y}{\Psi'} < 0, \tag{24}$$

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. With these derivatives at the boundaries and by Implicit Function Theorem, $\nu^*(y)$ is continuously differentiable with respect to y on $[y^L, y^H]$. □

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

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

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

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

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

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

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

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

since

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

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

$$\frac{\partial \nu^*(y)}{\partial s} = -\frac{\Psi_s}{\Psi'} < 0, \tag{25}$$

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

$$\begin{aligned}& s[(1-\underline{\tau})\mathcal{M}_+(\nu^*(y)) - (1-\overline{\tau})\mathcal{M}_-(\nu^*(y)) - (\overline{\tau}-\underline{\tau})(\bar{y}-y)] \\ &\quad = \delta(\overline{\tau}-\underline{\tau})(\bar{y} - y - \nu^*(y)).\end{aligned} \tag{26}$$

Now suppose $\Psi_s \leq 0$. If $s > 0$, this implies that the left-hand side of (26) is weakly negative. That is,

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

where the second inequality follows from the fact that $\nu' < \mathcal{M}_+(\nu')$ and $\nu' > \mathcal{M}_-(\nu')$ for the non-degenerate F. We thus have $(\overline{\tau}-\underline{\tau})(\nu^*(y)-\bar{y}+y) < 0$ implying $\bar{y}-y-\nu^*(y) > 0$ and thus the right hand side of (26) is strictly positive. Thus, weak negativity of the left-hand side of (26) implies strict positivity of the right hand side of (26) violating the equilibrium condition $\Psi(\nu^*(y); y) = 0$. Since $\Psi_s \leq 0$ gives us a contradiction, we must have $\Psi_s > 0$ whenever $\nu^*(y) \in (\underline{\nu}, \overline{\nu})$. □

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

$$\frac{\partial \nu^*(y)}{\partial \sigma} = -\frac{\Psi_\sigma}{\Psi'} < 0 \tag{27}$$

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

$$\Psi_\sigma = s\big[(1-\underline{\tau})\frac{\partial}{\partial \sigma}E[\sigma\nu|\sigma\nu > \nu^*(y)] - (1-\overline{\tau})\frac{\partial}{\partial \sigma}E[\sigma\nu|\sigma\nu < \nu^*(y)]\big] > 0, \tag{28}$$

where $\frac{\partial}{\partial \sigma}E[\sigma\nu|\sigma\nu > \nu^*(y)] > 0$ and $\frac{\partial}{\partial \sigma}E[\sigma\nu|\sigma\nu < \nu^*(y)] < 0$ follow from Lemma 3 and strict log-concavity of f. Define the derivative at $\nu^*(y^L) = \overline{\nu}$ to be the right derivative and at $\nu^*(y^H) = \underline{\nu}$ to be the left derivative. With these derivatives at the boundaries and by Implicit Function Theorem, $\nu^*(y)$ 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

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

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

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

□

Proof of Proposition 4. First note that

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

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

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

and so

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

and thus we have

$$\frac{\partial \nu^*}{\partial \sigma} - \nu^* = -\frac{\Psi_\sigma}{\Psi'} - \frac{\Psi'\nu^*}{\Psi'} = -\frac{\Psi_\sigma + \Psi'\nu^*}{\Psi'} = -\frac{\Psi(\nu^*(y);\bar{y})}{\Psi'} \tag{29}$$

and so

$$\frac{\partial}{\partial \sigma} h(y,\sigma) = f(\nu^*(y))\left(\frac{\partial \nu^*(y)}{\partial \sigma} - \nu^*(y)\right) = -f(\nu^*(y))\frac{\Psi(\nu^*(y);\bar{y})}{\Psi'}. \tag{30}$$

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

Proof of Proposition 5. Noting that

$$\mathcal{M}'_-(\nu) = \frac{f(\nu)}{F(\nu)}[\nu - \mathcal{M}_-(\nu)] \quad \text{and} \quad \mathcal{M}'_+(\nu) = \frac{f(\nu)}{1-F(\nu)}[\mathcal{M}_+(\nu) - \nu]$$

we can write

$$W'(\tilde{\nu};y) = (s+\delta)(\overline{\tau}-\underline{\tau})f(\tilde{\nu})(\hat{\nu}(y)-\tilde{\nu}).$$

Thus W has a unique critical point $\tilde{\nu} = \hat{\nu}(y)$. Also

$$W''(\tilde{\nu};y) = [-f(\tilde{\nu}) + (\hat{\nu}(y)-\tilde{\nu})f'(\tilde{\nu})](s+\delta)(\overline{\tau}-\underline{\tau})$$

and thus at $\tilde{\nu} = \hat{\nu}(y)$ we have $W''(\tilde{\nu};y) = -f(\hat{\nu}(y))(s+\delta)(\overline{\tau}-\underline{\tau}) < 0$ and thus $\hat{\nu}(y)$ maximizes $W(\tilde{\nu};y)$. □

Proof of Proposition 6. If a voter votes for t and t is implemented the voter's utility flows sum to

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

Thus, the voter ν^{**} who is equally well off in terms of this experienced utility no matter her voting choice satisfies

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

Since $(\overline{\tau}-\underline{\tau}) = (q(\bar{t})-q(\underline{t}))(\bar{t}-\underline{t})$ we have $\hat{\nu} > \nu^{**} > \nu^*$ whenever $q(\bar{t})-q(\underline{t}) < 1$. Thus, for voters with $\nu \in (\nu^*, \nu^{**})$ 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 $\Psi(\nu^{**})$ and we have $\nu^{**} = \nu^*$. $\square$