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1 Introduction

Given the inherent skewness in income distribution, egoistic motives of voters should result in a positive relation between market income inequality and redistribution, as proposed by Meltzer and Richard (1981). Even when obstacles to the democratic process exist, voter preferences should still significantly influence policy decisions. Survey evidence

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shows that support for redistribution policy indeed hinges on self-interest, related to the policy's impact on an individual's disposable income, but voters also have other-regarding concerns. Alesina and Giuliano (2011) and OECD (2021), for example, document that voters care about their own income relative to others as well as the income inequality within society. Such concerns should elevate the support for redistributive policies even further. Nevertheless, the cross-country evidence on the relationship between market income inequality and redistribution policies is mixed and does not consistently confirm the predicted positive relation.[1]

In this paper we explore whether the absence of a clear-cut correlation between inequality and redistribution can be attributed to changes in preferences, that result from shifts in the market income distribution. Moreover, the way preferences change may also be influenced by social divisions and economic policies. To understand these changes, we turn to social identity theory. In this context, our paper investigates the impact of endogenous social identification on redistribution policies within a politico-economic framework. In doing so, we align with the recent literature that explores the concept of social identity and its influence on economic outcomes and policies, as introduced by Akerlof and Kranton (2000) and Shayo (2009), and reviewed in Costa-Font and Cowell (2015) and Shayo (2020). The equilibrium concept we employ incorporates social identification with various groups, based on a trade-off between group status and perceived distance to the typical group characteristics. Social identities often vary based on the specific context (Hogg et al., 1995) and they encompass a wide range of categorizations, such as income, social class, nationality, race, ethnicity, gender, or religion. We focus on social identification with regard to disposable income and ethnicity. By recognizing that alterations in voters' social identity influence their preferences regarding consumption, we are better equipped to characterize how changes in market income inequality affect the equilibrium redistribution and equilibrium social identification.

The theory we propose, built on voters' endogenous selection of social identity, leads to a non-monotonic relationship between market income inequality and redistribution. Intuitively, in our model, redistribution increases with market income inequality as long as the society remains cohesive—meaning that rich voters identify with everyone, including the poor. However, when income inequality reaches a sufficiently high level, rich voters begin to feel detached from the poor and shift toward in-group identification, resulting in lower support for redistribution policies. In the presence of ethnic divisions, our findings suggest that ethnic minorities tend to transition to in-group identification first as market income inequality increases. This leads to a pattern characterized by multiple rises and falls in the tax rate until it ultimately plummets, as even rich ethnic majority voters shift their allegiance toward in-group identification. Note that our results do not hinge on the

[1] See Choi (2019) for a recent survey of the mixed empirical evidence.

existence of multiple equilibria, a route followed by Shayo (2009) to explain the divide in redistribution between northern Europe and US. In addition to providing predictions regarding market income redistribution, our model also furnishes insights into the evolving patterns of identification among economic and ethnic groups across different levels of inequality. Specifically, it reveals that affluent individuals and minority communities tend to change their allegiances, and self-identify as in-group members, at earlier stages as market income inequality increases.

We now describe the main elements of our theory. The economy we study is populated by voters that are characterized by their wage income, which can be low or high, as well as a discrete dimension that we call ethnicity. For each ethnicity there can be a distinct distribution of wages. Voters have standard preferences over private consumption. Moreover, in line with social identity theory (Tajfel, 1974; Tajfel and Turner, 1986), they also have other-regarding preferences toward the members of their social identity group. Given the available individual characteristics, there are several feasible identities. However, norms, history and complexity are factors reducing this choice. In our model, we allow voters to identify either with all other voters or to their own social group, which we restrict to be the "poor" and the "rich". Even though these identities are not ethnicity specific, ethnicity is a characteristic and voters will consider the ethnicity composition of social groups when choosing their identity, as described below.

Following social identity theory, the other-regarding component of preferences is composed of an affective term (status) and a cognitive term (centrality). The status of a social group is captured by its mean consumption. Ethnicity does not affect group status but it enters the centrality term. A voter's utility will decrease the lower the representation of its ethnicity in the identity group. Thus, centrality is composed of the perceived distance with regard to mean consumption as well as ethnic representation. We allow for complementarity between economic and ethnic centrality, which captures that ethnic distance becomes more salient when consumption inequality is high and that ethnic distance makes consumption differences more salient.

The further elements of the model are standard in the politico-economic literature (e.g., Persson and Tabellini (2002), Acemoglu and Robinson (2006)). The government policy is a linear tax on earnings which is redistributed as a lump-sum payment. The democratic process is modeled with probabilistic voting, thus swing voters from all social groups, including the rich, are relevant for the chosen equilibrium policies. In the political equilibrium the tax rate and the social identity adopted by the different voters are determined.

We obtain several results, our aim being to characterize the effect of changes in the wage distribution on the tax rate and social identification. We first consider a society where both ethnic groups have equal representation. In such an economy with balanced ethnicity we demonstrate the existence of two distinct types of political equilibria, which one prevailing depending on the income level of the rich voters. In instances where their income remains relatively modest, all voters identify universal and a strictly positive level of redistribution is supported. In the alternate scenario, rich voters identify in-group obstructing the feasibility of any redistribution.

We then begin examining the impact of changes in the wage distribution. Initially, we demonstrate that uniform wage growth has no bearing on the political equilibrium. As such, only disproportional shifts in the wage distribution (i.e. wage dispersion) across the poor and the rich affect the equilibrium tax rate and social identification. We then introduce a natural and model coherent definition for wage dispersion, that is, the weighted absolute deviation from the mean wage relative to the mean wage. Our analysis reveals a non-monotonic relationship between wage dispersion and the equilibrium tax rate: initially, an increase in wage dispersion amplifies the degree of redistribution, since all voters perceive themselves as less central within their respective social identity group. Consequently, elevated taxes can serve to mitigate this perceived distance. However, a critical juncture emerges where this distance becomes excessive for rich voters. When this point moves closer, political candidates optimally campaign on lower tax rates and rich voters opt to align themselves with the in-group identity. In summary, the equilibrium tax rate first increases and then falls to zero as the wage dispersion increases. With exogenously given social identity of voters, as for instance in Ghiglino, Juárez-Luna and Müller (2021), such a non-monotonic pattern could not occur.

Subsequently, we delve into the influence of ethnicity on these findings. We direct our attention to a societal context with a stringent ethnic majority and minority in the population. We find that in such a society a third intermediate equilibrium candidate emerges: for a relevant spectrum of parameters the equilibrium tax rate initially rises with wage dispersion, followed by an early decline as the rich ethnic minority voters transition from universal to in-group identification first. The reason is that for the ethnic minority voters economic distance is more salient. With a further increase of wage dispersion, the tax rate experiences yet another increase. Ultimately, however, the tax rate plummets to zero as also the rich ethnic majority voters shift their allegiance toward the in-group identity. Furthermore, we also show that as long as a society is cohesive, our model predicts that the presence of ethnic minorities and across ethnic group inequality hamper the support for income redistribution, while within ethnic group wage inequality increases it.

Our main finding, the non-monotonic relationship between market income inequality and redistribution, brings a new explanation, endogenous social identity, for the lacking positive empirical correlation between market income inequality and redistribution across countries. There is also indirect evidence supporting the mechanisms leading to this result.

Shayo (2020) documents that social identity matters in individual decisions. Interestingly, income inequality seems to be a factor favoring identity-based conflicts. Recent evidence is provided by the rise of independist views in Catalonia following the rise in inequality (see Piketty (2020) and Gethin, Martínez-Toledano and Morgan (2019)). In line with our model predictions, the support for independence is higher among affluent Catalans, who are the rich minority in the Spanish context. There is further evidence that the support for redistribution depends on income, and that other-regarding concerns play a bigger role for affluent voters. A feature we find as an equilibrium outcome in our paper. The evidence spans a variety of situations. Drawing upon data collected during national plebiscites in Switzerland, a study conducted by Fehr, Epper and Senn (2022) underscores the substantial and positive impact of inequality aversion and altruism on the endorsement of redistribution initiatives, but particularly among affluent voters. Similarly, Dimick, Rueda and Stegmueller (2017) reveal that in the U.S., while support for redistribution tends to decline with rising income, the preferences of the wealthy are highly sensitive to the level of macroeconomic inequality. Importantly, this sensitivity is notably lower among lower-income individuals. A related finding by Côté, House and Willer (2015) suggests that higher income individuals are less generous than poorer individuals but that this pattern emerges only under conditions of high economic inequality.

1.1 Related Literature

Our modeling of preferences is issued from the general framework of Akerlof and Kranton (2000) in which individuals payoffs depends on their identity, as well as on their and others actions.[2] Shayo (2009, 2020) adopts the view that individuals identify with the nation or the social class. The choice of social identity is determined by a trade-off between gains from group status and costs of the perceived distance to the group. In Shayo's political economy, changes in the social identity of the median voter lead to jumps in the tax rate, and multiple equilibria may be coexisting: a high-tax equilibrium with self-identification among the poor and a low-tax equilibrium where the poor identify with the nation as a whole.

Although we share the concept of social identity equilibrium and the identity trade off, there are important differences to Shayo (2009). Our results do not hinge on the existence of multiple equilibria and equilibrium selection. Differences in equilibrium policies and social identification are the result of changes in market income inequality. The reason is that we use a probabilistic voting framework where, beyond the median voter, all social groups enter the political objective function. In this way, our model yields unique equilibrium policies and social identification. Furthermore, in our model, the perceived

[2] See also Ghiglino, Juárez-Luna and Müller (2021) and the references therein.

centrality of voters is affected by the economic policy, while in Shayo (2009) it only affects the group status. Finally, our results show that endogenous social identity of the affluent is crucial, while in Shayo (2009) equilibrium changes are due to the identification of the median voter, who is a "poor".

The present model allows for ethnic heterogeneity. In this regard, our paper is related to Lindqvist and Östling (2013) who extend Shayo (2009) and allow voters to self-identify with respect to ethnicity. Voters identify either to their ethnic group or their income group but not both. To obtain single-peaked preferences, the authors restrict voters to separately choose their social identity and preferred policy. This modeling choice, using the median voter theorem, again yields co-existing equilibria and makes comparative statics with respect to market income inequality challenging. Our model has a unique equilibrium and the comparative statics are clear-cut. Furthermore, contrary to the present model, their framework excludes the choice between a universal and in-group identity—an important contribution of Shayo (2009).

Grossman and Helpman (2021) adapts Shayo's notion of a social identity equilibrium to analyze the role of identity in trade policies. They consider three social identity groups: the elite formed of high-skill workers, the working class with low-skill workers, and the nation as a whole. Workers identify to their own class and can chose whether to also identify to the nation or not. Individuals vote on an ad valorem tariff that increases the domestic relative price of the import-competing good, which is more intensive in low-skill workers. Within a probabilistic voting framework they show that changes in social identification patterns that may result from exogenous changes in the environment lead to pronounced changes in trade policy. The paper does not provide a characterization of the role of market income inequality on redistribution, even less the non-monotonicy of this relationship.

Based on Benabou and Tirole (2011, 2016), Bonomi, Gennaioli and Tabellini (2021) posits that identity influences beliefs via group stereotypes, which are "exaggerated" group characteristics. Voters' beliefs are polarized along the distinctive features of salient groups. These groups can relate to income, trade or cultural groups. Changes in the environment may allow some groups to be more salient leading to increased voter identification. Although there is no treatment of inequality, they find that lower class individuals beliefs on their prospect lies below the realized value. Thus, by identifying to a low class the individuals become too pessimistic about their social mobility, enhancing their demand for redistribution.

Klor and Shayo (2010) investigate the link between identity and redistribution in an experimental setting. They divide participants into two groups based on their field of studies and randomly assign gross incomes. Subjects then vote anonymously over a redistributive scheme consisting of a linear tax and a lump sum transfer. They find that

that group identification is a strong force: participants tend to high levels of redistribution when their identity group is relatively poor even if they themselves are relatively rich and vice versa. Furthermore, they also document evidence that the social identification with rich groups is stronger than with poor groups.

A vast literature has considered economic, political, and behavioral mechanisms to explain the differences in redistributive government policies across countries. Alesina, Glaeser and Sacerdote (2001) argue that redistribution may differ between Europe and the U.S. for political reasons: America does not have proportional representation and has strong courts, which prevent the growth of socialist parties and reject popular attempts at redistribution. Acemoglu and Robinson (2006, 2008) discuss how elite minorities affect political outcomes. They adopt a probabilistic voting framework and provide micro-political foundations (lobbying, capturing the party system, and ideology) for why the elite may have disproportionate political power in a democracy. Generally, elites often set up entry barriers, regulations and inefficient contracting institutions in order to protect their economic rents.[3] Alesina, Glaeser and Sacerdote (2001) argue that another possible explanation for the difference in redistribution between the U.S. and Europe is based on the higher political representation of the poor in Europe and a lower general level of altruism due to racial prejudice in the U.S. Similarly, introducing religion and race in voter's preferences, as in Roemer (1998), Lee and Roemer (2006), and Putterman, Roemer and Sylvestre (1998), also affects tax levels.

As in the present model, Ghiglino, Juárez-Luna, and Müller (2021) study the role of other-regarding preferences and ethnic fragmentation in the political economy of income redistribution. In their framework, however, social identity is fixed and directs voters' altruism toward specific social groups. In their analysis changes in market income inequality or policies have no effect on social identity, which is exogenously given, and it rests on how other-regarding preferences vary across countries and across income and ethnic groups to explain the available data. Importantly, their model cannot generate the non-monotonicity between market income inequality and redistribution that we establish in this paper.

The rest of the paper is organized as follows: In Section 2, we present our model and describe voters' endogenous preferences. In Section, 3 we characterize the political equilibrium and analyze the effect of market income inequality and the ethnic composition on the equilibrium redistribution and social identification. Section 4 concludes. Appendix A contains all the mathematical proofs.

[3] E.g, Olson (1982), Krusell and Rios-Rull (1996), Parente and Prescott (1999), Acemoglu (2010), Bandiera and Levy (2011), and Bourguignon and Verdier (2012).

2 Model

We consider an economy populated by a unit measure of voters. Each voter of type i earns wage $y^i \in \{y^l, y^h\}$ and is of ethnicity $e^i \in \{v, w\}$. Wages are ordered according to $0 < y^l < \bar{y} < y^h$, where $\bar{y}$ is the average wage in the population. We assume that the set of social groups composes of the rich $r \equiv h \times \{v, w\}$ and the poor $p \equiv l \times \{v, w\}$. We denote by $\lambda^i > 0$ the fraction of type i voters in the population and by $\lambda^g > 0$ the fraction of voters in social group $g \in \{r, p\}$. Further, $\pi(e) > 0$ is the fraction of voters with ethnicity e in the population and $\pi^g(e) > 0$ the fraction of e-voters in social group g. Without loss of generality, w will denote the prevalent ethnicity and v the minority ethnicity in the population such that $\pi(w) \geq 1/2 \geq \pi(v)$. Moreover, we assume that the majority of voters are poor, $\lambda^p = (1 - \lambda^r) > 1/2$.

2.1 Endogenous Preferences

The utility of voters consists of an egoistic and an endogenous, other-regarding component. We describe each of them below.

Egoistic utility
In the egoistic part voters have preferences over private consumption that can be represented by the linear utility function

$$C^i(\tau) = (1 - \tau)y^i + T(\tau),$$

where $\tau \in [0, 1]$ is a proportional tax on wage income that finances the uniform transfer

$$T(\tau) = [\tau - X(\tau)]\bar{y}.$$

The function $X(\tau)$ accounts for the deadweight loss of taxation and satisfies $X(0) = 0$, $X'(0) = 0$, $X''(\tau) > 0$, and $X'(1) \geq 1$. We also note that egoistic utility is independent of voters' ethnicity.

Other-regarding utility
In the other-regarding part of utility, $\widehat{V}^i(\tau)$, voters endogenously choose their social identity between *universal* and *in-group*

$$\widehat{V}^i(\tau) = \max\left\{\overbrace{\alpha\left[\bar{C}(\tau) - \left|\bar{C}(\tau) - C^i(\tau)\right|\gamma(e^i)\right]}^{\text{universal}}, \overbrace{\beta C^i(\tau)}^{\text{in-group}}\right\},$$

where the absolute distance term for the universal identity is weighted by

$$\gamma(e^i) \equiv \gamma_c + \gamma_\pi \left(1 - \pi(e^i)\right).$$

$\widehat{V}^i(\tau)$ presumes that voters optimally choose to either identify with all voters resulting in the *universal identity*, or they choose to identify with their own social group resulting in the *in-group identity*. We adopt Shayo's (2009) utility formulation with an affective (*status*) and a cognitive (*centrality*) identification factor. Status is captured by the average consumption in the social identity group, i.e., $\bar{C}(\tau)$ or $C^i(\tau)$. Centrality, for voters with the universal identity, is influenced both by the perceived distance with regard to average consumption, $|\bar{C}(\tau) - C^i(\tau)|$ and the other ethnicity's prevalence in the group, $1 - \pi(e^i)$, which enters the weight $\gamma(e^i)$. For voters with the in-group identity the perceived centrality is trivially zero, since their consumption equals mean consumption in the social identity group.[4] Even though we assume that social groups are characterised by social class (i.e., rich and poor), the ethnicity of voters will still affect other-regarding utility. The definition of the weight $\gamma(e^i)$ allows for complementarity ($\gamma_\pi \geq 0$) between economic and ethnic distance in the centrality term for voters with the universal identity. This interaction captures that ethnic distance becomes more salient when consumption distance is high and that ethnic distance makes consumption differences more salient.

We restrict parameters such that $\alpha > \beta$, $\gamma_c + \gamma_\pi \leq 1/2$, $\beta \geq \alpha(\gamma_c + \gamma_\pi)$, and $\beta \geq \alpha\lambda^r$. Furthermore, $\gamma_c > 0$, and $\gamma_\pi \geq 0$. The assumption that $\alpha > \beta$ captures voters' preference to adopt a collective identity rather than a subgroup identity, everything else equal.[5] The restriction $\gamma_c + \gamma_\pi \leq 1/2$ ensures that the equilibrium tax rate remains below the top of the Laffer curve despite the centrality concerns. $\beta \geq \alpha(\gamma_c + \gamma_\pi)$ and $\beta \geq \alpha\lambda^r$ ensure that β is sufficiently high to allow for non-trivial social identification dynamics in equilibrium.[6]

Overall utility

The overall utility of voter type i is then given by

$$V^i(\tau) = C^i(\tau) + \widehat{V}^i(\tau) = C^i(\tau) + \max\left\{\widehat{V}^{\alpha,i}(\tau), \widehat{V}^{\beta,i}(\tau)\right\}, \tag{1}$$

[4] As in Shayo (2009), centrality is related to the subjective importance of the group to self-definition. This is the cognitive factor in the influential three factor models of Jackson (2002) and Ellemers, Kortekass and Ouwerkerk (1999). Affection relates to the membership esteem, it is the emotion of being grateful or glad to be a group member. This factor, referred as status, mainly originates via intergroup comparisons.

[5] In our framework, $\alpha > \beta$ is necessary to support an active redistribution policy in equilibrium. There is experimental evidence to support this assumption, that is, identification to bigger groups is preferred, everything else equal (Brewer and Kramer, 1986; Brewer, 2010).

[6] A simpler but more restrictive sufficient condition would be to assume $\beta \geq \alpha/2$.

where

$$\widehat{V}^{\alpha,i}(\tau) \equiv \alpha\left[\bar{C}(\tau) - \left|\bar{C}(\tau) - C^i(\tau)\right|\gamma(e^i)\right]$$
$$\widehat{V}^{\beta,i}(\tau) \equiv \beta C^i(\tau)$$

denote the other-regarding utility of universal identification (superscript α) and in-group identification (superscript β), respectively.

2.2 Endogenous Social Identity

The endogenous choice of social identity in (1) implies that voters with wages below a certain threshold level—the social identity threshold—will optimally choose universal identification. Voters with wages strictly above the threshold will optimally identify in-group. The following lemma formalizes the pattern of social identification that occurs for a given tax rate τ.

Lemma 1 (Social Identification)**.** *Let $\tau \in [0, 1)$.*

(a) Poor voters always identify universal.

(b) Rich voters of ethnicity e identify universal iff $y^h \leq \hat{y}^{h,e}(\tau)$, where the social identity threshold is given by:

$$\hat{y}^{h,e}(\tau) = \frac{\alpha + \alpha\gamma(e)}{\beta + \alpha\gamma(e)}\bar{y} + \frac{(\alpha - \beta)T(\tau)}{(1-\tau)[\beta + \alpha\gamma(e)]} > \bar{y}. \tag{2}$$

Further, $\hat{y}^{h,e}(\tau)$ is higher for the prevalent ethnicity w than for the minority v.

Proof. In Section A.1 of the Appendix. □

The lemma shows in part (a) that poor voters always identify universal, because $\alpha > \beta$ and the status term dominates the centrality term in the other-regarding utility for both ethnicities. Part (b) of the lemma establishes that the rich voters may identify universal if α is sufficiently higher than β. In this case, the ethnic minority voters feel less central among all voters and their identification threshold is strictly below that of the prevalent ethnicity w.[7]

In the next lemma we establish the comparative statics of voters' social identification with respect to the tax rate τ.

Lemma 2 (Social Identity: Comparative Statics Tax Rate)**.** *The share of universal altruists among all voters is weakly increasing in $\tau \in [0, \bar{\tau}]$, where $\bar{\tau} = \arg\max_{\tau\in[0,1]} T(\tau)$.*

[7]Had we allowed for $\alpha \leq \beta$, then the social identification threshold for the rich would be below the average wage $\bar{y}$ and rich voters would always identify in-group.

Proof. Consider that $\bar{\tau}$ is the top of the Laffer curve, thus $1 - X'(\bar{\tau}) = 0$ and $T(\bar{\tau}) > 0$. Therefore, $T(\tau)/(1-\tau)$ is increasing in $\tau \in [0, \bar{\tau}]$ since $T'(\tau)/(1-\tau) + T(\tau)/(1-\tau)^2 = [1 - X'(\tau)]\bar{y}/(1-\tau) + [\tau - X(\tau)]\bar{y}/(1-\tau)^2 > 0$ for $\tau \in [0, \bar{\tau}]$. Then, (2) implies that $\hat{y}^{h,e}(\tau)$ is increasing in $\tau \in [0, \bar{\tau}]$, which makes universal identification among the rich, and therefore all voters, relatively more likely. □

Lemma 2 establishes that more redistributive taxation increases the social identity threshold for the rich and thereby weakly increases universal identification in the whole population of voters. Note that in the political equilibrium the tax rate will always be lower than $\bar{\tau}$, since even the tax rate that maximizes the utility of poor voters with a universal identity is lower than $\bar{\tau}$.[8]

3 Political Equilibrium

Under a standard probabilistic voting framework with equal political clout of all voter types, the relevant political objective function can be expressed as the population weighted sum of indirect utility functions (see Ghiglino, Juárez-Luna, and Müller (2021), for example)

$$O(\tau) \equiv \sum_i \lambda^i V^i(\tau), \tag{3}$$

such that the equilibrium tax rate $\tau^\star$ solves

$$\tau^\star = \arg \max_{\tau \in [0,1]} O(\tau).$$

In the following sections, we demonstrate the properties of the political equilibrium in two steps. First, in Section 3.1, we show how mainly social class influences social identification and redistribution when both ethnicities have equal representation in the population, that is $\pi(w) = \pi(v)$. Second, in Section 3.2, we characterize the political equilibrium for the broader case with a strict ethnic majority and minority, $\pi(w) > \pi(v)$. For a more compact formulation of the results it is convenient to define the following political objective functions *conditional* on universal identification of: all voters (O^h); all

[8] To see this, consider that the tax rate maximizing the utility of poor voters with a universal identity satisfies:

$$\frac{\partial \widehat{V}^{\alpha,(l,e)}(\tau)}{\partial \tau} = 0 \Leftrightarrow 1 - X'(\tau) = \frac{y^l}{\bar{y}} \frac{1 + \alpha\gamma(e)}{1+\alpha} + \frac{\alpha(1-\gamma(e))}{1+\alpha} > 0 \Rightarrow \tau < \bar{\tau}.$$

voters except the rich minority (O^m); and all voters except all rich voters (O^l) such that:

$$\begin{aligned} O^h(\tau) &\equiv \bar{C}(\tau) + \sum_i \lambda^i \widehat{V}^{\alpha,i}(\tau) \\ O^m(\tau) &\equiv \bar{C}(\tau) + \sum_{i \neq (h,v)} \lambda^i \widehat{V}^{\alpha,i}(\tau) + \lambda^{h,v} \widehat{V}^{\beta,(h,v)} \\ O^l(\tau) &\equiv \bar{C}(\tau) + \sum_{i \in p} \lambda^i \widehat{V}^{\alpha,i}(\tau) + \sum_{i \in r} \lambda^i \widehat{V}^{\beta,i}. \end{aligned}$$

3.1 Endogenous Social Identity and Social Class

Our first proposition characterizes the political equilibrium when both ethnicities have equal representation in the population, $\pi(w) = \pi(v)$. This case is useful to isolate the effect of social class on the equilibrium tax and social identity in a tractable manner. In the next Section 3.2, we will then demonstrate how the presence of an ethnic minority affects the equilibrium beyond social class.

Proposition 1 (Political Equilibrium)**.** *Let $\pi(w) = \pi(v)$. The equilibrium tax rate is given by*

$$\tau^\star = \begin{cases} \tau^h \equiv (X')^{-1} \left[\frac{\alpha}{1+\alpha} \Lambda / \bar{y}\right] \in (0,1), & y^h \leq \tilde{y} \\ \tau^l \equiv 0, & y^h > \tilde{y} \end{cases} \tag{4}$$

where

$$\begin{aligned} \Lambda &\equiv \sum_i \lambda^i \left|\bar{y} - y^i\right| \gamma(e^i) > 0 \\ \tilde{y} &\equiv \left\{ y^h \in (\hat{y}^{h,e}(0), \bar{y}/\lambda^r) : O^h(\tau^h) = O^l(\tau^l) \right\}. \end{aligned} \tag{5}$$

Furthermore, all voters identify universal, $O(\tau^\star) = O^h(\tau^h)$, when $y^h \leq \tilde{y}$ and only the rich identify in-group, $O(\tau^\star) = O^l(\tau^l)$, when $y^h > \tilde{y}$.

Proof. In Section A.2 of the Appendix. □

The proposition shows that two types of political equilibria can occur, depending on the earnings of the rich: in the first case, when y^h is relatively low, all voters identify universal and a strictly positive level of redistribution is supported, $\tau^\star = \tau^h > 0$. In the second case, when y^h is relatively high, rich voters identify in-group and no redistribution can be supported, $\tau^\star = \tau^l = 0$. Note that there is a knife-edge case, $y^h = \tilde{y}$ characterized in (5), where both possible patterns of social identification (and redistributive taxation) maximize the political objective. In this case, we assume that the political candidates choose $\tau^\star = \tau^h$. This tiebreak rule is not crucial for our results, but having a unique equilibrium tax rate simplifies the presentation of the following results substantially.

The next lemma establishes the comparative statics of the political equilibrium with respect to uniform wage growth.

Lemma 3 (Comparative Statics: Uniform Wage Growth)**.** *Let $\pi(w) = \pi(v)$. The equilibrium tax rate and social identification are invariant to uniform proportional shifts of the wage distribution.*

Proof. Start from the political equilibrium with $\tau^\star = \tau^h$ and $y^h \leq \tilde{y}$, and assume that all wages grow at the same gross rate $\omega > 0$. Then $\bar{y}$ and Λ grow with rate ω as well, thus (4) implies that τ^h is invariant to uniform proportional shifts of the wage distribution. Given that τ^h, $\Lambda/\bar{y}$ and τ^l are constant, then $O^h(\tau^h)$ and $O^l(\tau^l)$ are linear homogenous in wages. Thus, the indifference in (5) can only remain if $\tilde{y}$ grows with rate ω too. Finally, since both y^h and $\tilde{y}$ grow at the same rate, we have that $\omega y^h \leq (>)\, \omega\tilde{y} \Leftrightarrow y^h \leq (>)\, \tilde{y}$, thus the equilibrium social identification of the rich is also invariant. A similar argument holds when starting from a political equilibrium with the constant tax rate $\tau^\star = \tau^l = 0$ and $y^h > \tilde{y}$. □

Lemma 3 establishes that any economy with the same relative (to its average) wage distribution has the same equilibrium tax rate and social identification. This is a crucial results, since any shift in the wage distribution can be decomposed into a uniform proportional shift, which leaves the equilibrium unchanged, plus a mean-preserving change in the wage dispersion, that affects the equilibrium.

Definition 1 (Wage Dispersion)**.** *The dispersion of the wage distribution is defined as*

$$1/\bar{y} \sum_i \lambda^i |\bar{y} - y^i| = 2\lambda^r (y^h/\bar{y} - 1).$$

The definition highlights that an increase in the relative wage of the rich, $y^h/\bar{y}$, is equivalent to an increase in the wage dispersion measured by the weighted absolute distance relative to the average wage. Furthermore, we note that an increase in $y^h/\bar{y}$ also implies an increase in the *perceived* wage dispersion $\Lambda/\bar{y} = 1/\bar{y} \sum_i \lambda^i |\bar{y} - y^i| \gamma(e^i)$.[9] The following lemma establishes the comparative statics of the political equilibrium with respect to the wage dispersion. We focus the lemma on the non-trivial case where the equilibrium social identification will change with a sufficiently high change in the wage dispersion.

Lemma 4 (Comparative Statics: Wage Dispersion)**.** *Let $\pi(w) = \pi(v)$. Starting from an equilibrium with universal identification of all voters and $\tau^\star = \tau^h$, the tax rate first*

[9] To see why consider that the wage dispersion increases due to an increase in $y^h/\bar{y} > 1$ at the expense of $y^l/\bar{y} < 1$. Then it is clear that this increase in the wage dispersion also implies an increase in the perceived wage dispersion since all distance terms in $\Lambda/\bar{y} = \sum_i \lambda^i |1 - y^i/\bar{y}| \gamma(e^i)$ increase.

increases in the wage dispersion and then falls to $\tau^l < \tau^h$ as the rich become in-group altruistic.

Proof. The order $0 < y^l < \bar{y} < y^h$ implies that $y^h/\bar{y} \in (1, 1/\lambda^r)$. The fact that $\bar{y} < \hat{y}^{h,e}(0) < \tilde{y} < \bar{y}/\lambda^r$ ensures a nonempty partition $(1, \tilde{y}/\bar{y}]$ where the rich identify universal and its complement $(\tilde{y}/\bar{y}, 1/\lambda^r)$ where the rich identify in-group. Thus, starting from $y^h/\bar{y} < \tilde{y}/\bar{y}$ an increase in the wage dispersion (or equivalently $y^h/\bar{y}$) will first increase the equilibrium tax rate τ^h via $\Lambda/\bar{y}$ while the rich remain universal altruistic. However, a sufficiently high increase in the wage dispersion will ultimately require that $y^h/\bar{y}$ increases above $\tilde{y}/\bar{y}$. At this point, the equilibrium tax rate falls to $\tau^l = 0$ and the rich will identify in-group. $\square$

Lemma 4 shows that the equilibrium tax rate is non-monotonic in the wage dispersion. Starting from an equilibrium with universal identification, wage dispersion initially increases redistribution as all voters feel less central in their social identity group and higher taxes can reduce this perceived distance. However, there comes a cliff edge where the distance becomes too high for the rich voters and they prefer to identify in-group when the political candidates propose $\tau^l < \tau^h$. Starting from an equilibrium with in-group identification of the rich, the non-monotonic pattern also holds in reverse, when the wage dispersion sufficiently contracts. The next corollary to Lemma 4 follows immediately.

Corollary 1 (Comparative Statics: Wage Dispersion)**.** *Let $\pi(w) = \pi(v)$. It holds that:*

(a) for $y^h \leq \tilde{y}$, the rich keep the universal identity and the equilibrium tax rate decreases when the wage dispersion contracts.

(b) for $y^h > \tilde{y}$, the rich keep the in-group identity and the tax rate remains at zero when the wage dispersion increases.

3.2 Endogenous Social Identity and Ethnicity

We now analyze the broader case when there is a strict ethnic majority and minority in the population, $\pi(w) > \pi(v)$. In this instance, the ethnic minority voters feel less central in the population and therefore switch from universal to in-group identification earlier than ethnic majority voters, everything else equal. As the next proposition shows, this pattern of social identification gives rise to a third equilibrium candidate.

Proposition 2 (Political Equilibrium: Ethnicity)**.** *Let $\pi(w) > \pi(v)$. The equilibrium tax rate $\tau^\star$ satisfies the necessary condition:*

$$\tau^\star = \begin{cases} \tau^h = (X')^{-1}\left[\frac{\alpha}{1+\alpha}\Lambda/\bar{y}\right], & y^h \leq \hat{y}^{h,v}(\tau^\star) \\ \tau^m \equiv (X')^{-1}\left[\max\left\{0, \frac{\alpha\Lambda-\lambda^{h,v}[\alpha\gamma(v)+\beta](y^h-\bar{y})}{[1+\alpha-(\alpha-\beta)\lambda^{h,v}]\bar{y}}\right\}\right], & \hat{y}^{h,v}(\tau^\star) < y^h \leq \hat{y}^{h,w}(\tau^\star) \\ \tau^l = 0, & \textit{otherwise.} \end{cases} \tag{6}$$

Moreover, we have that $1 > \tau^h > \tau^m \geq \tau^l = 0$.

Proof. In Section A.3 of the Appendix. □

The proposition establishes a *necessary* condition for the equilibrium tax rate and social identification. It shows that there exist at most three equilibrium candidates, namely $O^h(\tau^h)$, $O^m(\tau^m)$, and $O^l(\tau^l)$. The political candidates then choose the equilibrium candidate which maximizes the political objective function (3), depending on the value of y^h. For example, in the intermediate range of y^h it may occur that $O^h(\tau^h)$, $O^m(\tau^m)$, and $O^l(\tau^l)$ satisfy (6) simultaneously. However, in the range $y^h \leq \hat{h}^{h,v}(0)$, the only equilibrium candidate is $O^h(\tau^h)$ with universal identification of all voters. For $y^h > \hat{y}^{h,w}(\tau^h)$ the only candidate is $O^l(\tau^l)$ with universal identification of all poor and in-group identification of all rich voters.

Based on Proposition 2 we now establish a lemma showing that two type of equilibrium dynamics, depending on parameters, may occur when the wage dispersion increases. For a compact formulation of the following Lemma 5, it is convenient to define two further threshold wages for the rich voters, where the political candidates are indifferent between proposing two tax policy alternatives:

$$\tilde{y}^{h,m} \equiv \left\{y^h \in (\hat{y}^{h,v}(0), \bar{y}/\lambda^h) : O^h(\tau^h) = O^m(\tau^m)\right\}$$
$$\tilde{y}^{m,l} \equiv \left\{y^h \in (\hat{y}^{h,v}(0), \bar{y}/\lambda^h) : O^m(\tau^m) = O^l(\tau^l)\right\}.$$

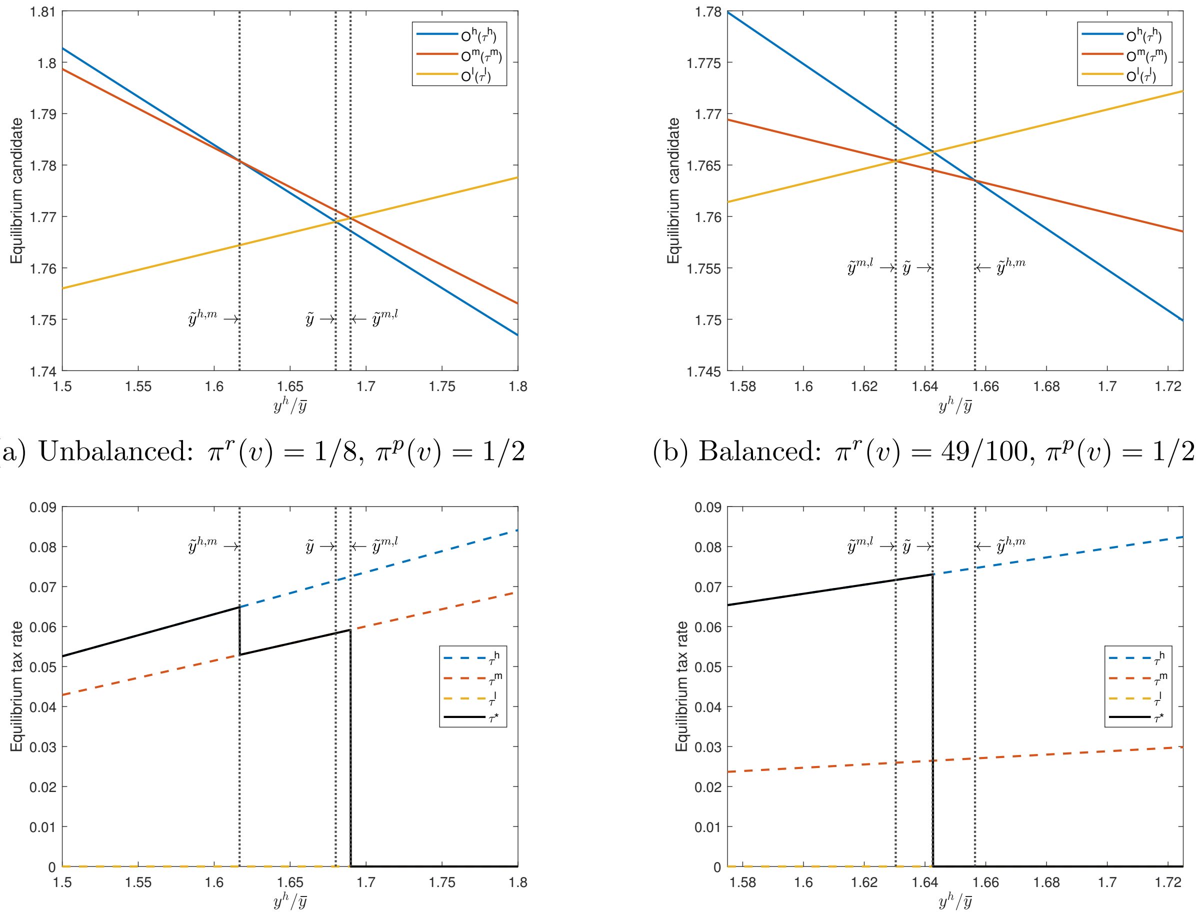
Lemma 5 (Comparative Statics: Wage dispersion)**.** *Let* $\pi(w) > \pi(v)$. *Starting from an equilibrium with universal identification of all voters and* $\tau^\star = \tau^h > 0$ *the following equilibrium dynamics hold:*

(a) when $\tilde{y}^{h,m} < \tilde{y} \leq \tilde{y}^{m,l}$, *the equilibrium tax rate first increases in the wage dispersion and then falls to* $\tau^m < \tau^h$ *as the ethnic minority switch to the in-group identity. For a further increase in the wage dispersion the tax rate again increases, before it drops to* $\tau^l = 0$ *as the rich ethnic majority voters switch to the in-group identity too.*

(b) when $\tilde{y}^{h,m} \geq \tilde{y} > \tilde{y}^{m,l}$, *the equilibrium tax rate first increases in the wage dispersion and then falls to* $\tau^l = 0$ *as all rich voters switch to the in-group identity.*

Proof. In Section A.4 of the Appendix. □

Figure 1 illustrates, using two numerical examples, that both cases stated in the lemma are relevant. In panel (a) of the figure, we choose $\pi^r(v) = 1/8$ and $\pi^p(v) = 1/2$ such that the ethnic minority is underrepresented among the rich and in the population. This yields that $\tilde{y}^{h,m} < \tilde{y}$ which corresponds to case (a) in Lemma 5. In panel (b) of Figure 1, we choose $\pi^r(v) = 49/100$ and $\pi^p(v) = 1/2$ such that the ethnic representation is almost balanced both among social classes and in the population. This yields that $O^m(\tau^l)$ and $O^l(\tau^l)$ cross before $\tilde{y}$ and corresponds to case (b) the lemma.



(a) Unbalanced: $\pi^r(v) = 1/8$, $\pi^p(v) = 1/2$

(b) Balanced: $\pi^r(v) = 49/100$, $\pi^p(v) = 1/2$

(c) Unbalanced: $\pi^r(v) = 1/8$, $\pi^p(v) = 1/2$

(d) Balanced: $\pi^r(v) = 49/100$, $\pi^p(v) = 1/2$

Figure 1: Political equilibrium with unbalanced vs balanced ethnic composition

Lemma 5 establishes in part (a) that the presence of ethnic minorities yields novel equilibrium dynamics compared to the previous Lemma 4 where we had assumed that the ethnic representation was balanced. In particular, the ethnic minority among the rich feels less central in the population and prefers in-group over universal identification at an earlier level of wage dispersion. The opposite holds for the ethnic majority rich. Panel (c) of Figure 1 illustrates that in this case the equilibrium tax rate is a non-monotonic function of wage dispersion: $\tau^\star = \tau^h$ for low wage dispersion, then falls to τ^m and later drops to $\tau^l = 0$ for a further increase in wage dispersion. Part (b) of Lemma 5 shows that there may also be equilibrium dynamics reminiscent of the one established in Lemma 4, where the equilibrium tax rate drops directly from τ^h to τ^l as the wage dispersion increases. Naturally, this case occurs when the ethnic representation is sufficiently balanced, as illustrated in panel (d) of Figure 1.

Corollary 2 (Comparative Statics: Ethnic Minority)**.** *Assume the rich identify universal, then the equilibrium tax rate:*

(a) decreases as $\pi(v)$ decreases, when $\lambda^{h,e}/\pi(e)$ is constant and the same across ethnicities.

(b) increases as the wage dispersion within ethnic groups increases, when $\lambda^{h,e}/\pi(e)$ is constant.

(c) decreases as $\lambda^{h,w}/\pi(w) - \lambda^{h,v}/\pi(v) \geq 0$ increases, when $\pi(v) < 1/2$ and $\pi(v)$, λ^r are both constant.

Proof. In Section A.5 of the Appendix. □

This corollary to Lemma 5 can be related to several empirical findings in the literature. Part (a) establishes that the support for redistribution in a cohesive society is highest when the ethnic representation is balanced, $\pi(w) = \pi(v) = 1/2$. All else equal, including social identification, a decrease in $\pi(v)$ then lowers the perceived wage dispersion and thereby the support for income redistribution. The reason is that, keeping the conditional wage distribution of ethnicities the same, the increase in the perceived distance by the ethnic minority is more than outweighed by the reduction in the distance perception of the ethnic majority. The result that the presence of ethnic minorities reduces the support for redistribution aligns with the works of Alesina and La Ferrara (2000, 2005), Alesina, Glaeser and Sacerdote (2001), and Alesina and Glaeser (2004). With regard to social identification, the reduction in $\pi(v)$ has heterogenous effects on rich voters. In particular, the reduction in the equilibrium tax rate τ^h and the reduced distance perception yield that the rich ethnic majority voters keep the universal identity longer when the wage dispersion increases. The rich ethnic minority voters, instead, tend to switch to in-group identification earlier due to the increased distance perception. This is illustrated in Figure 2, which compares the equilibrium tax rate of an economy with balanced ethnic representation, $\pi(v) = 1/2$, to an unbalanced one where $\pi(v) = 2/5$. In both cases $\lambda^{h,e}/\pi(e) = 0.4$.

Corollary 2 is also consistent with the empirical evidence that suggests the effect of minorities on the level of redistribution depends on the income distributions within and across ethnic groups. Part (b) is consistent with Lind (2007) who presents evidence from American states, revealing that increased inequality within ethnic groups leads to higher

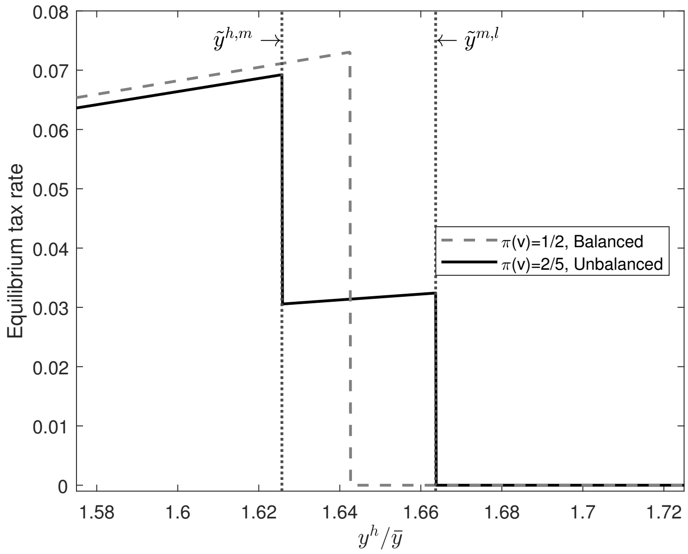


Figure 2: Equilibrium tax rate: $\pi(v) = 1/2$ vs. $\pi(v) = 2/5$, given $\lambda^{h,e}/\pi(e) = 0.4$.

levels of redistribution. Lind also shows that the impact of inequality between ethnic groups has a negative impact, which is consistent with part (c) of the corollary, where an increase in the average wage among the ethnic majority comes at the expense of a reduction in the average wage of the ethnic minority such that $\bar{y}$ remains constant. This result is also consistent with Baldwin and Huber (2010) that conduct a cross-national analysis, demonstrating that inequality between ethnic groups negatively affects public support for redistribution.

4 Conclusion

In this paper we developed a politico-economic theory that considers voters with other-regarding preferences derived from social identity theory. By allowing voters to choose whether to identify with others only from the same social class or all voters, we established a non-monotonic relationship between market income dispersion and redistributive policies. This finding is consistent with the absence of a clear empirical relationship between income inequality and redistribution across countries and time. Our framework also models the role of ethnic fragmentation and yields predictions in agreement with recent empirical evidence on the differential effects of intra versus between ethnic group income inequality on redistribution.

Our research opens up several promising avenues for further investigation. Introducing more than two income groups, could provide individuals with a broader range of identity options, especially when combined with considerations of ethnicity. Additionally, extending our model to a dynamic political economy setting along the lines of Song, Storesletten, Zilibotti (2012) and Müller, Storesletten and Zilibotti (2016) would enable to explore compelling questions regarding the role of public debt and the political color of governments in the context of endogenous social identity and income redistribution.

A Mathematical Appendix

A.1 Proof of Lemma 1

To show part (a) of the lemma, consider that for any $\tau \in [0, 1)$ the threshold wage $\hat{y}^{l,e}(\tau)$ that would make a poor voter exactly indifferent between universal and in-group identification is given by $\widehat{V}^{\alpha,(l,e)}(\tau) = \widehat{V}^{\beta,(l,e)}(\tau)$. Or, equivalently

$$\alpha\left[\bar{y} + T(\tau)/(1-\tau) - \left(\bar{y} - \hat{y}^{l,e}(\tau)\right)\gamma(e)\right] = \beta\left[\hat{y}^{l,e}(\tau) + T(\tau)/(1-\tau)\right]. \tag{7}$$

Collecting terms in (7) yields

$$[\alpha - \alpha\gamma(e)]\bar{y} + (\alpha - \beta)T(\tau)/(1-\tau) = [\beta - \alpha\gamma(e)]\hat{y}^{l,e}(\tau),$$

such that the social identity threshold of poor voters is given by

$$\hat{y}^{l,e}(\tau) = \frac{\alpha - \alpha\gamma(e)}{\beta - \alpha\gamma(e)}\bar{y} + \frac{(\alpha - \beta)T(\tau)}{(1-\tau)[\beta - \alpha\gamma(e)]} > \bar{y},$$

where we used that $\alpha > \beta$ and $\beta \geq \alpha(\gamma_c + \gamma_\pi) > \alpha\gamma(e)$ to establish the last inequality. Since $y^l < \bar{y} < \hat{y}^{l,e}(\tau)$, the poor will always prefer universal identification. To see this, consider that even at $y^l = \bar{y}$ we have that $\widehat{V}^{\alpha,(l,e)}(\tau) > \widehat{V}^{\beta,(l,e)}(\tau)$.

To prove part (b) consider that the threshold wage making a rich voter exactly indifferent between universal and in-group identification is given by

$$\alpha\left[\bar{y} + T(\tau)/(1-\tau) - \left(\hat{y}^{h,e}(\tau) - \bar{y}\right)\gamma(e)\right] = \beta\left[\hat{y}^{h,e}(\tau) + T(\tau)/(1-\tau)\right].$$

Collecting terms yields

$$[\alpha + \alpha\gamma(e)]\bar{y} + (\alpha - \beta)T(\tau)/(1-\tau) = [\beta + \alpha\gamma(e)]\hat{y}^{h,e}(\tau),$$

thus the social identity threshold of the rich voters is indeed given by (2). Finally, the social identification threshold is higher for the prevalent ethnicity w since $\gamma(w) < \gamma(v)$ and

$$\frac{d\hat{y}^{h,e}(\tau)}{d\gamma(e)} = \frac{\alpha(\beta - \alpha)}{[\beta + \alpha\gamma(e)]^2} - \frac{\alpha(\alpha - \beta)T(\tau)}{(1-\tau)[\beta + \alpha\gamma(e)]^2} \leq 0.$$

A.2 Proof of Proposition 1

Since $\pi(w) = \pi(v) = 1/2$ we have that $\gamma(w) = \gamma(v) = \gamma_c + \gamma_\pi/2$. Then, Lemma 1 implies that *all* rich voters, independent of their ethnicity, have the same social identification threshold $\hat{y}^{h,e}(\tau)$. Since the poor voters always identify universal, there are two possible equilibrium social identification patterns: one with universal identification of all voters including the rich, $O^h(\tau)$, and another with in-group identification of the rich, $O^l(\tau)$.

In the first case, when the rich identify universal, the political objective function is given by

$$
\begin{aligned}
O^h(\tau) &= \bar{C}(\tau) + \sum_i \lambda^i \widehat{V}^{\alpha,i}(\tau) \\
&= \bar{C}(\tau) + \alpha \sum_i \lambda^i \left[(1-\tau)\bar{y} + T(\tau) - (1-\tau)\left|\bar{y} - y^i\right| \gamma(e^i)\right] \\
&= (1+\alpha)[(1-\tau)\bar{y} + T(\tau)] - \alpha(1-\tau) \sum_i \lambda^i \left|\bar{y} - y^i\right| \gamma(e^i),
\end{aligned}
$$

and the corresponding equilibrium candidate tax rate $\tau^h = \arg\max_{\tau \in [0,1]} O^h(\tau)$ satisfies the optimality condition

$$
X'(\tau^h)\bar{y} = \frac{\alpha}{1+\alpha} \sum_i \lambda^i \left|\bar{y} - y^i\right| \gamma(e^i) \Leftrightarrow \tau^h = (X')^{-1}\left[\frac{\alpha}{1+\alpha}\Lambda/\bar{y}\right] > 0. \tag{8}
$$

Thus, $O^h(\tau^h)$ is an equilibrium candidate iff $y^h \leq \hat{y}^{h,e}(\tau^h)$, i.e., iff the rich indeed identify universal at tax rate τ^h. Next we prove that $\tau^h < 1$ by showing that

$$
\begin{aligned}
\Lambda/\bar{y} = \sum_i \lambda^i \left|\bar{y} - y^i\right| \gamma(e^i)/\bar{y} < \sum_i \lambda^i \left|\bar{y} - y^i\right| (\gamma_c + \gamma_\pi)/\bar{y} & \\
= (\gamma_c + \gamma_\pi)\left[\sum_{i \in p} \lambda^i(\bar{y} - y^l) + \sum_{i \in r} \lambda^i(y^h - \bar{y})\right]/\bar{y} & \\
= (\gamma_c + \gamma_\pi)\left[(1-\lambda^r)\bar{y} - (\bar{y} - \lambda^r y^h) + \lambda^r(y^h - \bar{y})\right]/\bar{y} & \\
= (\gamma_c + \gamma_\pi) 2\lambda^r (y^h - \bar{y})/\bar{y} & \\
< (\gamma_c + \gamma_\pi) 2\lambda^r (\bar{y}/\lambda^r - \bar{y})/\bar{y} & \\
= 2(\gamma_c + \gamma_\pi)(1-\lambda^r) < 1, & \qquad (9)
\end{aligned}
$$

where we used the fact that $y^h < \bar{y}/\lambda^r$ (otherwise $y^l \leq 0$) to derive the second inequality and $\gamma(e^i) < \gamma_c + \gamma_\pi \leq 1/2$ to establish the first and the last inequality. Together, (8) and (9) imply that $\tau^h < 1$ since $X'(1) \geq 1$ and $X''(\tau) > 0$.

In the second case, when the rich identify in-group the political objective can be written as

$$
\begin{aligned}
O^l(\tau) &= \bar{C}(\tau) + \sum_{i\in p} \lambda^i \widehat{V}^{\alpha,i}(\tau) + \sum_{i\in r} \lambda^i \widehat{V}^{\beta,i}(\tau) \\
&= \bar{C}(\tau) + \alpha \sum_{i\in p} \lambda^i \left[(1-\tau)\bar{y} + T(\tau) - (1-\tau)\left(\bar{y} - y^i\right)\gamma(e^i)\right] \\
&\quad + \beta \sum_{i\in r} \lambda^i [(1-\tau)y^h + T(\tau)] \\
&= \sum_{i} \lambda^i [(1-\tau)y^i + T(\tau)] + \alpha \sum_{i\in p} \lambda^i \left[(1-\tau)\bar{y} + T(\tau) - (1-\tau)\left(\bar{y} - y^i\right)\gamma(e^i)\right] \\
&\quad + \beta \sum_{i} \lambda^i [(1-\tau)y^i + T(\tau)] - \beta \sum_{i\in p} \lambda^i [(1-\tau)y^i + T(\tau)] \\
&= (1+\beta)[(1-\tau)\bar{y} + T(\tau)] + \alpha \sum_{i\in p} \lambda^i \left[(1-\tau)\bar{y} + T(\tau) - (1-\tau)\left(\bar{y} - y^i\right)\gamma(e^i)\right] \\
&\quad - \beta \sum_{i\in p} \lambda^i [(1-\tau)y^i + T(\tau)].
\end{aligned}
$$

The optimality condition for the corresponding equilibrium candidate tax rate $\tau^l = \arg\max_{\tau\in[0,1]} O^l(\tau)$ then reads

$$
(1+\beta)[-X'(\tau^l)\bar{y}] + \alpha \sum_{i\in p} \lambda^i [-X'(\tau^l)\bar{y} + (\bar{y} - y^i)\gamma(e^i)] - \beta \sum_{i\in p} \lambda^i [-y^i + \bar{y} - X'(\tau^l)\bar{y}] \leq (=)\, 0,
$$

for $\tau^l = (>)\, 0$. This condition can be rewritten as

$$
X'(\tau^l)\bar{y} \geq (=)\, \frac{1}{(1+\beta) + (\alpha - \beta)(1-\lambda^r)} \left[\alpha \sum_{i\in p} \lambda^i (\bar{y} - y^i)\gamma(e^i) - \beta \sum_{i\in p} \lambda^i (\bar{y} - y^i)\right],
$$

for $\tau^l = (>)\, 0$. Thus, since $\beta \geq \alpha(\gamma_c + \gamma_\pi) > \alpha\gamma(e^i)$, we conclude that $O^l(\tau^l) = O^l(0)$ is an equilibrium candidate iff $y^h > \hat{y}^{h,e}(0)$, i.e., iff the rich identify in-group at tax rate $\tau^l = 0$.

Recall that the threshold function $\hat{y}^{h,e}(\tau)$ is increasing in τ (Lemma 2). In the range $y^h \leq \hat{y}^{h,e}(0) \leq \hat{y}^{h,e}(\tau^h)$ the only equilibrium candidate is therefore $O^h(\tau^h)$, $\tau^h > 0$. Similarly, in the range $y^h > \hat{y}^{h,e}(\tau^h) \geq \hat{y}^{h,e}(0)$ the only equilibrium candidate tax rate is $O^l(\tau^l)$, $\tau^l = 0$. Thus, there remains the intermediate range $y^h \in (\hat{y}^{h,e}(0), \hat{y}^{h,e}(\tau^h)]$ where both are equilibrium candidates. We now characterize the (unique) wage $y^h = \tilde{y}$ in this range at which the political objective function is exactly the same under the two equilibrium candidates.

We first establish that $O^h(\tau^h) > O^l(\tau^l)$ at $y^h = \bar{y}$ since

$$O^h(\tau^h) - O^l(\tau^l) = O^h(\tau^h) - O^h(\tau^l) + \sum_{i\in r} \lambda^i [\widehat{V}^{\alpha,i}(\tau^l) - \widehat{V}^{\beta,i}(\tau^l)] > 0,$$

where we used the facts that $\tau^h = \arg\max_{\tau\in[0,1]} O^h(\tau)$ and $\widehat{V}^{\alpha,(h,e)}(\tau^l) > \widehat{V}^{\beta,(h,e)}(\tau^l)$ since $y^h = \bar{y} < \hat{y}^{h,e}(\tau^l)$. Next, we show that $O^h(\tau^h)/\bar{y}$ is strictly decreasing in y^h since

$$\begin{aligned}
\frac{d}{dy^h}\left[\frac{O^h(\tau^h)}{\bar{y}}\right] &= \frac{d}{dy^h}\left[(1+\alpha)[(1-\tau^h) + (\tau^h - X(\tau^h))] - \alpha(1-\tau^h)\Lambda/\bar{y}\right] \\
&= -\alpha(1-\tau^h)\left[\sum_{i\in r} \lambda^i \gamma(e^i) + \frac{\lambda^r}{1-\lambda^r}\sum_{i\in p} \lambda^i \gamma(e^i)\right]/\bar{y} < 0,
\end{aligned}$$

where we used the facts that the indirect effect of y^h via τ^h envelopes out and $\Lambda/\bar{y} = (y^h/\bar{y}-1)\sum_{i\in r}\lambda^i\gamma(e^i) + (y^h/\bar{y}-1)\lambda^r/(1-\lambda^r)\sum_{i\in p}\lambda^i\gamma(e^i)$. Then, we show that $O^l(\tau^l)/\bar{y} = O^l(0)/\bar{y}$ is increasing in y^h

$$\begin{aligned}
\frac{d}{dy^h}\left[\frac{O^l(0)}{\bar{y}}\right] &= \frac{d}{dy^h}\left[\frac{O^h(0)}{\bar{y}} + \sum_{i\in r} \beta\lambda^i \frac{y^h}{\bar{y}} - \sum_{i\in r} \alpha\lambda^i \left[1 - \left(\frac{y^h}{\bar{y}} - 1\right)\gamma(e^i)\right]\right] \\
&= -\alpha 2/\bar{y} \sum_{i\in r} \lambda^i\gamma(e^i) + \beta\lambda^r/\bar{y} + \alpha/\bar{y}\sum_{i\in r}\lambda^i\gamma(e^i) \\
&= -\alpha/\bar{y}\sum_{i\in r}\lambda^i\gamma(e^i) + \beta\lambda^r/\bar{y} \\
&> -\alpha/\bar{y}\lambda^r(\gamma_c + \gamma_\pi) + \beta\lambda^r/\bar{y} \geq 0,
\end{aligned}$$

where we used the facts that $\gamma(e) < \gamma_c + \gamma_\pi$ and $\beta \geq \alpha(\gamma_c + \gamma_\pi)$. Thus, in summary we have shown that $O^h(\tau^h)/\bar{y} > O^l(\tau^l)/\bar{y}$ at $y^h = \bar{y}$ and that $O^h(\tau^h)/\bar{y}$ is strictly decreasing, while $O^l(\tau^l)/\bar{y}$ is strictly increasing in y^h. Thus, there must be a unique crossing $y^h = \tilde{y}$ where $O^h(\tau^h)/\bar{y} = O^l(\tau^l)/\bar{y}$ and therefore $O^h(\tau^h) = O^l(\tau^l)$.

Finally, we need to verify that the threshold $\tilde{y}$ occurs in the relevant range of y^h, i.e., that $\tilde{y} < \bar{y}/\lambda^r$. To derive a contradiction assume that $O^h(\tau^h) \geq O^l(\tau^l)$ at $y^h = \bar{y}/\lambda^r$, which is equivalent to assuming that $\tilde{y} \geq \bar{y}/\lambda^r$. This implies that the rich would prefer universal identification over in-group identification at $y^h = \bar{y}/\lambda^r$. This is a contradiction since

$$\begin{aligned}
\alpha\lambda^r \leq \beta &\Leftrightarrow \alpha(1-\tau^h)\bar{y} \leq \beta(1-\tau^h)\bar{y}/\lambda^r \\
&\Rightarrow \alpha[(1-\tau^h)\bar{y} - (1-\tau^h)(\bar{y}/\lambda^r - \bar{y})\gamma(e)] < \beta(1-\tau^h)\bar{y}/\lambda^r \\
&\Leftrightarrow \widehat{V}^{\alpha,(h,e)}(\tau^h) < \widehat{V}^{\beta,(h,e)}(\tau^h) \text{ at } y^h = \bar{y}/\lambda^r,
\end{aligned}$$

since $\gamma(e) > 0$. This completes the proof of the proposition.

A.3 Proof of Proposition 2

Lemma 1 shows that all poor voters identify universal. Thus, there remain three equilibrium social identification candidates: one with universal identification of all all voters including the rich, $O^h(\tau)$, another with in-group identification of all the rich, $O^l(\tau)$, and finally an intermediate candidate where only the ethnic majority voters among the rich identify universal, $O^m(\tau)$, as shown in part (b) of Lemma 1. The first two equilibrium candidates have already been characterized in Proposition 1. Thus, we limit this proof on the intermediate candidate $O^m(\tau)$. In this case, when only the ethnic minority rich identify in-group the political objective function can be written as

$$\begin{aligned}
O^m &= \bar{C}(\tau) + \sum_{i \neq (h,v)} \lambda^i \widehat{V}^{\alpha,i}(\tau) + \lambda^{h,v}\widehat{V}^{\beta,(h,v)}(\tau) \\
&= \bar{C}(\tau) + \alpha \sum_{i \neq (h,v)} \lambda^i \left[(1-\tau)\bar{y} + T(\tau) - (1-\tau)\left|\bar{y} - y^i\right|\gamma(e^i)\right] + \beta\lambda^{h,v}[(1-\tau)y^h + T(\tau)] \\
&= \sum_i \lambda^i[(1-\tau)y^i + T(\tau)] + \alpha \sum_i \lambda^i \left[(1-\tau)\bar{y} + T(\tau) - (1-\tau)\left|\bar{y} - y^i\right|\gamma(e^i)\right] \\
&\quad - \alpha\lambda^{h,v}[(1-\tau)\bar{y} + T(\tau) - (1-\tau)|\bar{y} - y^h|\gamma(v)] + \beta\lambda^{h,v}[(1-\tau)y^h + T(\tau)] \\
&= (1+\alpha)[(1-\tau)\bar{y} + T(\tau)] - \alpha(1-\tau)\sum_i \lambda^i \left|\bar{y} - y^i\right|\gamma(e^i) \\
&\quad - \alpha\lambda^{h,v}[(1-\tau)\bar{y} + T(\tau) - (1-\tau)|\bar{y} - y^h|\gamma(v)] + \beta\lambda^{h,v}[(1-\tau)y^h + T(\tau)].
\end{aligned}$$

The optimality condition for the equilibrium candidate tax rate $\tau^m = \arg\max_{\tau \in [0,1]} O^m(\tau)$ then reads

$$\begin{aligned}
&(1+\alpha)[-X'(\tau^m)\bar{y}] + \alpha \sum_i \lambda^i |\bar{y} - y^i|\gamma(e^i) \\
&\qquad - \alpha\lambda^{h,v}[-X'(\tau^m)\bar{y} + (y^h - \bar{y})\gamma(v)] + \beta\lambda^{h,v}[-y^h + \bar{y} - X'(\tau^m)\bar{y}] \leq (=)\, 0 \qquad (10)
\end{aligned}$$

for $\tau^m = (>)\, 0$. Condition (10) can be rewritten as

$$X'(\tau^m) \geq (=)\ \frac{\alpha\Lambda - \lambda^{h,v}[\alpha\gamma(v) + \beta](y^h - \bar{y})}{[1 + \alpha + (\beta - \alpha)\lambda^{h,v}]\bar{y}}$$

for $\tau^m = (>)\, 0$. Thus,

$$\tau^m = (X')^{-1}\left[\max\left\{0, \frac{\alpha\Lambda - \lambda^{h,v}[\alpha\gamma(v) + \beta](y^h - \bar{y})}{[1 + \alpha + (\beta - \alpha)\lambda^{h,v}]\bar{y}}\right\}\right]. \qquad (11)$$

Finally, we have to show that $\tau^h > \tau^m \geq \tau^l = 0$. First, $\tau^m \geq 0$ follows immediately from (11) since $X'(0) = 0$ and $X''(\tau) > 0$. Next optimality condition (10) can be expressed as

$$(1+\alpha)X'(\tau^m)\bar{y} \geq (=)\ \alpha \sum_i \lambda^i \left|\bar{y} - y^i\right| \gamma(e^i)$$
$$- \lambda^{h,v} \left[(\beta - \alpha)X'(\tau^m)\bar{y} + [\alpha\gamma(v) + \beta](y^h - \bar{y})\right] \tag{12}$$

for $\tau^m = (>)\,0$. Note that if τ^m was equal to τ^h, then the LHS of (12) would be equal to $\alpha \sum_i \lambda^i \left|\bar{y} - y^i\right| \gamma(e^i)$ as can be seen from (8). However, we next show that the second term of the RHS of (12) would be negative. Thus, we must have that $\tau^m < \tau^h$ since $X'(\tau)$ is increasing in τ. The term on the RHS of (12) is negative at $\tau^m = \tau^h$ when

$$\alpha[-X'(\tau^h)\bar{y} + (y^h - \bar{y})\gamma(v)] > \beta[-y^h + \bar{y} - X'(\tau^h)\bar{y}]$$
$$\Leftrightarrow \quad -[\beta + \alpha\gamma(v)](y^h - \bar{y}) < (\beta - \alpha)X'(\tau^h)\bar{y}.$$

We now show that this inequality indeed holds. Recall that the rich minority identifies in-group for this equilibrium candidate, thus at $\tau^m = \tau^h$ we must have that

$$\alpha[(1-\tau^h)\bar{y} + T(\tau^h) - (1-\tau^h)|\bar{y} - y^h|\gamma(v)] < \beta\lambda^{h,v}[(1-\tau)y^h + T(\tau^h)]$$
$$\Leftrightarrow \quad -[\beta + \alpha\gamma(v)](y^h - \bar{y}) < (\beta - \alpha)\left[\frac{T(\tau^h)}{1-\tau^h} + \bar{y}\frac{1-\tau^h}{1-\tau^h}\right]$$
$$= (\beta - \alpha)\frac{1 - X(\tau^h)}{1-\tau^h}\bar{y} < (\beta - \alpha)X'(\tau^h)\bar{y}$$

since $X'(\tau^h) < 1$, $[1 - X(\tau^h)]/(1-\tau^h) > 1$, and $(\beta - \alpha) < 0$.

In summary, we have shown that $O^m(\tau^m)$ is an equilibrium candidate iff $\hat{y}^{h,v}(\tau^m) < y^h \leq \hat{y}^{h,w}(\tau^m)$, i.e., iff the ethnic minority among the rich indeed identify in-group at tax rate τ^m. Furthermore, $\tau^h > \tau^m \geq \tau^l = 0$. This concludes the proof of the proposition.

A.4 Proof of Lemma 5

We start the proof by checking that the described equilibrium dynamics are in the relevant range of $y^h/\bar{y} \in (1, 1/\lambda^h)$, otherwise some of the stated social identity changes may never occur.

Consider first part (a) of the lemma where $\tilde{y}^{h,m} \leq \tilde{y}^{m,l}$. Recall that for any given average wage $\bar{y}$, the high wage can never exceed $\bar{y}/\lambda^h$ (otherwise y^l would need to be negative). Thus, we need to verify that $\tilde{y}^{m,l} < \bar{y}/\lambda^h$. We prove this by deriving a contradiction. Assume that $O^m(\tau^m) \geq O^l(\tau^l)$ at $y^h = \bar{y}/\lambda^r$, which is equivalent to assuming that $\tilde{y}^{m,l} \geq \bar{y}/\lambda^r$. Since $\tilde{y} < \bar{y}/\lambda^r$ (we already proved in Section A.2 for Proposition 1 that $O^l(\tau^l) > O^h(\tau^h)$ at $y^h = \bar{y}/\lambda^r$) $O^m(\tau^m)$ must be the equilibrium, which requires that the rich of ethnicity w would prefer universal identification over in-group identification at

$y^h = \bar{y}/\lambda^r$. This is a contradiction since

$$\begin{aligned}\alpha\lambda^r \leq \beta &\Leftrightarrow \alpha(1-\tau^m)\bar{y} \leq \beta(1-\tau^m)\bar{y}/\lambda^r \\ &\Rightarrow \alpha[(1-\tau^m)\bar{y} - (1-\tau^m)(\bar{y}/\lambda^r - \bar{y})\gamma(w)] < \beta(1-\tau^m)\bar{y}/\lambda^r \\ &\Leftrightarrow \widehat{V}^{\alpha,(h,w)}(\tau^m) < \widehat{V}^{\beta,(h,w)}(\tau^m) \text{ at } y^h = \bar{y}/\lambda^r,\end{aligned}$$

where $\gamma(w) > 0$. In summary, for the case where $\tilde{y}^{h,m} \leq \tilde{y}^{m,l}$, we have shown that $\tilde{y}^{h,m} \leq \tilde{y}^{m,l} < \bar{y}/\lambda^h$, such that the equilibrium indeed switches from $O^h(\tau^h)$ to $O^m(\tau^m)$ and then to $O^l(\tau^l)$ as $y^h/\bar{y}$ and therefore the wage dispersion increases.

Consider next part (b) of the lemma with $\tilde{y}^{m,l} < \tilde{y}^{h,m}$. In this case it is sufficient that $\tilde{y} < \bar{y}/\lambda^h$. To see why note that $\tilde{y} \leq \tilde{y}^{m,l} < \tilde{y}^{h,m}$ is a contradiction because if $O^l(\tau^l) > O^h(\tau^h)$ and $O^m(\tau^l) > O^l(\tau^l)$ it is impossible that $O^h(\tau^h) > O^m(\tau^m)$. Thus $\tilde{y}^{m,l} < \tilde{y}$. But this implies that for $y^h > \tilde{y}$ the equilibrium must be $O^l(\tau^l)$. Thus, even if $\tilde{y}^{h,m} > \bar{y}/\lambda^h$, the equilibrium dynamic is as stated in the lemma: the equilibrium indeed switches directly from $O^h(\tau^h)$ to $O^l(\tau^l)$ as $y^h/\bar{y}$ and therefore the wage dispersion increases.

Finally, we need to show that $\tilde{y}^{m,l}$ and $\tilde{y}^{h,m}$ are unique. We do this in four steps.

Step 1: At $y^h = \bar{y}$, which implies that $y^l = \bar{y}$ and $\Lambda = 0$, $O^h(\tau^h) > O^m(\tau^m) > O^l(\tau^l)$ since $\alpha > \beta$.

Step 2: We have already already proven in Section A.2 for Proposition 1 that $O^h(\tau^h)/\bar{y}$ is decreasing and $O^l(\tau^l)/\bar{y}$ increasing in y^h. Next we show that the derivative of $O^m(\tau^m)/\bar{y}$ is increasing in y^h since

$$\begin{aligned}\frac{d}{dy^h}\left[\frac{O^m(\tau^m)}{\bar{y}}\right] &= \frac{d}{dy^h}\left[\frac{O^h(\tau^m)}{\bar{y}} + \beta\lambda^{h,v}\frac{y^h}{\bar{y}} - \alpha\lambda^{h,v}\left[1 - \left(\frac{y^h}{\bar{y}} - 1\right)\gamma(v)\right]\right] \\ &= -\alpha(1-\tau^m)2/\bar{y}\sum_{i\in r}\lambda^i\gamma(e^i) + \beta\lambda^{h,v}/\bar{y} + \alpha/\bar{y}\lambda^{h,v}\gamma(v) \\ \Rightarrow \frac{d^2}{(dy^h)^2}\frac{O^m(\tau^m)}{\bar{y}} &= \alpha 2/\bar{y}\sum_{i\in r}\lambda^i\gamma(e^i)\frac{\tau^m}{dy^h} \geq 0,\end{aligned}$$

where we used the fact that τ^m is either zero or increasing in y^h.

Step 3. Since $O^h(\tau^h)/\bar{y} > O^m(\tau^m)/\bar{y}$ at $y^h = \bar{y}$, $O^h(\tau^h)/\bar{y}$ is decreasing, and the derivative of $O^m(\tau^m)/\bar{y}$ is increasing in y^h, there can be at most one crossing point $\tilde{y}^{h,m} > \bar{y}$. Moreover, there must be a crossing point since $O^h(\tau^h) < O^m(\tau^h) \leq O^m(\tau^m)$ at $y^h = \bar{y}/\lambda^r$, where we used the fact that the ethnic monority rich would always prefer in-group over universal identification. Thus, $\tilde{y}^{h,m}$ is unique.

Step 4. Since $O^m(\tau^m)/\bar{y} > O^l(\tau^l)/\bar{y}$ at $y^h = \bar{y}$, $O^l(\tau^l)/\bar{y}$ is inreasing, and the derivative of $O^m(\tau^m)/\bar{y}$ is increasing in y^h, there can be at most two crossing points $\tilde{y}^{m,l} > \bar{y}$. However, since $O^m(\tau^m) < O^l(\tau^m) \leq O^l(\tau^l)$ at $y^h = \bar{y}/\lambda^r$, where we used the fact that the ethnic majority rich would always prefer in-group over universal identification, $O^m(\tau^m)$ will cross $O^l(\tau^l)$ exactly once from above such that $\tilde{y}^{m,l}$ is unique.

A.5 Proof of Corollary 2

When the rich identify universal, the equilibrium tax rate is $\tau^h = (X')^{-1}[\alpha/(1+\alpha)\Lambda/\bar{y}]$. Therefore, to prove part (a) we need to show that the perceived wage dispersion, $\Lambda/\bar{y}$, and thus τ^h, decreases as $\pi(v)$ decreases. Note that $\Lambda = \sum_i \lambda^i |y^i - \bar{y}|\gamma(e^i)$ can be expressed as

$$\begin{aligned}
\Lambda &= \sum_i \lambda^i |y^i - \bar{y}|\gamma_c + \sum_{i:\{e^i=v\}} \lambda^i |y^i - \bar{y}|(1-\pi(v))\gamma_\pi + \sum_{i:\{e^i=w\}} \lambda^i |y^i - \bar{y}|\pi(v)\gamma_\pi \\
&= \sum_i \lambda^i |y^i - \bar{y}|\gamma_c + \gamma_\pi(1-\pi(v))\pi(v)\left[\sum_{i:\{e^i=v\}} \frac{\lambda^i}{\pi(v)}|y^i - \bar{y}| + \sum_{i:\{e^i=w\}} \frac{\lambda^i}{1-\pi(v)}|y^i - \bar{y}|\right] \\
&= \gamma_c 2\lambda^r(y^h - \bar{y}) + \gamma_\pi(1-\pi(v))\pi(v)\sum_i \frac{\lambda^i}{\pi(e^i)}|y^i - \bar{y}|. \qquad (13)
\end{aligned}$$

Since $\lambda^{h,w}/\pi(w) = \lambda^{h,v}/\pi(v)$ we have that $[\lambda^{h,w}/\pi(w)]y^h + [1 - \lambda^{h,w}/\pi(w)]y^l = \bar{y}^w = \bar{y}^v$, where $\bar{y}^e$ denotes that average wage among e-voters. Moreover, since $\lambda^{h,e}/\pi(e)$ is constant, $\bar{y}^e$ is constant as well. This implies that a decrease in $\pi(v)$ will leave $\bar{y} = \pi(v)\bar{y}^v + (1 - \pi(v))\bar{y}^w$ and $\lambda^r = [\lambda^{h,v}/\pi(v)]\pi(v) + [\lambda^{h,w}/\pi(w)](1-\pi(v))$ unchanged. The expression in (13) is then maximal when $\pi(v) = 1/2$ and it decreases as $\pi(v)$ decreases. In summary, we have established that $\tau^h = (X')^{-1}[\alpha/(1+\alpha)\Lambda/\bar{y}]$ decreases as $\pi(v)$ decreases.

Part (b) follows from the fact that the wage dispersion within ethnic groups

$$1/\bar{y}^e \sum_{i:e^i=e} \lambda^i/\pi(e)|y^i - \bar{y}^e| = 2\frac{\lambda^{h,e}}{\pi(e)}(y^h/\bar{y}^e - 1)$$

can only increase when $y^h/\bar{y}$ increases given that $\lambda^{h,e}/\pi(e)$ and therefore $\bar{y}^e$ and $\bar{y}$ are constant. Thus, we can directly apply Lemma 5 to conclude that τ^h is increasing as the wage dispersion within groups increases.

For part (c), consider that constant λ^r implies that $\bar{y} = \lambda^r y^h + (1-\lambda^r)y^l$ also remains constant. The following change leads to an increase of $\lambda^{h,w}/\pi(w) - \lambda^{h,v}/\pi(v)$ when λ^r and $\pi(v)$ are constant: an increase $\mathrm{d}\lambda^{h,w} > 0$ at the expense of $\mathrm{d}\lambda^{h,v} = -\mathrm{d}\lambda^{h,w}$ and a decrease of $\mathrm{d}\lambda^{l,w} = -\mathrm{d}\lambda^{h,w}$ compensated by an increase in $\mathrm{d}\lambda^{l,v} = \mathrm{d}\lambda^{h,w}$. The total differential of

(13) can then be expressed as

$$\begin{aligned}
\mathrm{d}\Lambda &= \gamma_\pi(1-\pi(v))\pi(v)\left(\frac{1}{\pi(w)} - \frac{1}{\pi(v)}\right)\left[(y^h - \bar{y}) - (\bar{y} - y^l)\right]\mathrm{d}\lambda^{h,w} \\
&= \gamma_\pi(1-\pi(v))\pi(v)\left(\frac{1}{\pi(w)} - \frac{1}{\pi(v)}\right)(1 - 2\lambda^r) < 0,
\end{aligned}$$

since $1/\pi(w) - 1/\pi(v) < 0$ and $\lambda^r < 1/2$. Thus, the tax rate τ^h decreases as $\lambda^{h,w}/\pi(w) - \lambda^{h,v}/\pi(v)$ increases. This concludes the proof of the corollary.

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