Mandated Political Representation and Redistribution

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ABSTRACT

Mandated political representation for minorities involves earmarking certain electoral districts where only minority–group candidates are permitted to contest. Such quotas have been implemented in India for certain social groups and for women, although gender quotas in the legislature are popular in several other countries. This paper builds a political–economy model to analyze the effect of such affirmative action on redistribution in equilibrium. Our model predicts that, in situations where the minority–group is economically disadvantaged and where voters favor candidates from their own group, such a quota actually *reduces* transfers to poorer groups. Moreover, redistribution in reserved districts leads to a rise in within–(minority) group inequality.

JEL codes: D72, D78, O20

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1 Introduction

Serious concerns exist about the extent to which minority groups participate in policy–making. These concerns are heightened when the minorities are socio–economically disadvantaged. For example, blacks in the US are a minority who exhibit lower levels of educational attainments and greater poverty, as compared to whites. Women, though not always a minority, enjoy rather limited participation in various domains. Many countries have implemented quota requirements in various occupations and institutions, often in the public sector, to correct for such anomalies. Electoral quotas, which is the subject of this current paper, are quite popular. Currently over 100 countries use electoral quotas for women and over 38 countries have electoral quotas for minority groups primarily in the form of reserved seats (Krook and O'Brien (2010)). Results from an UNDP survey in 2010 indicate that 40% of the 91 countries studied have in place special electoral measures to ensure the representation of minorities (Protsyk (2010)). The extent of representation of women and minorities in political institutions is increasingly seen as an indication of "liberal progressiveness" (Reynolds (2005)).

Among developing nations, India has in place wide–ranging affirmative action programs (often termed "reservation") for minority groups called the Scheduled Castes and Tribes; an important component of this has been mandated representation in the legislature. The mandate involves earmarking a fraction of electoral districts where only these minority group candidates are permitted to contest. More recently, similar policies have been implemented for women with the aim to enhance their presence in politics.

A natural question that arises is the following: How does political reservation for a minority group affect the conditions of the group–members living in these reserved districts? Several empirical studies (discussed later) evaluate whether political reservation benefits the minority group *in the aggregate*. However, the question of who gains and who loses *within* the minority group has mostly been neglected.[2] This question is especially relevant when the minority group — while economically disadvantaged — exhibits a fair degree of heterogeneity in terms of income. So do these political quotas benefit the poor within the minority or the rich? We seek answers to such questions in this paper.

Tables 1 and 2 (see Section 5.1 in the appendix) have been constructed using data from the 43rd National Sample Survey Organization's (NSSO) consumer expenditure survey combined with parliamentary election data from India. The regressions in Table 1 are at the household level. The negative and significant coefficients in the first row suggest that a household belonging to a reserved electoral district is *less* likely to have been employed in government–funded *Public Works* projects.[3] This in turn points to the lack of implementation of such projects in these areas, suggestive of lower transfers to the poor. In Table 2, the regressions are at the electoral district level. The positive and significant coefficients in the first row suggest that reservation of a district is associated with greater inequality within the Scheduled Castes living in the district.

These empirical patterns suggest that the gains to the minorities from political reservation may

[2] We defer a discussion of the related literature till the next section.

[3] India has implemented several employment–based poverty reduction programs (collectively known as *Public Works*). Hence, these are effectively "transfers" to the poor.

not be uniform. But what could potentially explain such non-uniformity? What may be the underlying theoretical justification for such patterns? This paper attempts to answer such questions by putting forward a tractable model which aims to highlight a political-economy channel linking quotas to redistributive outcomes. The predictions of our model are consistent with the empirical correlations presented above. Specifically, the model delivers the following: (i) in the context of an economically disadvantaged minority, political reservation reduces transfers to poorer (income) groups when voters favor candidates from their own group. (ii) Such quotas lead to greater inequality within the minority group.

The mechanism underlying our theory does not rely upon considerations of statistical discrimination, differences in reputation or ability across ethnic groups.[4] Such factors may well be important. However, one does not *necessarily* have to introduce them to generate the above predictions. Indeed, our results stem from some key features of standard models of political competition. We build on the following insight from these models of redistributive politics: when parties compete for votes by promising transfers across different groups, the group with the least ideological bias (the "swing" group) is most favored by all parties. The standard probabilistic–voting setup, *a la* Lindbeck and Weibull (1987), is modified and extended to a two–stage game here.

The first stage involves parties choosing candidates from one of the two ethnic groups. The presence of political quotas implies that the district in question may be contested only by members of the ethnic minority thereby restricting the choice in the first stage. In the second stage, the fielded candidates propose redistribution policies. We impose some structure on the ideological bias of a generic voter. We assume that *ceteris paribus* every voter feels a positive bias for a candidate from his own ethnic group. The other component of the ideological bias stems from a party–wise affiliation, with poorer voters *ex ante* preferring a certain party while their richer counterparts *ex ante* preferring the other one; call the former a "pro–poor" party and the latter "pro–rich".[5]

The key point is this: reservation, by influencing the ethnic identities of the fielded candidates, potentially has an effect on a voter's overall ideological bias and thereby on the identity of the swing group. This, in turn, affects the nature of redistribution in equilibrium. First, consider a reserved district. Here the ideological bias of any voter is driven by simply the party bias; the ethnic bias loses relevance as the two candidates are from the same ethnic group (by mandate, the minority). So the swing group is presumably some intermediate income group which is neither too poor nor too rich. Next, consider the following "mixed–ethnicity candidate" situation. Suppose the "pro–poor" party fields a candidate from the minority while the rival party picks one from the majority group. In this scenario, both types of biases matter. The swing group here is basically an income group where the majority ethnic types (who form the bulk of the group) exhibit near–zero (ex ante) bias. Where exactly in the income distribution is this possible? It is precisely true for a'poor' rather than some middle income group. A 'poor' majority ethnic type prefers the "pro–poor" party but is averse to this party's candidate on ethnic considerations; thus making him largely indifferent between the two options. Therefore the swing group in this situation is relatively poor

[4]We use the term "ethnic" group here to refer to the two segments of the population: the *majority* and the *minority*. The relevant marker need not be ethnicity; it could be language, race or even gender. However, for ease of exposition we continue to use the term "ethnicity".

[5]One could think of one party being more leftist in its ideological position and hence attracting the "toiling masses" while the other party could be thought of as more "pro–business" and so more right–wing.

in contrast to the one in a reserved district.

Political reservation, by eliminating such "mixed–ethnicity candidate" cases, results in penalizing lower–income groups. But what of the other possible "mixed–ethnicity candidate " case? Namely, where the "pro–poor" party fields a candidate from the majority while the rival party picks one from the minority group. We show that such is not possible in equilibrium. Therefore, we have that the transfers in a reserved district end up being concentrated at intermediate rather than lower income groups. This leads to a widening of disparities within the economically disadvantaged minority group. To be sure, this is also true for the majority group. But if the minority group is indeed strictly economically disdvantaged to begin with, then the implications in terms of increased within–group inequality are more salient for them.

We also discuss the effect of an across–the–board change in the size of the ethnic bias. It seems plausible (even if a trifle optimistic) that with the passage of time ethnic biases become less important. It turns out, perhaps somewhat intriguingly, that the effect of (exogenously) lowering the ethnic bias on redistribution is far from unambiguous. Although it is possible that reducing the bias makes the effect of reservation *less* pronounced on the equilibrium redistribution policy, it also may make the "mixed–ethnicity candidate" scenario *more* likely. Recall, the "mixed–ethnicity candidate" case is essentially where the introduction of the political quota has a marked impact. Thus, the two opposing forces make the net effect indeterminate.

Some of the restrictions in the baseline model are subsequently relaxed to check the robustness of the main results. First, the political parties are endowed with intrinsic policy preferences which explicitly justify calling them "pro–poor" and "pro–rich". Specifically, the former is allowed to care more about the consumption of poorer groups relative to the latter. We show that this does not alter the main findings in any significant way. Although in this case, there is no longer policy convergence in equilibrium. Next, we change the baseline model to allow for differentiation in transfers between voters within the same income group on the basis of *ethnicity*: so it is possible to promise a poor voter a higher transfer than another similarly poor voter as long as the two are from different ethnic groups.[6] Here again the intuition of the baseline model prevails and the findings are qualitatively similar.

These findings should not be interpreted as an indictment of political quotas. It may well be that quotas are required to enhance minority participation to the degree that they feel confident about running for elections in districts which are not reserved. The model is really relevant in the scenario where minorities do actually participate in elections though perhaps not at par with the majority group. If one believes that quotas are necessary — at least initially — to induce minority candidates to run in non–reserved districts then our theory is useful to evaluate the effects of such quotas at a point *later in time*; specifically, in the stage where minority candidates are running for office in non–reserved districts.

The remainder of the paper is organized as follows. Section 2 provides a brief overview of the existing related literature. Section 3 contains the basic model while Section 4 considers some extensions; Section 5 concludes. All proofs and tables are contained in the Appendix.

[6]Strictly speaking, this bears strong overtones of sheer discrimination based on ethnicity and maybe illegal to implement.

2 Related Literature

This paper is part of the broad literature which studies the impact of ethnic/gender quotas on socio-economic outcomes. There have been several studies on the impact of reservation on the provision of publicly provided goods at local levels of government like village councils (see, e.g., Besley et al (2004), Munshi and Rosenzweig (2008), Bardhan, Mookherjee and Parra Torrado (2010)). Chattopadhyay and Duflo (2004a, 2004b) use political reservations for women in India to study the impact of women's leadership on policy decisions. Pande (2003) finds that political reservation for SCs in the state legislature has resulted in observable rise in targeted transfers towards these groups. These papers provide evidence that political reservation *does* make a difference to policy outcomes; specifically, there is a shift in policy towards delivering what the minority groups (or women) want. Dunning and Nilekani (2013) investigate the socio-economic effects of political quotas for SCs at the village councils level. They find weak distributive effects of quotas for these marginalized groups. Their findings also suggest that cross-cutting partisan ties can reduce the distributive effect of such ethnic quotas.

Chauchard (2014) focuses on the changing perceptions of SCs in society due to political quotas. Jensenius (2015) uses a unique dataset of development indicators for more than 3,000 state assembly constituencies in 15 Indian states in 1971 and 2001. Matching constituencies on pre-treatment variables from 1971, she finds that 30 years of quotas had no aggregate effect on development indicators for SCs in reserved constituencies. Chin and Prakash (2011) estimate the impact of political reservation in the state–level legislature on overall state–level poverty. They find that, at the state–level, ST reservation reduces poverty while SC reservation has no such impact. The present contribution complements these studies: we present a theory which links reservation to redistributive outcomes in general and provides predictions regarding the effect of reservation on *within*–minority inequality while emphasizing a particular political–economy channel.

Our paper directly relates to theoretical models of affirmative action in various contexts: labor market participation or educational institutions. Austen-Smith and Wallerstein (2006) posit a model which show that racial divisions reduce support for welfare expenditures; this happens even if voters have color-blind preferences. They show that relatively advantaged members of both the majority and minority group gain from having a second dimension of redistribution, while the less advantaged members of the majority are the principal losers. Their focus on the dispersion of gains among heterogenous agents within ethnic groups is close in spirit to our paper though their mechanism is different. Ray and Sethi (2010) address the issue of elite educational institutions adopting criteria that meet diversity goals without being formally contingent on applicant identity. They establish that under weak conditions such color-blind affirmative action policies must be non-monotone, i.e., within each social group, some students with lower scores are admitted while others with higher scores are denied.

In terms of ramifications of electoral re-districting/changing 'reservation' status, our paper is connected to the literature on US politics of minority representation. The practice of changing political boundaries to create majority-minority electoral districts as a means to increase representation of minority groups is prevalent in the US (see e.g., Cameron et al. (1996), Epstein and O'Halloran (1999), Lublin (1999)). Several scholars take the position that minority representatives will act in the interest of their group on assuming power (see e.g., the discussion in Mansbridge (1999)). In many developing countries, women are also a population minority thus re-inforcing their limited participation (see, e.g., Sen (1990, 1992), Anderson and Ray (2010, 2012)). Also, the perception is that women are better geared towards representing the interests of women (see e.g., Mansbridge (1999, 2003)).

Kotsadam and Nerman (2014) argue that the introduction of gender quotas in Latin America caused an exogenous increase in womens representation. But they uncover no major effects beyond mere representation. Several studies (see Rosie Campbell and Lovenduski (2010), Svaleryd (2009), Skjeie (1991), Krook (2006), Beaman et al. (2009) among others) support the view that women have political preferences which often vary from those of men. The idea that blacks are more suitable for representing blacks (in the context of the US) has been discussed in Mansbridge (1999) and Minta (2009) among others. For India, scholars have argued that voting often takes place along caste lines (see e.g., Banerjee and Pande (2007)).

Our paper shares certain similarities with Myerson (1993) and Lizzeri and Persico (2001). These papers analyze models in which it is possible to target budget allocations to infinitesimally small groups. Moene and Wallerstein (2001) ask how political support for welfare programs depend upon the inequality in incomes in society. In terms of the focus on diversity and redistribution, our paper relates to Fernández and Levy (2008). They study the relationship between redistribution and taste diversity using a model with endogenous platforms involving redistribution and targeted public goods, and find a non–monotonic relationship. Levy and Razin (2015) studies the question of whether more polarisation of voters' opinions necessarily lead to a polarisation of policies. They argue that it may happen — particularly, in less competetive elections — that increased polarisation of voter opinions may actually lead to lower levels of policy polarisation.

Our emphasis on ethnic bias in voting relates to Ashworth and Bueno de Mesquita (2014). They provide several examples under which behavioural biases might be beneficial for voters when one takes into account the strategic behaviour of politicians. Huber (2012) builds several measures of the "ethnicization" of electoral behavior. Using survey data from 43 countries, he shows that proportional electoral laws are associated with lower levels of ethnicization. Baldwin and Huber (2010) examine the differences between various measures of ethnic diversity. They argue that the choice between them affects our understanding of which countries are most ethnically diverse. They also show that one of the measures has a large, robust, and negative relationship with public goods provision, whereas several others do not.

Huber and Ting (2013) examine why citizens may vote against redistributive policies from which they stand to gain. Their model describes the situations under which poor voters support right-wing parties that favor low taxes and redistribution, and under which rich voters support left-wing parties that favor high taxes and redistribution. Their model also emphasizes the role of party discipline during legislative bargaining in affecting the prominence of redistribution in voter behavior. In terms of aligning incentives of voters with political actors, our paper relates to Myerson (2006). He studies various problems associated with democratization with a focus on how the structure of federalism and decentralization may affect the chances of success for a new democracy.

3 The Model

Society is populated by a unit mass of individuals and every individual — indexed by i — is characterized by two features. One is individual i's income, denoted by w_i, and the other is i's ethnicity, denoted by e_i.[7] Every individual belongs to either one of two groups: majority/ 'high mass' (h) or minority/ 'low mass' (l). Hence for every i, $e_i \in \{h, l\}$.

Let the distribution of incomes in society be represented by the cdf G with support on $[0, \overline{w}]$ where $\overline{w} > 0$ is "large". Take any income level w. Let $\pi(w)$ denote the proportion of w-earners who are type l. Also, let $\pi(w)$ be continuous in w. In society, the l–types form a minority. Hence, $\int_0^{\overline{w}} \pi(w)\, \mathrm{d}G(w) < \frac{1}{2}$. Also, the l–types are economically disadvantaged; their numbers tend to dwindle as w increases. To capture this aspect, we assume that there is some threshold income level, call it $\underline{w}$, beyond which $\pi(w)$ is weakly decreasing in w with $\pi(\underline{w}) < 1/2$.

A *balanced-budget redistribution* — or simply *redistribution* for short — is a continuous function $\mathbf{z} : [0, \overline{w}] \to \mathbb{R}$, where $z(w)$ is the transfer to *each individual* earning w, and:

(i) $\mathbf{z}$ satisfies the budget constraint $\int_0^{\overline{w}} z(w)\, \mathrm{d}G(w) = 0$.

(ii) Every individual's *net consumption* ($\equiv w + z(w)$) is non–negative.

We will denote the set of all such functions by $\mathbf{Z}$.

There are two political parties, denoted by R and P, where R is viewed as pro–rich, and P as pro–poor, in a sense that we make precise below. Each party fields a candidate of some ethnicity who proposes a particular redistribution from the set $\mathbf{Z}$. However, the constituency in question may be reserved for l–type candidates. In this case, *each* party is constrained to field a l–type candidate.

Note, the game proceeds in two stages: in the first stage, the parties choose their respective candidates concurrently while in the second stage, the candidates make simultaneous offers of redistribution. The second stage game is also referred to as the "expected–plurality game" subsequently.

Let γ denote the candidate ethnicity configuration in the following manner:

$$\gamma = (e(P), e(R))$$

where the first argument refers to P–candidate's type and the second refers to party R–candidate's type. Therefore, $\gamma \in \{(h, h), (l, l), (l, h), (h, l)\}$. Note, γ is determined by the parties' choices in the first stage. For a reserved constituency, $\gamma = (l, l)$ by definition.

An individual's preferences over candidates (and their proposed policies) are described as follows. First, individual i exhibits a bias α_i, positive or negative, for party P. The corresponding payoff from R is normalized to be zero; hence α_i is really the *net* bias for party P. This bias has two main components: one that stems from i's emotive affiliation with party P (relative to R), and the other which arises from i's association with the ethnic identity of party P's candidate (relative to R's candidate).

[7] As mentioned earlier, e_i could stand for i's race, religion, gender or any such non–income marker.

Specifically, we assume that individual i feels an affiliation $t(w_i)$ with party P (relative to R), which is continuous and naturally decreasing in w.[8] Thus, $\mathbf{t} : [0, \overline{w}] \to \mathbb{R}$. As for the "ethnic bias", assume that the voter feels some degree of association for a candidate of the same type as the voter.[9] This would depend upon the candidate configuration γ and hence we denote it by $s_i(\gamma)$.

Combining, we write

$$\alpha(w_i, e_i) = t(w_i) + s_i(\gamma).$$

Here, $s_i(\gamma)$ takes on one of the three values: s, $-s$, or 0 where $s > 0$. In particular, when P's (R's) candidate is from the same ethnic group as voter i while R's (P's) candidate is from the other group, then the ethnic bias for voter i equals s ($-s$). Note, when both parties field candidates from the same ethnic group, this type–based association factor effectively cancels out. Hence, $s_i(h, h) = s_i(l, l) = 0$.

This is not to say that a h–type voter is indifferent between $\gamma = (h, h)$ and $\gamma = (l, l)$. She may strictly prefer (h, h) over (l, l). However, when it comes to determining $s_i(\gamma)$ this does not matter as $s_i(\gamma)$ is the *net* bias towards P's candidate relative to R's candidate. Analogous considerations apply to any l–type voter.[10]

Therefore, for any individual i:

$$\begin{array}{llll} s_i(\gamma) = s & if \quad e(P) \neq e(R) & and & e_i = e(P) \\ s_i(\gamma) = -s & if \quad e(P) \neq e(R) & and & e_i = e(R) \\ s_i(\gamma) = 0 & if \quad e(P) = e(R). & & \end{array}$$

We can now write individual i's bias as

$$\alpha_i = \alpha(w_i, e_i) + \epsilon_i,$$

where the extra term ϵ_i is just mean-zero noise. The individual sees the realization of ϵ_i before she votes; the politicians (the parties and their candidates) do not; more on this below. We assume that ϵ_i is independently and identically distributed across individuals, with a symmetric, unimodal density f (and corresponding cdf F) that has its support on $\mathbb{R}$.

To this non-pecuniary bias α_i we add the economic benefit from a proposed redistribution to arrive at the overall payoff. Recall $z(w)$ is the transfer to each individual earning w. We write the economic benefit to an individual earning w from redistribution $\mathbf{z} \in \mathbf{Z}$ as

$$m(\mathbf{z}, w) \equiv u(w + z(w)),$$

[8] In this sense, P is viewed as pro–poor. Also, in equilibrium, P's actions confirm this label.

[9] There could be long–standing reasons for such bias; say, for e.g., asymmetric information (better knowledge of members of own type). Such behavior has been dubbed as "homophily" in many social contexts. In India, there is plenty of anecdotal evidence on voting behavior along caste lines. Also, there is evidence of bias against women leaders. See Banerjee and Pande (2007) and Beaman et al. (2009), among others.

[10] Here, every voter is assumed to cast his vote in favor of one party's candidate or the other. Of course, one could introduce the notion of "costly voting" where say any h–type voter may feel reluctant to vote for either party when he observes $\gamma = (l, l)$. This would no doubt lead to interesting predictions for turnout but we do not pursue this direction here.

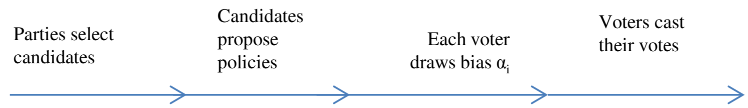

Figure 1: Timing of the game

where u denotes a utility function with $u' > 0$, $u'' < 0$ and $u'(0) = \infty$.

Say party P's candidate proposes $\mathbf{x}$, and R's candidate proposes $\mathbf{y}$ where $\mathbf{x}$, $\mathbf{y} \in \mathbf{Z}$. An individual i earning w_i, with bias α_i will vote for party P's candidate if

$$m(\mathbf{x}, w_i) + \alpha_i > m(\mathbf{y}, w_i),$$

will vote for R's candidate if the opposite inequality holds, and will be indifferent in case of equality.

From the perspective of the party, any individual's vote is stochastic. The probability that citizen i will vote for party P's candidate is given by

$$p_i \equiv 1 - F\left(m(\mathbf{y}, w_i) - m(\mathbf{x}, w_i) - \alpha(w_i, e_i)\right).$$

The expected plurality for party P is proportional to $\int\limits_i p_i$,[11] and this is what party P's candidate seeks to maximize — and party R's candidate minimize — through the appropriate choice of policy in the second stage, conditional on candidate choice in the prior stage. Figure 1 depicts the sequence of moves in the game.

Recall that in the first stage of the game, the two parties choose their respective candidates and hence determine γ. Of course, this choice is trivial in a reserved constituency where $\gamma = (l, l)$ by mandate. We turn to an explicit discussion of party payoffs (which would drive the first stage choices) in section 3.3.

The redistribution profile $(\mathbf{x}, \mathbf{y})$ proposed by the fielded candidates of P and R, respectively, in equilibrium will — in principle — depend on γ.[12] Therefore, for any given γ, an equilibrium of the expected–plurality game is defined by a redistribution pair $(\mathbf{x}, \mathbf{y})$ which constitute mutual best responses from the perspective of the two candidates. Note, that this expected–plurality game is by nature, a *zero–sum* game.

3.1 Equilibrium

We use the standard notion of subgame perfection as the equilibrium concept for this game. To be specific, an equilibrium of this game is given by a collection of candidate choices and redistribution policies, $\{e(P), e(R); \mathbf{x}, \mathbf{y}\}$, which satisfy the following:

[11]To be precise, the expected plurality is given by $\int\limits_i [p_i - (1 - p_i)] = \int\limits_i [2p_i - 1]$.

[12] We will make this dependence explicit by indexing all relevant parameters by γ.

(i) The redistribution policies $\mathbf{x}$ and $\mathbf{y}$ constitute mutual best–responses for the fielded candidates given $(e(P), e(R))$.

(ii) The candidate choices $(e(P), e(R))$ constitute mutual best–responses for the two parties given the redistribution policies $\mathbf{x}$ and $\mathbf{y}$.

Existence: This can be guaranteed by simply assuming — like in Lindbeck and Weibull (1987) — that party P's candidate's objective function, namely $\int_i p_i$, is concave in $\mathbf{x}$ for any given $\mathbf{y}$ and convex in $\mathbf{y}$ for any given $\mathbf{x}$.

Characterization: We now proceed to describe the set of equlibria for this simple game. Given the equilibrium notion adopted, we start by solving backwards.

It will be useful to define the term

$$\sigma(\gamma, w) \equiv \pi(w) f(\alpha(w, l)) + (1 - \pi(w)) f(\alpha(w, h))$$

This term is important for subsequent analysis and hence requires some interpretation. First, fix a candidate configuration γ; this effectively pins down the ethnic bias for every voter. Now consider some level of income, say w, the values $\alpha(w, l)$ and $\alpha(w, h)$ are "small" in magnitude. This basically means that the group characterized by income level w (group w henceforth, for brevity), does not exhibit much partisan bias *ex-ante*. Recall that the density f is unimodal and symmetric around 0. Hence, such lack of strong bias indicates that $\sigma(\gamma, w)$ will exhibit a high value.

Alternatively, if the values $\alpha(w, l)$ and $\alpha(w, h)$ are "large" in magnitude — suggesting that the members of group w feel strongly about one party vis–a–vis the other party — then $\sigma(\gamma, w)$ will exhibit a low value for this group w. In this sense, one can think of $\sigma(\gamma, w)$ as representing the "average swing propensity" of group w. It captures the extent to which the members of a group may be willing to switch loyalties.

From the perspective of the parties, the groups with high "swing" propensity assume importance as they are *ex-ante* more responsive to transfers. The following proposition makes this explicit.

PROPOSITION **1.** *For any given candidate configuration γ, there is a unique equilibrium of this expected–plurality game. In that equilibrium, there is a unique redistribution scheme $\mathbf{x}_\gamma$ offered by both parties, with the property that*

$$\sigma(\gamma, w)[u'(w + x(w))] = \lambda_\gamma$$

for every w in $[0, \overline{w}]$ and some $\lambda_\gamma > 0$. Moreover, $w + x(w)$ varies positively with $\sigma(\gamma, w)$.

Proof. (See Appendix.) ■

Recall the "class bias" $t(w)$ felt by an individual in group w. We will assume the following:

$$t(\underline{w}) \geq s \text{ and } t(\overline{w}) < 0.$$

By the continuity of t, there will be some $w \in (\underline{w}, \overline{w})$, call it w^*, such that $t(w^*) = 0$.[13] One can think of this group w^* as the "middle income" group which feels equally *class–wise* affiliated to either party.

Proposition 1 provides a clue as to which type of w–groups will be most favored by both parties in equilibrium. It is the groups with high values of $\sigma(\gamma, w)$. Specifically, the group(s) where $\sigma(\gamma, w)$ is maximized — the "swing" group(s) — is (are) the biggest gainer(s). We denote these groups as members of the set W_γ and a generic member of this set as w_γ. Clearly, depending upon γ, this set could be a singleton.[14] Moreover, by the continuity of $\sigma(\gamma, w)$ in w we know that the net transfer is going to be relatively high in income groups "close" to any $w_\gamma \in W_\gamma$; hence, the focus on W_γ.

The explicit dependence of the set W_γ on γ is the subject of the ensuing section (section 3.2).

3.2 Redistribution policies under different candidate configurations

We now examine, one by one, what the equilibrium redistribution policies look like for the different possible choices of candidate configuration γ in the first stage.

We start with the configuration (l, h), i.e., party P fields an l–group candidate while party R fields a h–group candidate. Here, we show that *any* group which is swing, i.e. belongs to W_γ, must necessarily lie to the left of the income group w^*. To put it in another way, the focus of redistributive tranfers is on groups earning lesser than the middle income group. The following proposition makes this point more formally.

PROPOSITION **2.** *Take a constituency with $\gamma = (l, h)$ and consider the swing group set W_γ. Here the swing group(s) is (are) poorer than the group w^*, i.e., $w_\gamma < w^*$ for every $w_\gamma \in W_\gamma$.*

Proof. (See Appendix.) ■

The next proposition considers the case in which both parties field candidates from the same ethnic group; hence, $\gamma \in \{(l, l), (h, h)\}$. Note, this subsumes the case of a reserved constituency. Recall that for such configurations, we have $s_i(\gamma) = 0$ for every voter i. Thus, the ethnic–affiliation component of *every* voter's bias loses relevance.

PROPOSITION **3.** *In a constituency in which both parties field candidates from the same ethnic group, group w^* is the "swing" group in equilibrium. Hence, $W_\gamma = \{w^*\}$ for $\gamma \in \{(l, l), (h, h)\}$.*

Proof. (See Appendix.) ■

[13]If t is weakly decreasing then there could be an income interval where the value of t is 0. The distinction between a unique w^* versus an interval makes no significant difference to the results that follow. So for ease of exposition, we will proceed as if w^* is unique.

[14]We know that W_γ is non-empty for any given γ since the function $\sigma(\gamma, w)$ is continuous in w and is defined over a compact set $[0, \overline{w}]$.

A quick eye–balling of the two preceding propositions above provides some inkling about which types of groups get preferential treatment under the different candidate configurations. Clearly, $\gamma = (l, h)$ is more geared towards benefitting lower income groups in relation to configurations involving candidates from the same ethnic group, i.e., $\gamma \in \{(l, l), (h, h)\}$.

This leaves us with the case where $\gamma = (h, l)$, i.e., $e(P) = h$ and $e(R) = l$. We will return to this case later. Now we move to on the details of the first stage game.

3.3 Candidate choice by parties

So far the discussion has focused on equilibrium redistribution policies and identity of "swing" groups *given a candidate configuration*. Recall that the parties are free to choose their candidates in unreserved constituencies in the first stage of the game.[15]

Now we will describe the payoffs to the parties in detail. Both parties care about their respective performance in the election, specifically, their (respective) expected pluralities; in other words, they are *office–seeking* to some degree. Each party also cares about the effect fielding a candidate of either ethnic group has on what we call the "cohesiveness" of the party.

The basic idea is the following. First, there is the issue of *compliance* of the fielded candidate with regards to the party leadership *should the former actually win the election*. It makes sense to assume that an l–group candidate is more compliant with the leadership's decisions than an h–group one. Secondly, there is the issue of within–party cooperation across the two ethnic groups; alternatively, one could think of this as the degree of tolerance for l–group members by their h–group counterparts. So, "cohesiveness" of a party depends upon both of these factors: *compliance* and *tolerance*.

We use a simple (reduced form) way of capturing these aspects. Let the payoff to party j, for $j = P, R$, be given by

$$W_j(\gamma) + \chi c_j(e(j))$$

where $W_j(\gamma)$ is the expected plurality under configuration γ, $c_j(e(j))$ is the cohesiveness for party j from choosing candidate type $e(j)$ and $\chi > 0$ is the weight accorded to it. So, $c_j : \{l, h\} \to \mathbb{R}$ for $j = P, R$.

Suppose that parties can only field their members as candidates and any citizen can potentially join any political party. However, party R by its very nature attracts richer individuals, as compared to party P.[16] Hence, the relatively wealthier section of society will populate R.[17] This means that the proportion of l–group members in party R is *strictly lower* than in P (since l–type citizens are on average poorer than the h–type ones). This suggests that *tolerance* is higher in party P than in R when each of the parties consider fielding an l–type candidate.

[15] In principle, there could be equilibria in which one or both political parties play *mixed* strategies, i.e., randomize between fielding an l–group candidate and a h–group candidate. We restrict attention to only those equilibria in which each political party fields *a* candidate rather than randomizing since this seems more natural in our setting.

[16] Recall, R is pro–rich which can be interpreted as being "pro–business", more "right–wing", etc.

[17] This joining of political parties by politicians is a coalition formation process which could have been written out in a more sequenced manner. However, this reduced form approach pursued here is adequate for our purposes.

The "cohesiveness" payoff from fielding a h–type candidate is normalized to 0 for both parties. Observe that there is a large pool of h–type members in both parties who are eligible for candidacy. So it seems reasonable that this would affect cohesiveness in the same way in the two parties. Hence, $c_P(h) = c_R(h) = 0$. For ease of notation, we will denote $c_j(l)$ simply as c_j for $j = P, R$.

As noted earlier, it seems reasonable to assume that the *compliance* factor is positive for an l–type candidate for either party as the l–group is a minority in either party and also from their minority status in society. As per the *tolerance* part, we argued earlier than it is greater in party P.

Combining, we can write

$$c_P > max\{0, c_R\}.$$

This sets the ground for identifying the set of candidate configurations that can be observed in equilibrium in any unreserved constituency. The following proposition is a step in that direction.

PROPOSITION **4.** *In any unreserved constituency, the candidate configuration $\gamma = (h, l)$ will not be observed in equilibrium.*

Proof. (See Appendix.) ■

Proposition 4 rules out the possibility of the configuration (h, l) in an unreserved constituency. However one may ask — in the context of an unreserved constituency — if (h, h) is the only possible candidate configuration in equilibrium. After all, if the candidate configuration (l, h) is like–wise ruled out then political reservation would not affect the equilibrium redistribution policy at all.

Next, we examine when configuration (l, h) can arise in the equilibrium of this game.

Consider the configuration (h, h). Here, the ethnic bias component is irrelevant for every voter; hence, $s_i(h, h) = 0$ for every voter i. Here the payoff to P is $W_P(h, h) = \int\limits_i p_i$ since the cohesion payoff from fielding a h–type candidate has been normalized to zero. Now,

$$\int\limits_i p_i = \int\limits_0^{\overline{w}} [\pi(w)[1 - F(-\alpha(w, l))] + (1 - \pi(w))[1 - F(-\alpha(w, h))]] \, \mathrm{d}G(w)$$

which simplifies to $\int\limits_0^{\overline{w}} [1 - F(-t(w))] \, \mathrm{d}G(w)$ since $\alpha(w, h) = \alpha(w, l) = t(w)$.

Under the configuration (l, h), we have $\alpha(w, l) = t(w) + s$ and $\alpha(w, h) = t(w) - s$. Hence,

$$W_P(l, h) = \int\limits_0^{\overline{w}} [\pi(w)[1 - F(-t(w) - s)] + (1 - \pi(w))[1 - F(-t(w) + s)]] \, \mathrm{d}G(w)$$

Now for P given that R is fielding h, fielding l will be (weakly) preferred to h if and only if

$$W_P(l, h) + \chi c_P \geq W_P(h, h). \tag{1}$$

Note that

$$1 - F(-t(w) - s) > 1 - F(-t(w)) > 1 - F(-t(w) + s)$$

for every $w \in [0, \overline{w}]$. This introduces some ambiguity in ranking $W_P(l, h)$ and $W_P(h, h)$. Intuitively, in switching from (h, h) to (l, h), party P potentially gains the support of some l–type voters while it potentially loses some h–type supporters.

To be specific, the extent of loss and gain of votes depends on the distribution of the biases among the voters ($F(.)$), the proportion of l–type voters across income groups ($\pi(.)$), the function $t(.)$, the size of ethnic bias s as well as the income distribution ($G(.)$). Moreover, the term χc_P (the additional cohesiveness payoff to party P from fielding an l–type candidate as opposed to an h–type candidate) is positive. Hence, the ambiguity in comparing the two payoffs for party P.[18]

Notice, any factor which raises c_P would make (l, h) more likely in equilibrium. In this regard without explicitly turning to a dynamic version of this model, one can discuss the role of quotas in increasing political participation of the minorities over time. In particular, one could imagine that c_P is increasing in the degree of participation of the minorities *as long as their participation rate is no higher than that of the majority group*. Specifically, quotas would espouse greater tolerance towards minority politicians in party P arising through greater interaction across ethnic groups in the political domain and hence raising c_P over time. Therefore, the presence of quotas *early on* in time would actually make (l, h) more likely in equilibrium.

Additionally, one can make the following claim about observing (l, h) in equilibrium.

PROPOSITION **5.** *Suppose in a unreserved constituency, the candidate configuration $\gamma = (l, h)$ is observed in equilibrium. Now take this constituency and increase the proportion of the l–types ($\pi(w)$) in at least one income group w while making no other changes. Then $\gamma = (l, h)$ continues to be observed in equilibrium.*

Proof. (See Appendix.) ■

Thus, Proposition 5 suggests that the configuration $\gamma = (l, h)$ is more likely to be observed in constituencies where the l–group, while a minority, is relatively sizeable.

Taking stock, in an unreserved constituency the only possible configurations in equilibrium are (h, h), (l, l) and (l, h). The first two configurations yield identical redistributions in equilibrium (see Proposition 3) while the last configuration produces a redistribution policy which favors poorer groups (see Proposition 2). In sum, reservation appears to bias policy against poorer groups.

So far we have two political parties P and R towards whom voters feel affiliated on the basis of their incomes; in particular, poor voters tend to favor P while rich voters tend to favor R. However, in equilibrium both parties propose the same redistribution policy. This might raise the question as to why party affiliations take such a form when both parties propose identical redistribution policies in equilibrium. However, there is an important distinction in the actions of the two parties which justifies — at least, to some extent — the "pro–poor" and "pro–rich" labels. Recall, P fields an l–type candidate (in some cases) in response to R's fielding a h–type candidate and this improves

[18]This ambiguity is in sharp contrast with the case of $\gamma = (h, l)$ which has been dealt with earlier.

the condition of poorer groups by shifting the focus of targeting towards them. In this way, P does favor poorer groups through its actions; specifically, through its candidate choice. However, this still leaves us open to the criticism that the fielded candidates in a constituency behave identically *regardless of their party affiliations*.

In the following section, the baseline model is amended so as to relax some of the assumptions made so far. As discussed in detail below, the main intuition is robust to such changes.

4 Extensions of the Model

4.1 Intrinsic policy preferences of parties

Here, we explicitly allow candidates to *instrinsically* care about their proposed redistribution policies alongside expected vote shares. In particular, one can model P's candidate to care more (less) about the consumption of poorer (richer) groups relative to R's candidate. In this manner, the parties can be more easily categorized as "pro–poor" and "pro–rich". What is interesting is that it is possible to introduce this aspect without altering the main findings in any significant way, although there is no longer policy convergence in equilibrium.

In particular, now suppose party P's candidate maximizes the following:

$$\int\limits_i p_i + \int\limits_0^{\overline{w}} \rho(w)d(w)\mathrm{d}G(w).$$

Note, $\int\limits_i p_i$ is P's expected vote share and $d(w)$ is the utility differential $u(w+y(w))-u(w+x(w))$, just as before. Here, $\rho(w)$ is a real-valued, continuous function with $\rho' > 0$ and $\rho(w^*) = 0$. Note, w^* represents the intermediate income group where $t(w)$ is 0, as before.

Party R's candidate continues to maximize — as before — the following term: $1 - \int\limits_i p_i$.

By construction, P's candidate now has an incentive to have $d(w)$ (the utility *shortfall* from P's candidates' perspective) as *negative* for groups with $w < w^*$ and $d(w) > 0$ for groups with $w > w^*$. So P's candidate has an incentive to "outbid" R's candidate for groups with income lower than w^* while for richer groups, i.e., for $w > w^*$, P's candidate has an incentive to "bid" below R's candidate.

4.1.1 Description of the second–stage equilibrium

Suppose $(\mathbf{x}, \mathbf{y})$ is an equilibrium of this (second–stage) redistribution choice game, conditional on candidate configuration choice γ.

Like in Proposition 1 of the baseline model, the following relations must hold. The marginal gain in payoff to party P from a marginal increase in transfer to any group w must be equalized across all (income) groups. Therefore,

$$[\nu(\gamma, w) - \rho(w)]u'(x(w) + w) = \lambda$$

The same consideration applies to party R. Hence,

$$\nu(\gamma, w)u'(y(w) + w) = \mu$$

where

$$\nu(\gamma, w) \equiv \pi(w)f(d(w) - \alpha(w, l)) + (1 - \pi(w))f(d(w) - \alpha(w, h)).$$

Note, $\nu(\gamma, w)$ is positive for all (γ, w). However, $\rho(w)$ is non-negative only for $w \geq w^*$. This implies we need some restriction on $\rho(.)$ so that marginal gain in payoff to party P from a marginal increase in transfer to any group w is always positive. Intuitively, if $\rho(.)$ is "sufficiently" bounded then both λ and μ will be positive. It is easy enough to outline such a sufficient condition.

Note, $|\alpha(w, e)| \leq s + max\{t(0), -t(\overline{w})\}$ for $e = l, h$. Also, $d(w)$ is continuous in w and given that both $\mathbf{x}$ and $\mathbf{y}$ are budget–balanced schemes ensures that there is some upper bound — call it $\overline{d}$ — such that $|d(w)| \leq \overline{d}$ for every $w \in [0, \overline{w}]$.

Hence, assuming

$$f(\overline{d} + s + max\{t(0), -t(\overline{w})\}) > max\{\rho(\overline{w}), -\rho(0)\}$$

is sufficient to guarantee that λ, $\mu > 0$. In the ensuing discussion, it is assumed that this condition is met.

Consider the following relation obtained from the above two equations:

$$\frac{[\nu(\gamma, w) - \rho(w)]u'(x(w) + w)}{\nu(\gamma, w)u'(y(w) + w)} = \frac{\lambda}{\mu}.$$

Now we examine each of the following possibilities. (i) $\frac{\lambda}{\mu} > 1$, (ii) $\frac{\lambda}{\mu} < 1$ and (iii) $\frac{\lambda}{\mu} = 1$.

If we are in case (i), then it must be $x(w^*) < y(w^*)$ since $\rho(w^*) = 0$ and $u'' < 0$. Hence, $d(w^*) > 0$. Also, for every $w > w^*$, it must be that $d(w) > 0$. To ensure that both $\mathbf{x}$ and $\mathbf{y}$ are budget–balanced policies, it must be that $d(w) < 0$ for some interval of incomes for $w < w^*$. Hence, we have $d(w) > 0$ for "high" incomes and $d(w) < 0$ for some "low" income groups.

Case (ii) is analogous with $d(w) < 0$ for every $w < w^*$ and $d(w) > 0$ for some interval of incomes for $w > w^*$.

For case (iii), we have $d(w) < 0$ for every $w < w^*$, $d(w) > 0$ for every $w > w^*$ and $d(w^*) = 0$.

In principle, any of the three possibilties can arise in equilibrium depending upon the details of $\rho(.)$. However, case (iii) is the most compelling candidate for the following reason. One can always construct an equilibrium corresponding to case (iii); such is not true for cases (i) and (ii). For certain functional forms for $\rho(.)$, one could construct revealed–preference type arguments to show that cases (ii) and (iii) are not possible in equilibrium. For this reason, in the following analysis we only focus on those equilibria $(\mathbf{x}, \mathbf{y})$ which belong to case (iii).

Hence, the equilibrium policy profile $(\mathbf{x}, \mathbf{y})$ for any given candidate configuration γ has the following property:

$$\begin{array}{lll} x(w) > y(w) & if & w < w^* \\ x(w) = y(w) & if & w = w^* \\ x(w) < y(w) & if & w > w^* \end{array}$$

Thus, there is no longer policy convergence in equilibrium. Moreover, P's policy is more tilted towards poorer groups while R's policy is more tilted towards richer groups thus reflecting their party identities. Next we study the equilibrium redistribution policy profile under different candidate configurations.

4.1.2 Redistribution under different candidate configurations

First consider the configuration (l, h), i.e., party P fields an l–group candidate in response to party R fielding a h–group candidate. Like in the baseline model, we can show that the focus of targeting — under (l, h) — is some group poorer than the middle-income group w^*. Recall, in this setup parties propose different policies in equilibrium. Let party P's most favored group — the group with the highest $x(w) + w$ — be denoted by w_P; let w_R be defined similarly. In principle, now w_P and w_R could refer to distinct income groups depending upon the configuration γ, and thus complicating matters relative to the baseline model. Hence, to simplify the arguments we make an assumption concerning the share of the l–group voters in group w^*, i.e., $\pi(w^*)$.

The assumption — call it C1 — is the following:

$$f(s) > \pi(w^*)f(s - \epsilon) + (1 - \pi(w^*))f(s + \epsilon)$$

for any $\epsilon > 0$.

As long as the minority group is "sufficiently" poor in the sense that $\pi(w^*) << 1/2$, the above condition will be easily met. The following proposition describes the relationship between w_P, w_R and the middle income group w^*.

PROPOSITION **6.** *Suppose condition C1 is satisfied. Consider an unreserved constituency with $\gamma = (l, h)$. Then, party P's most favored group, namely w_P, is poorer than the group w^*, while party R's most favored group w_R is no richer than w^*. Hence, $w_P < w^*$ and $w_R \leq w^*$.*

Proof. (See Appendix.) ∎

So under the configuration (l, h), the most favored group in equilibrium will either be $w_R \leq w^*$ (when party R wins) or some group $w_P < w^*$ (when party P wins). Hence, in expected terms, the most favored group is one which is *poorer* than the group w^*.

Next, we move to candidate configurations where both parties field candidates from the same ethnic group. Before proceeding, we make one more assumption concerning $\rho(.)$. Let

$$[f(0) - f(|t(w)|) \geq |\rho(w)|]$$

for all $w \in [0, \overline{w}]$.

This assumption — call it C2 — essentially imposes bounds on $\rho(.)$.

Now, consider either of the two configurations: (h, h) or (l, l). Here, like in the baseline model, we can show that the intermediate income group w^* is most favored by both parties P and R. The result is stated formally in the following proposition.

PROPOSITION **7.** *Under condition C2, in a constituency in which both parties field candidates from the same ethnicity, the group w^* becomes the most favored group for both parties in equilibrium. Therefore, $w_P = w_R = w^*$ in such a constituency.*

Proof. (See Appendix.) ■

In this setup we allow that in every possible configuration γ, P's candidate has an intrinsic bias in favor of poorer groups relative to R's candidate. Also, this is something known by all players — voters and party–members alike. However, for reasons of tractability, we continue to assume that the first–stage considerations (specifically, the party payoff functions) are the same as those in the baseline model. Hence for guaranteeing that the only possible equilibrium configurations in an unreserved constituency are (h, h), (l, l) and (l, h), we can use the exact same arguments as in the baseline model.

Next, we partially relax the assumption that transfers to all voters within the same income group *must* be the same.

4.2 Within–(income) group differentiation

In the baseline model, it was feasible to redistribute across the income groups but within each income group the transfer received by a voter was independent of the voter's ethnic identity. In other words, it was not possible to differentiate — in terms of transfers — between an l–type voter and an h–type voter earning the same income w. Here we introduce the possibility of such a differentiation though we assume that doing so involves a cost.

Specifically, when the transfer to a voter (w, e) is given by $z(w, e)$, the cost is

$$\frac{1}{2}\psi[z(w, l) - z(w, h)]^2$$

where ψ is some positive real number.

The justification for assuming such a cost comes from that the fact that differentiating between voters *within the same income group* on the basis of some congenital marker like ethnicity or religion is often looked down upon as sheer discrimination. Hence, it is overtly discouraged. Therefore, to implement this kind of differentiation one has to pay a cost.[19]

In this setup, the *across*-income group and *within*-income group allocation decisions takes place in two steps: (i) both candidates first announce the average per–capita transfer to every income group w. Call this $\overline{x}(w)$ and $\overline{y}(w)$ for P and R, respectively. (ii) Subsequently they announce the respective transfers to each ethnic group within a given income group. This is $x(w,e)$ and $y(w,e)$ for P and R, respectively.

Note, in step (ii) the transfers to the different ethnic groups within a given income group must respect the average per–capita transfer announced in step (i). Therefore,

$$\pi(w)x(w,l) + (1-\pi(w))x(w,h) = \overline{x}(w)$$

and

$$\pi(w)y(w,l) + (1-\pi(w))y(w,h) = \overline{y}(w)$$

for every income group w.

First, consider the case where γ is either (h,h) or (l,l). Under this scenario, the ethnicity bias (s_i for voter i) is effectively zero and plays no role. There is no incentive to appeal *more* to a voter of a particular ethnicity — within a given income group — as long as this is costly ($\psi > 0$). Hence, here $x(w,l) = x(w,h) = \overline{x}(w)$ and $y(w,l) = y(w,h) = \overline{y}(w)$ for every w. Hence, we can invoke Propositions 1 and 3 and conclude that both parties favor the w^*–group in equilibrium as in the baseline model.

Now consider the case of $\gamma = (l,h)$. We begin by noting that a symmetric equilibrium always exists. Like in the baseline model (specifically in Proposition 1), it is the case that for P, the equilibrium allocation of $\overline{x}(w)$ for all w must be such that redistributing across w must not yield a higher expected voteshare; this yields an analogue to equation (4). The same is true for R. Considering these two equations (analogues to equations (4) and (5)) together, we can see that setting $\overline{x}(w) = \overline{y}(w)$ is a solution to these first–order conditions.[20] Other solutions where $\overline{x}(w) \neq \overline{y}(w)$ are possible but we restrict attention to symmetric equilibrium profiles for two reasons: first, a symmetric equilibirum always exists while asymmetric equilirbia may not for certain parameter values and functional forms. Secondly, this makes comparisons with the baseline model easier.

Even though identical platform choices occur in equilibrium, this does not mean that P and R do not differentiate across voters within the same income group by ethnicity. Recall, the net expected biases are given by $\alpha(w,l) = t(w) + s$ and $\alpha(w,h) = t(w) - s$. Consider P's problem conditional on the choice of $\overline{x}(w)$ for any income group w. P's candidate chooses $x(w,l)$ to maximize the following expected payoff[21]:

$$max_{x(w,l)}\pi(w)[1 - F(d(w,l) - \alpha(w,l))] + (1-\pi(w))[1 - F(d(w,h) - \alpha(w,h))]$$

[19]This cost may be interpreted either as direct cost of implementation or as an indirect psychological or even reputational cost.

[20]For brevity, we omit the explicit calculations. Also, the first–order conditions are necessary and sufficient as the objective functions are concave in their respective arguments.

[21]Choosing $x(w,l)$ automatically pins down $x(w,h)$ since the budget constraint binds in equilibrium.

$$-\frac{1}{2}\psi[x(w,l)-x(w,h)]^2$$

s.t.

$$\pi(w)x(w,l)+(1-\pi(w))x(w,h)=\overline{x}(w)$$

The first-order condition is given by:

$$\pi(w)[f(d(w,l)-\alpha(w,l))u'(w+x(w,l))-f(d(w,h)-\alpha(w,h))u'(w+x(w,h))]$$
$$=\psi[x(w,l)-x(w,h)].$$

Recall $\gamma=(l,h)$ implies $\alpha(w,l)=t(w)+s$ and $\alpha(w,h)=t(w)-s$. Moreover, symmetric equilibrium implies $d(w,l)=d(w,h)=0$. Hence, FOC becomes:

$$\pi(w)[f(t(w)+s)u'(w+x(w,l))-f(t(w)-s)u'(w+x(w,h))]=\psi[x(w,l)-x(w,h)] \quad (2)$$

This implies

$$\begin{array}{lll} x(w,l)<x(w,h) & if & w<w^* \\ x(w,l)=x(w,h) & if & w=w^* \\ x(w,l)>x(w,h) & if & w>w^* \end{array}$$

By equation (2), it is clear that the difference $x(w,l)-x(w,h)$ is falling in the parameter ψ. This is in line with our intuition: a higher cost (of differentiation) induces lesser differentiation in equilibrium.

Now return to the choice of $\overline{x}(w)$. Recall, the equilibrium allocation of $\overline{x}(w)$ for all w must be such that redistributing across w must not yield a higher expected voteshare for either party. Hence, the following term is equalized across all w:

$$\pi(w)f(t(w)+s)u'(w+x(w,l))\frac{\partial x(w,l)}{\partial\overline{x}(w)}+(1-\pi(w))f(t(w)-s)u'(w+x(w,h))\frac{\partial x(w,h)}{\partial\overline{x}(w)}$$
$$-\psi[x(w,l)-x(w,h)]\left[\frac{\partial x(w,l)}{\partial\overline{x}(w)}-\frac{\partial x(w,h)}{\partial\overline{x}(w)}\right]$$

Call the above expression $\theta(w;\psi)$. Note, $\theta(w^*;\psi)=f(s)u'(w^*+\overline{x}(w^*))$ since $t(w^*)=0$ and $x(w^*,l)=x(w^*h)=\overline{x}(w^*)$.

Next we claim that in this configuration (l,h), $w+\overline{x}(w)$ is maximized to the left of w^* as long as ψ is "sufficiently" high. This is an analogue of Proposition 2 of the baseline model.

PROPOSITION **8.** *There exists a threshold level of ψ beyond which $w+\overline{x}(w)$ is maximized to the left of w^* for the configuration (l,h).*

Proof. (See Appendix.) ∎

Thus, if we choose the cost of differentiation parameter ψ sufficiently high (as in the proof of Proposition 8) then it is guaranteed that the average level of consumption $w+\overline{x}(w)$ is maximized at some $w<w^*$; this is very much in the spirit of the baseline model. Also, given that the magnitude of ψ limits the difference between $x(w,l)$ and $x(w,h)$ for any w, a high $\overline{x}(w)$ implies a sizeable $x(w,l)$. Therefore we can argue — like in the baseline model — that within-l group inequality would increase by replacing (l,h) with (l,l) via quotas.

4.3 Some Remarks on the Ethnic Bias

There are two aspects relating to the ethnic bias component which we discuss here. The first relates to the question of allowing some degree of heterogeneity in the individual–level ethnic bias component. The second is a question of how redistribution would respond — in equilibrium — to a shift in the *size* of ethnic bias, i.e., a change in s.

4.3.1 Heterogeneity of the bias.

In the baseline model, the size of the ethnic bias for every individual was either 0 or a given $s > 0$. It possible to allow some extent of heterogeneity in this respect without substantially affecting the results in any way. Suppose, instead of the baseline model structure of ethnic bias, we have the following. For any individual i:

$$\begin{array}{lllll} s_i(\gamma) = \psi_i & if & e(P) \neq e(R) & and & e_i = e(P) \\ s_i(\gamma) = -\psi_i & if & e(P) \neq e(R) & and & e_i = e(R) \\ s_i(\gamma) = 0 & if & e(P) = e(R). & & \end{array}$$

where $\psi_i = s + \eta_i$ and $-\psi_i = -s + \eta_i$. Suppose η is just mean–zero noise and each i draws η_i from some given distribution. As long as η–distribution is independent of the income distribution (i.e., η_i and w_i are independent) the game is basically unchanged. We can rewrite α_i as follows:

$$\alpha_i = t(w_i) + s + \upsilon_i$$

where $\upsilon_i = \eta_i + \epsilon_i$ and let υ_i be distributed according to a symmetric, unimodal density f with support on $\mathbb{R}$ (like ϵ_i was in the baseline model). This makes it clear that the basic structure of the game is the same as before; hence, all our results obtain. Of course, if the distribution of η and income distribution were related in some way, then there could be important differences. We do not pursue this avenue in this paper as it is not obvious as to what form such a correlation between ethnic bias and income should take.[22]

4.3.2 Changes in the size of the bias.

One may ask: what happens to the nature of redistribution in equilibrium as society becomes more and more ethnically biased? In the context of our baseline model, this tantamounts to a comparative statics exercise with respect to s, the parameter which represents the size of the ethnic bias.

Now, it is straightforward to see that if we set $s = 0$, then the swing group would be the middle income group w^* regardless of the candidate configuration chosen in the first stage. In general for $s > 0$, the set comprising the swing group(s), namely, W_γ need not be a singleton set for various

[22] These could be related in several different ways. For example, one could assume a negative correlation between η_i and w_i suggesting that poorer individuals have stronger ethnic biases. Alternatively, the relationship could be non–monotonic, perhaps U–shaped with the middle income groups having the least degree of ethnic biases. We avoid pursuing these possibilities as we see them as being somewhat tangential to the main issues in this paper.

values of γ. One could, of course, choose specific forms for the different functions in the model to guarantee a singleton W_γ for every feasible γ. One would require assumptions to guarantee that w_γ (which is defined by $W_\gamma = \{w_\gamma\}$) is differentiable in s. Even at the sacrifice of some generality, it is still interesting to understand how the swing group responds to shifts in s for the possible candidate configurations.

For $\gamma = (h, h), (l, l)$, the swing group is always w^* for *any* $s > 0$. So what we need to check if the relation between w_γ and s for $\gamma = (l, h)$. Basic intuition would suggest that increasing s would make w_γ (for $\gamma = (l, h)$) go down. Why? Roughly, the swing group in (l, h) is one where the h–group has "negligible" bias whereas the l–group has a positive bias in favor of P. The "negligible bias" for the h–group is because $t(w_\gamma)$ and s effectively cancel out. Hence, increasing s suggests that w_γ must go down for $\gamma = (l, h)$. The following example is in line with our basic inituition.

AN EXAMPLE. Suppose that the ideological bias follows a logistic distribution, i.e., $F(x) = \frac{1}{1+e^{-x}}$ and the downward–sloping function $t(w)$ is simply $w^* - w$. Note, this immediately implies $t(w^*) = 0$. Also, let the share of the l–type members be the same across all income levels, so $\pi(w) = 1/2 - \theta$ for every $w \in [0, \overline{w}]$ for some parameter $\theta \in (0, 1/2)$. It is easily checked that these specific functional forms satisfy all the assumptions made in the baseline model.

Note, $f(x) = f(-x) = \frac{e^{-x}}{(1+e^{-x})^2}$. Hence for $\gamma = (l, h)$, we have $f(t(w) + s) = \frac{e^{w-w^*-s}}{(1+e^{w-w^*-s})^2}$ and $f(t(w) - s) = \frac{e^{w-w^*+s}}{(1+e^{w-w^*+s})^2}$.

Therefore, the function $\sigma(\gamma, w)$ for $\gamma = (l, h)$ is given by

$$\Big(\frac{1}{2} - \theta\Big).\Big[\frac{e^{w-w^*-s}}{(1+e^{w-w^*-s})^2}\Big] + \Big(\frac{1}{2} + \theta\Big).\Big[\frac{e^{w-w^*+s}}{(1+e^{w-w^*+s})^2}\Big].$$

The idea is to find the maxima of this function w.r.t w so as to identify the swing group. Differentiating this function w.r.t. w and setting $\partial\sigma(\gamma, w)/\partial w = 0$ yields:

$$\Big(\frac{1}{2} - \theta\Big).\Big[\frac{e^{w-w^*-s}}{(1+e^{w-w^*-s})^2}\Big].\Big[\frac{1-e^{w-w^*-s}}{1+e^{w-w^*-s}}\Big] = \Big(\frac{1}{2} + \theta\Big).\Big[\frac{e^{w-w^*+s}}{(1+e^{w-w^*+s})^2}\Big].\Big[\frac{e^{w-w^*+s}-1}{1+e^{w-w^*+s}}\Big].$$

Define

$$z \equiv w - w^*.$$

Re-arranging terms and re-writing the above relation in terms of z yields

$$\frac{e^{s-z}}{e^{s+z}}.\frac{(e^{s-z}-1)}{(e^{s+z}-1)}.\frac{(e^{s+z}+1)^3}{(e^{s-z}+1)^3} = \frac{\frac{1}{2}+\theta}{\frac{1}{2}-\theta}. \tag{3}$$

Noting that the RHS of equation (3) exceeds 1, we infer that $z = 0$ cannot be a solution. In fact, applying Proposition 2 gives $z < 0$ for identifying the maxima. Also, $s + z \le 0$ does not satisfy (3). Hence, all maxima must have $z \in (-s, 0)$.

Define the function $I(s, z)$ as follows:

$$I(s, z) \equiv \frac{e^{s-z}}{e^{s+z}}.\frac{(e^{s-z}-1)}{(e^{s+z}-1)}.\frac{(e^{s+z}+1)^3}{(e^{s-z}+1)^3} - \frac{\frac{1}{2}+\theta}{\frac{1}{2}-\theta} = 0.$$

Using the Implicit function theorem, we get

$$\frac{\partial z}{\partial s} = -\frac{I_s}{I_z} = \frac{(cosh(z) - 2cosh(s))sinh(s)^{-1}sinh(z)}{cosh(s) - 2cosh(z)}.$$

For the range $s > 0$ and $z < 0$ (the region relevant for the maxima), we have $\frac{\partial z}{\partial s} < 0$.[23] This, in turn, implies w_γ (for $\gamma = (l, h)$ must go down as s goes up.

However, this need not be true in general; non–monotonicity is a possibility. Moreover, even within the context of this example, there is another (and perhaps more subtle) issue: while it is true that the equilibrium redistribution policy in a constituency with configuration (l, h) will be more favorable towards poorer groups in a more (ethnically) biased society, the probability of (l, h) being a first stage equilibrium choice is affected by the size of s. In particular, the expected–plurality payoff to P from fielding l against R's h–group candidate (denoted by $W_P(l, h)$) depends upon s. It may well be the case that $W_P(l, h)$ falls in s and in that case can go below $W_P(h, h) - \chi c_P$ for some adequately high value of s.

In sum, the *overall* effect on greater ethnic bias is ambiguous even in the restricted environment of our example.[24] This arises from the fact that while the redistribution certainly changes in a definite direction for the configuration (l, h), the possibility of this very configuration arising in equilibrium may well go down.

5 Conclusion

This paper presents some novel results on certain redistributive implications of political reservation for minorities. We exploit the "swing voter" idea from previous models of electoral competition to show that in the presence of ethnic biases, political quotas can potentially harm the interests of the very minorities it was designed to benefit.

Our theory can readily talk to reservation for SCs in the Indian parliament. The SCs collectively are an economically–disadvantaged minority at the national level. Interestingly, they are geographically quite evenly spread all over the country; so even in districts where they are more concentrated they happen to be never much above 50% of the district population. Since the early 1980s they have been *politically active*, in part, due to the impetus from pre–existing quotas. Moreover, the way districts are chosen for SC reservation creates a bias towards selecting those districts where SCs are relatively more numerous. Proposition 5 suggests that it is precisely *such* constituencies where the mixed–ethnicity candidate configuration (l, h) is more likely to be observed prior to reservation. In fact, the empirical correlations noted in Tables 1 and 2 are supportive of our approach.[25]

[23] The details of the calculation have been omitted in the interest of brevity.

[24] We need to make assumptions on the income distribution $G(.)$ to get a clear answer.

[25] We briefly mention the issue of the other closely related group, namely, the Scheduled Tribes (STs). STs are quite distinct from SCs on at least two counts: (i) STs are not as well politically organized as SCs even today, so political reservation has had limited impact on their political standing, unlike the SCs who are a political force to reckon with today. (ii) STs tend to live in rural areas separate from other groups while SCs are spread more evenly in the geographical sense. Hence, the model would not really apply to STs.

The theory can be useful for studying gender quotas. Women are a population minority in many developing countries. In many occupations women typically are underpaid in comparison to males. Also, there exist some within–group bias (by gender) possibly arising due to stereotypes about gender roles. So the basic ingredients of the model are in place. However, it is difficult to develop a notion of within–women economic inequality in an empirical exercise given that most households have men and women co–habiting.

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Appendix

5.1 Tables

Table 1: *Reservation and household participation in 'Public Works'.*

	[1]	[2]	[3]	[4]	[5]	[6]
	Logit	Logit	Logit	Logit	Probit	OLS
Reserved dum.	-0.386***	-0.386***	-0.386***	-0.376***	-0.166***	-0.016***
	(0.120)	(0.120)	(0.120)	(0.121)	(0.054)	(0.005)
Pce	-0.295***	-0.256***	-0.186**	-0.048	-0.020	-0.002
	(0.078)	(0.080)	(0.080)	(0.074)	(0.033)	(0.003)
SC dum.	0.062	0.046	0.014	-0.130*	-0.056	-0.007*
	(0.070)	(0.070)	(0.071)	(0.076)	(0.035)	(0.004)
Urban dum.	-0.959***	-0.919***	-0.855***	-0.557***	-0.228***	-0.011**
	(0.104)	(0.102)	(0.102)	(0.212)	(0.088)	(0.005)
Hindu dum.	0.361***	0.367***	0.373***	0.392***	0.176***	0.016***
	(0.091)	(0.091)	(0.089)	(0.089)	(0.039)	(0.003)
HH size	0.016*	0.019**	0.026***	0.048***	0.022***	0.002***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.004)	(0.000)
Educ.		-0.171***	-0.125**	-0.060	-0.025	-0.003
		(0.057)	(0.059)	(0.058)	(0.026)	(0.002)
Home dum.	No	No	Yes	Yes	Yes	Yes
Employ dum.	No	No	No	Yes	Yes	Yes
Pseudo/Adj. R^2	0.026	0.027	0.029	0.041	0.041	0.015
Observations	108,309	108,309	107,819	107,819	107,819	107,819

NOTES. Household–level regressions: Data on households come from the 43rd NSSO consumer expenditure survey conducted in 1987-88. Data on reservation status of electoral districts ("constituencies") comes from the Parliamentary election data obtained from the Election Commission of India. The dependent variable is a dummy variable *Public Works* which takes the value 1 if the household had participated in Public Works for at least 60 days during the last 365 days and 0 otherwise. There are 542 constituencies spread over 338 districts. Although the NSSO survey is fairly extensive in terms of household characteristics, it does not permit identification of the household all the way down to the constituency; district is as far as one can go. So *Reserved dum.* is a dummy variable which takes the value 1 the household belongs to a district which has at least one reserved constituency, and 0 otherwise. Robust standard errors (clustered by district) in parentheses. *significant at 10% **significant at 5% ***significant at 1%

Table 2: DISTRICT-LEVEL REGRESSIONS: *Reservation and SC inequality.*

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
	SC IQR	SC IQR	SC IQR	Q_3/Q_1 (SC)	Q_3/Q_1 (SC)	Q_3/Q_1 (SC)	Gini SC	Gini SC	Gini SC
Reserved dum.	0.082***	0.093***	0.087**	0.131*	0.215**	0.217**	0.018*	0.017*	0.014
	(0.028)	(0.031)	(0.038)	(0.077)	(0.084)	(0.103)	(0.010)	(0.010)	(0.018)
Population	-0.003	0.128***	0.108*	-0.046	0.249***	0.218*	0.018*	0.030	0.038
	(0.025)	(0.039)	(0.058)	(0.058)	(0.081)	(0.127)	(0.011)	(0.020)	(0.027)
Pce.	0.189***	0.177**	0.139*	0.447***	0.446**	0.398**	0.095***	0.089***	0.090**
	(0.066)	(0.081)	(0.077)	(0.171)	(0.180)	(0.188)	(0.020)	(0.032)	(0.037)
SC%		0.024	0.075*		-0.041	0.061		0.025***	0.040***
		(0.055)	(0.043)		(0.074)	(0.076)		(0.009)	(0.015)
SC% (1971)		-0.031	-0.049		-0.570	-0.933		-0.128*	-0.132
		(0.029)	(0.037)		(0.737)	(0.799)		(0.067)	(0.132)
Gini 71 (landholdings)		0.161	0.103		0.278	0.296		0.043	0.048
		(0.127)	(0.171)		(0.342)	(0.462)		(0.104)	(0.084)
Population 71		-0.100**	-0.069		-0.228***	-0.155		-0.023*	-0.017
		(0.039)	(0.051)		(0.088)	(0.104)		(0.012)	(0.022)
State dummies	No	No	Yes	No	No	Yes	No	No	Yes
Adjusted R^2	0.084	0.125	0.223	0.086	0.116	0.202	0.099	0.120	0.184
Observations	182	157	157	182	157	157	182	157	157

NOTES. OLS regressions where the dependent variable is a measure of SC–inequality: Data on households come from the 43rd NSSO consumer expenditure survey conducted in 1987-88. Data on reservation status of electoral districts ("constituencies") comes from the Parliamentary election data obtained from the Election Commission of India. Typically constituencies are smaller than districts: there are 542 constituencies spread over 338 districts. The sample is restricted to those 182 cases where district and constituency are the same. So *Reserved dum.* is a dummy variable which takes the value 1 if the constituency is reserved, and 0 otherwise. Mean-normalized Inter-quartile range (IQR) in columns 1-3, Q_3/Q_1 ratio in columns 4-6 and Gini in columns 7-9. Robust standard errors in parentheses. Standard errors are clustered by state.*significant at 10% **significant at 5% ***significant at 1%

5.2 Proofs: Baseline Model

Proof. [PROPOSITION 1.] The arguments here closely parallel those in Theorem 1 of Lindbeck and Weibull (1987). Let $V(x(w), y(w)) \equiv \pi(w)[1-F(d(w)-\alpha(w,l))]+(1-\pi(w))[1-F(d(w)-\alpha(w,h))]$. Let $d(w)$ represent the utility differential $m(\mathbf{y}, w) - m(\mathbf{x}, w)$. Rewrite $\int\limits_i p_i$ as

$$\int\limits_0^{\overline{w}} [V(x(w), y(w))] \, \mathrm{d}G(w)$$

P's candidate seeks to maximize the integral above by choosing redistribution $\mathbf{x}$ while R's candidate seeks to minimize the same by choosing $\mathbf{y}$. Suppose $(\mathbf{x}, \mathbf{y})$ is an equilibrium of this expected–plurality game.

Pick any w in $[0, \overline{w}]$. For this group w,

$$V_{x(w)} = [\pi(w)f(d(w) - \alpha(w, l)) + (1 - \pi(w))f(d(w) - \alpha(w, h))]u'(w + x(w)).$$

Note, $V_{x(w)} > 0$ since both f, $u' > 0$. Also, $V_{x(w)}$ is continuous in w and this implies the value of $V_{x(w)}$ *must* be the same for every w in $[0, \overline{w}]$. Suppose not. Let w_1 and w_2 be two distinct income levels such that $V_{x(w_1)} > V_{x(w_2)}$. A marginal decrease in $x(w)$ in a small enough interval around w_2 accompanied by a marginal increase in $x(w)$ in a small interval around w_1 while respecting the budget constraint improves expected plurality for P, contradicting that $(\mathbf{x}, \mathbf{y})$ is an equilibrium.

Hence, we can write the following:

$$[\pi(w)f(d(w) - \alpha(w, l)) + (1 - \pi(w))f(d(w) - \alpha(w, h))]u'(w + x(w)) = \lambda_\gamma \tag{4}$$

for every $w \in [0, \overline{w}]$ and some $\lambda_\gamma > 0$.

Now consider $\frac{\partial V}{\partial y(w)}$. Analogous arguments apply in this case and hence we can claim

$$[\pi(w)f(d(w) - \alpha(w, l)) + (1 - \pi(w))f(d(w) - \alpha(w, h))]u'(w + y(w)) = \mu_\gamma \tag{5}$$

for every $w \in [0, \overline{w}]$ and some $\mu_\gamma > 0$.

Comparing equations (4) and (5) for any group w yields $\frac{u'(w+x(w))}{u'(w+y(w))} = \frac{\lambda_\gamma}{\mu_\gamma}$ which is a constant. This implies that in *any* equilibrium $\mathbf{x} = \mathbf{y}$ given the strict concavity of u and that both $\mathbf{x}$ and $\mathbf{y}$ are balanced–budget redistributions. Suppose not. Assume that for some w_1, w.l.o.g. $x(w_1) > y(w_1)$. By $\frac{u'(w+x(w))}{u'(w+y(w))} = \frac{\lambda_\gamma}{\mu_\gamma}$, this implies $x(w) > y(w)$ for every w in violation of the budget constraint. Thus, $d(w) = 0$ for every group w. Imputing this in equation (4) and using the symmetry of f around 0, we get for every group w:

$$\sigma(\gamma, w)[u'(w + x(w))] = \lambda_\gamma. \tag{6}$$

This guarantees that $w + x(w)$ varies positively with $\sigma(\gamma, w)$ given the strict concavity of u. The same equation can be utilized to show the uniqueness of equilibrium. Suppose that both $(\mathbf{x}, \lambda)$ and $(\mathbf{x}', \lambda')$ satisfy (6). If $\lambda = \lambda'$ then $\mathbf{x} = \mathbf{x}'$ by the strict concavity of u. Alternatively if $\lambda < \lambda'$ then $\mathbf{x} > \mathbf{x}'$ for the same reason. However, this implies that both $\mathbf{x}$ and $\mathbf{x}'$ cannot be balanced-budget redistributions. Hence it must be that $(\mathbf{x}, \lambda) = (\mathbf{x}', \lambda')$. ■

Proof. [PROPOSITION 2.] Note, $\gamma = (l, h)$ implies that every l–group voter associates positively with P's candidate while every h–group voter associates positively with R's candidate. Hence, $\alpha(w, l) = t(w) + s$ and $\alpha(w, h) = t(w) - s$.

The derivative of $\sigma(\gamma, w)$ w.r.t. w when evaluated at w^* is the following:

$$f'(s)t'(w^*)[2\pi(w^*) - 1].$$

This term is negative since $\pi(w^*) < 1/2$ and both $f'(s)$ and $t'(w^*)$ are negative. So, $w_\gamma \neq w^*$.

Suppose $w_\gamma > w^*$. Hence, $t(w_\gamma) \leq 0$ and

$$\sigma(\gamma, w_\gamma) = \pi(w_\gamma)f(t(w_\gamma) + s) + (1 - \pi(w_\gamma))f(t(w_\gamma) - s). \tag{7}$$

It must be that $t(w_\gamma) + s \geq 0$. Suppose not. Consider $\hat{w}$ such that $t(\hat{w}) + s = 0$. Clearly, $\hat{w} < w_\gamma$ since t is decreasing in w.

So,

$$\sigma(\gamma, \hat{w}) = \pi(\hat{w})f(0) + (1 - \pi(\hat{w}))f(t(\hat{w}) - s).$$

Also

$$\sigma(\gamma, \hat{w}) \geq \pi(w_\gamma)f(0) + (1 - \pi(w_\gamma))f(t(\hat{w}) - s) > \sigma(\gamma, w_\gamma). \tag{8}$$

where the first inequality comes from $\pi(\hat{w}) \geq \pi(w_\gamma)$. The second inequality follows from the unimodality and symmetry of f around 0 and by observing that

$$|t(\hat{w}) - s| = 2s < |t(w_\gamma) - s|.$$

Hence, it must be that $s + t(w_\gamma) \geq 0$.

Now, corresponding to w_γ, one can always find a group $\tilde{w} \in [\underline{w}, w^*)$ such that $t(\tilde{w}) = -t(w_\gamma) > 0$. This is possible since $t(\underline{w}) \geq s$ by assumption. For this group $\tilde{w}$,

$$\sigma(\gamma, \tilde{w}) = \pi(\tilde{w})f\left(t(\tilde{w}) + s\right) + (1 - \pi(\tilde{w}))f\left(s - t(\tilde{w})\right) \tag{9}$$

Now compare equations (7) and (9). Since $t(\tilde{w}) = -t(w_\gamma)$ and $1 - \pi(\tilde{w}) > 1/2 > \pi(w_\gamma)$, it must be that $\sigma(\gamma, \tilde{w}) > \sigma(\gamma, w_\gamma)$. This leads to a contradiction which establishes the proposition. ■

Proof. [PROPOSITION 3.] In a constituency where $e(P) = e(R)$, for any group w:

$$\sigma(\gamma, w) = \pi(w)f(t(w)) + (1 - \pi(w))f(t(w)) = f(t(w)).$$

Clearly, the above is maximized at $w = w^*$ given that f is unimodal and symmetric around 0 and that $t(w^*) = 0$. ■

Proof. [PROPOSITION 4.] Suppose $\gamma = (h, l)$ is the first–stage equilibrium choice in an unreserved constituency. Since party R is fielding an l–group candidate, it must be

$$W_R(h, l) + \chi c_R \geq W_R(h, h). \tag{10}$$

Now suppose that party P deviates to fielding an l–group candidate. Given that $\gamma = (h, l)$ is part of the equilibrium, such a deviation should not be profitable for party P. Hence,

$$W_P(l, l) + \chi c_P - W_P(h, l) \leq 0. \tag{11}$$

However,

$$W_P(l, l) + \chi c_P - W_P(h, l) = W_P(l, l) + \chi c_P + W_R(h, l) = W_P(h, h) + \chi c_P + W_R(h, l) \tag{12}$$

where the last equality follows from Proposition 3. However,

$$W_P(h, h) + \chi c_P + W_R(h, l) \geq W_P(h, h) + W_R(h, h) - \chi c_R + \chi c_P = \chi(c_P - c_R) > 0$$

where the first inequality follows from the relation in (10). Therefore,

$$W_P(l, l) + \chi c_P - W_P(h, l) > 0.$$

This contradicts the relation in (11) and thus establishes the proposition. ∎

Proof. [PROPOSITION 5.] Increasing $\pi(w)$ for at least one income group while making no other changes implies an increase in $W_P(l, h)$ since $F(-t(w) - s) < F(-t(w) + s)$. Note, $W_P(h, h)$ is unaffected. Clearly, if (1) was satisfied earlier, it continues to be so after the change in the size of the l–group. ∎

5.3 Proofs: Extensions of the Model

Proof. [PROPOSITION 6.]

Note, $\gamma = (l, h)$ implies that $\alpha(w, l) = t(w) + s$ and $\alpha(w, h) = t(w) - s$.

Recall P's FOC for any w:

$$[\nu(\gamma, w) - \rho(w)]u'(x(w) + w) = \lambda. \tag{13}$$

Given the strict concavity of $u(.)$, w_P is where $\nu(\gamma, w) - \rho(w)$ is maximized. Analogously (from R's FOC), w_R is where $\nu(\gamma, w)$ is maximized.

Note,

$$\nu(\gamma, w^*) = f(s).$$

For any $w > w^*$,

$$\nu(\gamma, w) = \pi(w)f(d(w) - t(w) - s) + (1 - \pi(w))f(d(w) - t(w) + s).$$

where $d(w) - t(w) > 0$. The RHS is lower than

$$\pi(w^*)f(s - \epsilon) + (1 - \pi(w^*))f(s + \epsilon)$$

for some $\epsilon \in (0, s]$ by the unimodality and symmetry of f around 0. Therefore, under C1,

$$\nu(\gamma, w) < f(s)$$

for any $w > w^*$. This implies $w_j \leq w^*$ for $j = P, R$.

To rule out $w_P = w^*$, note the following. For any $w < w^*$,

$$\nu(\gamma, w) = \pi(w)f(d(w) - t(w) - s) + (1 - \pi(w))f(d(w) - t(w) + s).$$

where $d(w) - t(w) < 0$. Let $\delta_w \equiv t(w) - d(w)$ for any $w \leq w^*$. Clearly, $\delta_w \geq 0$ with $\delta_w^* = 0$. If we can establish that there is some $\delta_w > 0$ such that

$$\pi(w)f(s + \delta_w) + (1 - \pi(w))f(s - \delta_w) \geq f(s) = \nu(\gamma, w^*)$$

then we are done.

Define $\tau(w) \equiv (1 - \pi(w))[f(s - \delta_w) - f(s)] + \pi(w)[f(s + \delta_w) - f(s)]$. Hence, showing that $\tau(w) \geq 0$ for some $w < w^*$ will establish $w_P < w^*$.

Pick any w arbitrarily close to w^* such that $\delta_w > 0$ but infinitesimal. Hence,

$$\tau(w) = \delta_w\{(1 - \pi(w))[\frac{f(s - \delta_w) - f(s)}{\delta_w}] + \pi(w)[\frac{f(s + \delta_w) - f(s)}{\delta_w}]\}$$

Given that δ_w is arbitrarily close to 0,

$$\tau(w) \approx \delta_w\{(\pi(w) - 1)f'(s - \delta_w) + \pi(w)f'(s)\} \approx (2\pi(w) - 1)f'(s)\delta_w > 0.$$

This implies $w_P < w^*$ and establishes the proposition. ■

Proof. [PROPOSITION 7.] Under such candidate configurations, the ethnic bias for every voter loses relevance, i.e. $\alpha(w, h) = \alpha(w, l) = t(w)$ for every income group w.

Consider party P's FOC for any w:

$$[f(d(w) - t(w)) - \rho(w)]u'(x(w) + w) = \lambda.$$

For $w = w^*$, this takes the following form:

$$f(0)u'(x(w^*) + w^*) = \lambda$$

Recall,

$$\begin{array}{lll} d(w), -t(w) < 0 & if & w < w^* \\ d(w) = t(w) = 0 & if & w = w^* \\ d(w), -t(w) > 0 & if & w > w^* \end{array}$$

Now, we claim that the most favored group for party P, i.e., w_P is actually w^*. First, we show that

$$f(0) > f(d(w) - t(w)) - \rho(w)$$

for any $w < w^*$.

Take any $w < w^*$. Now,

$$f(0) - f(t(w)) < f(0) - f(d(w) - t(w))$$

since $d(w), -t(w) < 0$ and f is symmetric around 0. Hence,

$$f(0) - f(t(w)) + \rho(w) < f(0) - f(d(w) - t(w)) + \rho(w).$$

But the LHS is non-negative by C2. Hence,

$$f(0) - f(d(w) - t(w)) + \rho(w) > 0$$

which gives $w_P \neq w < w^*$.

For $w > w^*$,

$$f(0) > f(d(w) - t(w)) - \rho(w)$$

since $\rho(w) > 0$ for such w and by the unimodality and symmetry of f around 0. This establishes $w_P = w^*$.

Party R's FOC for any w is

$$f(d(w) - t(w))u'(y(w) + w) = \mu.$$

We have $f(0) > f(d(w) - t(w))$ for $w \neq w^*$ by the unimodality and symmetry of f around 0. This establishes $w_R = w^*$. ■

Proof. [PROPOSITION 8.] Start with $w = w^*$. Consider $w < w^*$ but arbitrarily close, i.e., $w^* - \epsilon$ where $\epsilon \to 0$. First, we claim that for $\epsilon \to 0$, $\overline{x}(w^* - \epsilon) > \overline{x}(w^*)$. Suppose not. Recall,

$$\sigma(\gamma, w) \equiv \pi(w)f(\alpha(w, l)) + (1 - \pi(w))f(\alpha(w, h)).$$

For $\gamma = (l, h)$, the derivative of this term w.r.t. w is negative when evaluated at w^* (shown in Proposition 2). Note, $\theta(w^* - \epsilon; \psi) \geq \sigma(\gamma, w^* - \epsilon)u'(w^* - \epsilon + \overline{x}(w^* - \epsilon))$ by the optimality of $(x(w^* - \epsilon, l), x(w^* - \epsilon, h))$. But $\overline{x}(w^* - \epsilon) \leq \overline{x}(w^*)$ and the negative derivative of σ at w^* imply

$$\sigma(\gamma, w^* - \epsilon)u'(w^* - \epsilon + \overline{x}(w^* - \epsilon)) > \sigma(\gamma, w^*)u'(w^* + \overline{x}(w^*)) = f(s)u'(w^* + \overline{x}(w^*)).$$

But $f(s)u'(w^* + \overline{x}(w^*)) = \theta(w^*; \psi)$ and $\theta(w^*; \psi)$ must equal $\theta(w^* - \epsilon; \psi)$. Hence, contradiction and the claim is established.

Now take any $w > w^*$. Call it $\hat{w}$. Note, $\theta(\hat{w}; \psi) \geq \sigma(\gamma, \hat{w})u'(\hat{w} + \overline{x}(\hat{w}))$ by the optimality of $(x(\hat{w}, l), x(\hat{w}, h))$. Appyling the same logic as in Proposition 2, we can find $\tilde{w} < w^*$ such that $t(\tilde{w}) = -t(\hat{w}) > 0$. It immediately follows that $\sigma(\gamma, \tilde{w}) > \sigma(\gamma, \hat{w})$.

Now, if $\theta(\hat{w};\psi) = \sigma(\gamma,\hat{w})u'(\hat{w} + \overline{x}(\hat{w}))$, then $\tilde{w} + \overline{x}(\tilde{w}) > \hat{w} + \overline{x}(\hat{w})$. Otherwise, $\theta(\tilde{w};\psi)$ will exceed $\theta(\hat{w};\psi)$ leading to violation of the FOC w.r.t. $\overline{x}(w)$.

Suppose $\theta(\hat{w};\psi) > \sigma(\gamma,\hat{w})u'(\hat{w}+\overline{x}(\hat{w}))$. Note however, that increasing ψ decreases the difference between $x(w,l)$ and $x(w,h)$ for any given $\overline{x}(w)$ and w. This implies that $\theta(\hat{w};\psi)$ approaches $\sigma(\gamma,\hat{w})u'(\hat{w} + \overline{x}(\hat{w}))$ from above as ψ increases. In fact, by continuity there exists a threshold level of ψ, call it $\overline{\psi}(\hat{w})$, such that

$$\theta(\hat{w};\psi) \leq \sigma(\gamma,\tilde{w})u'(\hat{w} + \overline{x}(\hat{w}))$$

for all $\psi \geq \overline{\psi}(\hat{w})$. Define $\overline{\psi} \equiv sup_{\{w>w^*\}}\overline{\psi}(\hat{w})$. For any $\psi \geq \overline{\psi}$, it must be that $w + \overline{x}(w)$ is maximized at $w < w^*$. ■