Public Goods Provision in Divided Societies*

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Abstract

We develop a probabilistic-voting model of public goods provision in divided societies. The society is divided into multiple groups based on identity, and the government provides a generic public good and a group-specific public good for each group which is financed by taxation. Voters derive utility from public good specific to their own group and disutility from public goods provided to other groups, and the extent of disutility is a measure of intergroup identity distance. No group is inherently partisan, so political influence depends on the share of persuadable swing voters. When all groups are equally influential, electoral competition replicates the social planner's allocation. As influence varies, equilibrium provision of both generic and group-specific public goods diverges from first-best. When groups with larger tax base (richer and/or larger) are more politically influential on the average, there is an undersupply of both kinds of public goods, and when groups with lower tax base are more politically influential there is an oversupply. Stronger inter-group animosity dampens identity-good promises; greater tolerance amplifies them. Embedding groups in a social-identity network shows hat central groups secure larger identity-good shares, whereas higher overall fractionalization reduces identity-good provision for all.

Keywords: Public goods; Identity goods; Political clout; Social network.

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1 Introduction

Divided societies exhibit heterogeneous preferences across ethnic, religious, and other identity-based groups. Empirical studies show that high ethnic or cultural diversity undermines the provision of broad, society–wide public goods (Alesina et al., 1999; Habyarimana et al., 2007). In such contexts, political competition shifts toward group-oriented *identity goods*—state-funded benefits or projects that exclusively serve a favored community, from religious monuments to caste-based job reservations or minority scholarships (Chandra, 2007; Chhibber and Nooruddin, 2004; Banerjee and Pande, 2007).

Unlike universal public goods, identity goods generate positive utility for in-group members but impose negative externalities on others. Out-groups may perceive these exclusive benefits as losses to their own status or resources, breeding resentment and exacerbating inter-group antagonism (Esteban and Ray, 2011). Empirical and experimental work across the social sciences links such targeted allocations to deepened social cleavages and eroded trust—consistent with classic theories of in-group favoritism and out-group aversion (Turner et al., 1979; Horowitz, 2000).

There is some recent work in economics and the social sciences documenting outgroup aversion in various contexts. Luttmer (2001) uses US Survey data to demonstrate that individuals' support for welfare spending decreases when they perceive out-groups as the main beneficiaries. Voors et al. (2012) and Fershtman and Gneezy (2001) provide experimental evidence to demonstrate altruism towards in-group members and spite or hostility towards out-group members. Cikara and Fiske (2011) provides neuroscientific evidence that people have *schadenfreude* or pleaure from outgroups' losses.

Recent economic models capture these dynamics by embedding identity-based externalities into utility functions, so that one group's gain becomes another's loss (Shayo, 2009; Esteban and Ray, 2011; Esteban et al., 2012). These frameworks emphasize that, in plural societies, effective policymaking requires not only allocating resources efficiently but also managing identity-driven demands and the cross-group spillovers they generate.

In this paper, we examine how vote-seeking politicians in multi-group societies balance generic public goods, which benefit all citizens, against identity goods, which serve only specific communities. We build a formal model of electoral competition in which voters' utilities reflect both shared public-good benefits and identity-based resentments. The novelty of our approach lies in explicit consideration of the disutility due to provision of identity goods to other groups. Using the disutility between each pair of groups as the intergroup identity distance, we describe a divided society as an identity network. We characterize the political equilibrium of public goods provision based on the identity network—identifying which groups are targeted, the extent of their benefits, and how these outcomes depart from the social planner's benchmark.

The idea of identity distance creating negative externality first occurs in Esteban and Ray (1994) and has later been formalized as a disutility in Esteban and Ray (2011) and Esteban et al. (2012). However, while this line of work looks at the effect of identity distances on redistribution through the conflict channel, we look at the effect of identity network on redistribution through the channel of electoral competition.

Building on the framework of Lindbeck and Weibull (1987), our probabilistic voting model allows each group to contain both partisan and neutral voters, so that no group is inherently core or opposition. Electoral influence thus depends on the prevalence of ideologically neutral or policy-responsive voters within a group: the larger this share, the more attractive the group becomes as an electoral battleground. In equilibrium, office-seeking parties allocate more resources—both generic public goods and identity goods—to groups with greater swing potential. We extend the standard framework by introducing identity payoffs: when one group receives an identity good, others experience disutility. This captures the political trade-off between winning swing voters in one group and provoking resentment in others, thereby merging classic electoral incentives with the realities of ethnically and culturally divided societies.

Our framework relates directly to the long-standing debate on whether politicians target core supporters or swing voters. Early accounts emphasized rewarding loyal constituencies: Cox and McCubbins (1986) argue that parties channel resources to their base to secure turnout and deter defection, while clientelist models similarly highlight incentives to buy off groups that can credibly commit support. In contrast, probabilistic voting models (Lindbeck and Weibull, 1987; Dixit and Londregan, 1995, 1996) formalized the swing-voter hypothesis, in which parties concentrate spending on persuadable voters whose allegiance is in flux. There are empirical evidence in favor of the latter view: Dahlberg and Johansson (2002), for instance, show that Swedish governments directed grants to swing-rich regions, while studies of Latin America document spending patterns consistent with persuading undecided voters rather than rewarding loyalists (Stokes, 2005). Our framework adopts the swing voter perspective and extends this literature by showing how identity considerations reshape the redistributive politics: politicians continue to pursue swing voters, but identity externalities constrain how far they can privilege any one group.

Our analysis yields several insights into how electoral influence and identity shape the allocation of public goods. First, consider a benchmark in which all groups have equal political influence, that is, similar shares of swing voters across groups. In this symmetric setting, electoral competition between office-seeking parties produces an efficient allocation of resources, essentially replicating the outcome of a social planner (Wittman, 1989). Group preferences and identity-based grudges may affect the composition of spending, but no purely political distortions arise: each marginal unit of the budget is allocated to whichever good—generic or identity-specific—maximizes aggregate utility. This allocation pattern changes sharply once groups differ in electoral clout—unequal influence creates allocative distortions. The equilibrium levels of both generic and identity goods may be above or below the social optimum, depending on how political influence is aligned with other group specific features, including income, size, and preferences. For example, when the electorally influential groups are also those contributing relatively little to the tax base, parties oversupply public goods in order to satisfy their swing voters. These groups demand high spending but bear less of the cost, producing a redistributive bias in their favor. Conversely, when pivotal groups are wealthier or value the generic good less than others, equilibrium shifts toward under-provision of the generic good: influential groups prefer lower taxes or less redistributive spending, and parties respond accordingly. More generally, misalignment between political influence and economic strength or preferences drives inefficiencies, with resources skewed toward electorally pivotal groups rather than socially optimal uses.

Second, identity-based externalities moderate these distortions. We show that stronger inter-group animosity dampens the provision of identity goods, since favoring one group imposes large negative externality on others and thus carries political costs. This moderating effect is consistent with work in political psychology and conflict studies emphasizing the role of out-group resentment (Turner et al., 1979; Horowitz, 2000). By contrast, when animosity is low, parties can promise more identity goods to a group without losing much support elsewhere, making such transfers electorally attractive. In this sense, tolerant societies may see more identity-based redistribution, while polarized societies restrain it. The result is a form of endogenous moderation: even purely office-motivated politicians temper identity spending when it risks provoking broad voter backlash.

Third, the structure of identity cleavages influences allocation outcomes. We model identity relations as a network and highlight two key dimensions: centrality and fractionalization. Groups that are larger in size or more central—meaning they have relatively low antagonism toward many others—receive greater provision of identity goods, since catering to them incurs fewer electoral penalties. In contrast, groups that are small or identity-isolated (widely disliked or distant from others) obtain limited benefits, as favoritism toward them triggers widespread opposition. Our analysis also reveals indirect effects: proximity to influential groups can enhance a group's access to resources, as identity-alliances help lowering the backlash from redistributive promises. At the aggregate level, higher identity fractionalization reduces identity-good provision across the board: when society is highly fragmented, almost any group-specific allocation alienates a large portion of the electorate, discouraging targeted spending. This result resonates with empirical findings that ethnically fractionalized countries often undersupply both generic public goods and identity goods (Alesina et al., 1999).

Taken together, these results portray an equilibrium in which political influence, economic structure, and social identity jointly determine public good provision. Electoral competition advantages groups that combine swing-voter density with sufficient size or income and groups that are not viewed with hostility by others. Politically marginal or socially isolated groups, by contrast, fare poorly. This helps explain why some minorities secure quotas or targeted subsidies while others do not, and why high fractionalization is often associated with weaker public good provision overall.

This paper contributes to and bridges several strands of research in political economy, public finance, and identity politics. First, our work relates to the classic literature on distributive politics and public goods provision. Foundational models of electoral redistribution (Lindbeck and Weibull, 1987; Dixit and Londregan, 1995, 1996) show how competing politicians allocate resources between universal public goods and targeted transfers in order to maximize votes. We extend this framework by introducing group-specific externalities: unlike in earlier models where a transfer to one group has no direct impact on others, here an identity good for a group explicitly reduces the welfare of non-members. This extension captures the reality of ethnic favoritism and inter-group backlash, allowing us to reinterpret phenomena such as affirmative action, ethnic pork-barreling, or sectarian subsidies within a unified theoretical framework. For example, why do some minority groups secure quotas or earmarked benefits while others, equally poor, do not? Our model suggests the answer lies in political clout—groups with higher swing potential or coalition leverage can be accommodated without provoking excessive opposition from others. In this way, we build on earlier analyses of patronage and special-interest transfers (Coate and Morris, 1995; Grossman and Helpman, 1996) while focusing specifically on the strategic role of identity-based redistribution.

Second, our study engages with the empirical literature linking ethnic diversity to public goods provision. Alesina et al. (1999) and subsequent work document that ethnically fragmented societies often underinvest in broad public goods such as education, infrastructure, and health. A common interpretation is that heterogeneous communities hold divergent preferences and exhibit lower mutual altruism, making collective action more difficult (Habyarimana et al., 2007). We incorporate this insight by allowing each group in our model to attach a different weight to the generic public good, reflecting real-world cultural or economic variation in preferences. Our results are consistent with the idea that preference diversity shapes the mix of goods provided. However, unlike some earlier accounts, we do not assume exogenous inefficiencies from heterogeneity. In our model, diversity alone need not reduce welfare—if groups are equally represented politically, the allocation can still be the first-best efficient. The inefficiencies we identify arise from political distortions, namely, the misalignment between electoral influence and groups' economic weight or preferences. This provides a complementary mechanism to the standard explanation that ethnic heterogeneity can undermine public goods. Our finding that greater identity fractionalization suppresses identity-good provision for all groups aligns with empirical correlations between diversity and lower spending (Miguel and Gugerty, 2005; Esteban and Ray, 2011), but we attribute the effect to electoral strategy rather than technological or cooperative failure.

Third, we contribute to the growing literature on identity politics and redistribution. A wide range of studies highlight the role of social identities—ethnicity, religion, caste—in shaping fiscal outcomes in democracies (Chandra, 2007; Posner, 2005). Theoretical work such as Esteban and Ray (2011) models identity polarization as a driver of conflict over resources, while empirical studies show systematic ethnic favoritism in government spending, whether in road building, public jobs, or welfare benefits (Franck and Rainer, 2012). Our framework complements these approaches by embedding identity directly into a probabilistic voting model, thus highlighting an electoral channel for identity-based redistribution. Identity favoritism emerges here not through violence or lobbying but as the rational outcome of vote-maximizing behavior.

Methodologically, our use of a social network approach adds a new dimension: we model the topology of identity cleavages to capture the preference diversity across groups. Measures of centrality and fragmentation capture how a group's position within the identity structure affects its electoral attractiveness and, in turn, its access to resources. This approach builds on sociological insights into networked group relations (Munshi and Rosenzweig, 2015) and connects to recent political economy work on group fragmentation, notably Dasgupta and Neogi (2018). The contest-theoretic model in Dasgupta and Neogi (2018) shows that within-group splits dilute collective effort in distributive contests, reducing a group's share of resources. Our results echo this insight but through a distinct mechanism: in an electoral setting, fragmentation dilutes swing power rather than contest effort, and the costs spill over through voter preferences rather than strategic lobbying or conflict. In both approaches, fragmentation disadvantages groups relative to more cohesive rivals, but our electoral framework also highlights the moderating role of network centrality—that is, a fragmented group may still gain if it is identity-close to pivotal allies. In this way, our contribution complements and extends the analysis in Dasgupta and Neogi (2018) by demonstrating how analogous dynamics play out in democratic competition. Finally, our analysis has comparative implications. Recent evidence shows that the relationship between ethnicity and public spending varies across institutional contexts—democracies and autocracies exhibit different patterns of ethnic redistribution (Ghosh and Mitra, 2022). By linking identity to probabilistic voting, our model provides a theoretical rationale for why electoral competition may either amplify or constrain identity-based transfers, depending on the institutional environment.

The remainder of the paper is structured as follows. Section 2 presents the formal model. Section 3 derives the first-best allocation and the political equilibrium. Section 4 discusses the allocative inefficiency in equilibrium. Section 5 extends the model to social identity networks, linking centrality and fractionalization to equilibrium allocations. Section 6 considers a policy experiment banning identity goods to isolate their efficiency costs. Section 7 concludes with implications for policy and future research.

2 The Model

We study the provision of generic public goods as well as identity-based, group-specific public goods in a society through electoral competition between two parties. There is a unit mass of agents in the society, and they are divided into n mutually exclusive and exhaustive groups denoted as $i = 1, 2, ...n$. Each group i, has $\beta_i > 0$ share of members. We assume (for simplicity) that each member in group i has a common income $y_i > 0$. We shall denote the income of the society by $\bar{y}$, which can be expressed as $\bar{y} = \sum_{i=1}^{n} \beta_i y_i$.

There are two parties, A and B. Each party K commits to a policy platform $\mathbf{q}_K$ which is a tuple of a tax rate $t^K \in [0, 1]$, a generic public good $G^K > 0$ and a group-specific public good G_i^K for each group i. We assume complete commitment to the platforms, *i.e.,* parties implement what they promise. In our framework, parties are win-motivated and obtain a payoff $w > 0$ from holding the office. However, the model can be easily extended to illustrate how the results change if parties care about particular groups. It is important that the total expenditure on public goods be equal to the taxes raised, *i.e.*, there is no deadweight loss due to taxation.

$$\bar{y}t^K = G^K + \sum_{i=1}^{n} G_i^K \tag{1}$$

Voters exhibit preferences concerning private consumption (taken to be equal to the post-tax income), a generic public good, and the allocation of group-specific public goods. We conceptualize these group-specific goods as *identity goods*, which are characterized by the feature that an agent not only prefers to have more of it for his own group but also prefers the other groups to have less of it.

We capture the value of identity good provided to group j for group i by the parameter b_{ij}. We posit that if $i \neq j$, $b_{ij} \leq 0$, with the interpretation that larger numerical values of b_{ij} imply more antagonistic nature or animosity of relationship between identity i and identity j. However, this assumption can be easily relaxed without any major changes in the main model or results. Moreover, we assume $b_{ij} = b_{ji}$. On the other hand, the value for one's own identity good is $b_{ii} > 0$. We also assume that $0 < b_{ii} < 1$. The term b_{ii} also captures the relative valuation of the public good and group-specific good by the group i. Therefore, the relationship between identity groups is captured by the symmetric matrix B with its diagonal elements positive and all other elements non-positive. For any pair of groups (i, j), we shall denote by $-b_{ij}$ the *inter-group distance* between the two groups.

We shall write the utility derived by a voter from group i from party $K's$ platform as $w_i(\mathbf{q}_K)$, where

$$w_i(q_K) = y_i(1 - t^K) + \alpha \begin{bmatrix} (1 - b_{ii}) \log\Big(1 + G^K\Big) + b_{ii} \log\Big(1 + G_i^K\Big) \\ + \sum_{\substack{j=1 \\ j \neq i}}^{n} b_{ij} \log\Big(1 + G_j^K\Big) \end{bmatrix} \tag{2}$$

We assume that $\alpha > 1$, which ensures that the marginal return from providing public goods is positive when the provision level is zero.

We consider a probabilistic voting model. The electorate gets a common exogenous shock δ, which is realized just before the elections, and it is uniformly distributed over $\left[\frac{-1}{2\psi}, \frac{1}{2\psi}\right]$. A voter j from group i also gets an idiosyncratic shock in the favour of one party or another based on a myriad of factors that are important to the specific voter but do not depend on the campaign platform on the redistributive policy. This shock is modeled as a random variable γ^{ij} drawn from a uniform distribution over $\left[\frac{-1}{2\phi_i}, \frac{1}{2\phi_i}\right]$, denoting the difference in utility from party B and party A. Although the support of γ^{ij} varies across groups, each group has some members biased toward party A and others biased toward party B. Voters with γ^{ij} close to zero are ideological neutral (i.e., weak partisan bias) and thus more responsive to the policy platform. Because ϕ_i also measures the density of this uniform distribution, a larger ϕ_i indicates that group i has a higher proportion of ideologically neutral or policy-responsive voters.

Given a realization of γ^{ij}, a voter j in group i votes for party A over B if

$$w_i(q_A) > w_i(q_B) + \delta + \gamma^{ij}, \tag{3}$$

and for B over A if the inequality goes in the other direction. This concludes the foundational framework of the central model. We now turn to the benchmark first-best allocation, followed by an analysis of the political equilibrium and the resulting allocative inefficiencies that arise from political competition.

3 Analysis

We begin by analyzing the socially optimal allocation of the generic public good and identity goods, referred to as the first-best allocation, that maximizes aggregate utility. We then characterize the allocation that arises in political equilibrium.

3.1 First-best allocation

Consider a social planner who maximizes the sum of utilities, subject to the budget constraint. The optimal allocation solves

$$\begin{aligned}
&\max_{t,G,G_1,..G_n} \bar{y}(1-t) + \sum_{i=1}^{n} \beta_i(1-b_{ii})\alpha \log(1+G) + \sum_{i=1}^{n} \beta_i \left[\sum_{j=1}^{n} b_{ij}\alpha \log(1+G_j)\right] \\
&\text{subject to} \\
&\bar{y}t = G + \sum_{i=1}^{n} G_i, \\
&t \in [0,1],\ G \geq 0,\ G_i \geq 0.
\end{aligned}$$

We denote the solution with superscript s. From the first-order condition, we can derive the optimal provision of public goods and identity goods.

Lemma 1. *The first-best allocation of public goods is given by*

$$G^s = \max\left\{\alpha \sum_{i=1}^{n} \beta_i(1-b_{ii}) - 1, 0\right\}$$
$$G_i^s = \max\left\{\alpha \sum_{j=1}^{n} \beta_j b_{ji} - 1, 0\right\}, \forall i$$

Proof. In appendix □

It follows from Lemma 1 that it is socially optimal to provide the generic public good if

$$\sum_i \beta_i b_{ii} < 1 - \frac{1}{\alpha}$$

and to provide the identity good to group i if

$$\beta_i b_{ii} > (\frac{1}{\alpha} - \sum_{j \neq i} \beta_j b_{ji}).$$

Hence, a group with sufficiently large inter-group distances and a strong relative preference for its identity good may receive no provision of either the generic public good or its own identity good. Moreover, an increase in inter-group distance, *ceteris paribus*, results in a weakly lower provision of identity goods for both groups.

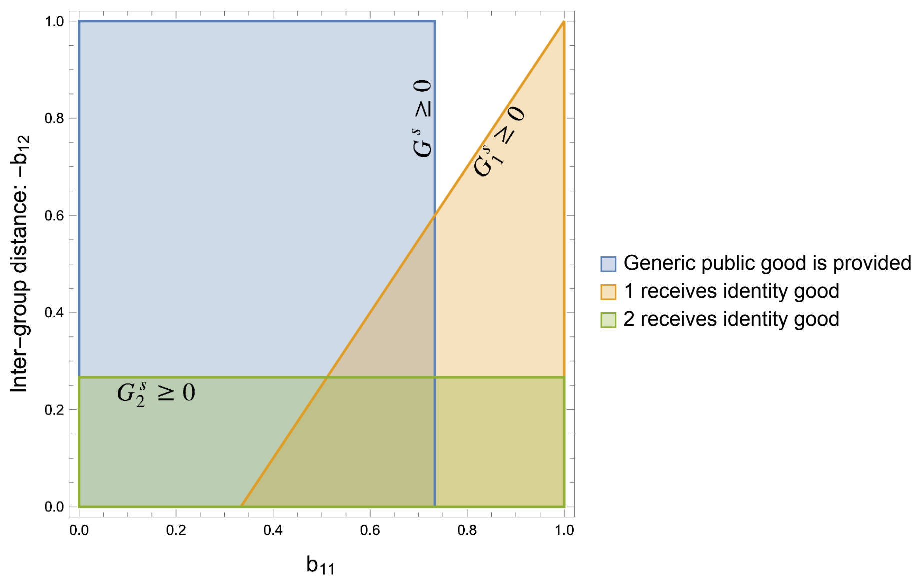

Figure 1: Socially optimal provision of public goods

Figure 1 provides an illustrative example. We consider $n = 2$, $b_{22} = 0.9$, $\beta_1 = 0.6$, $\beta_2 = 0.4$, and $\alpha = 5$. Figure 1 depicts the regions where $G^s > 0$, $G_1^s > 0$, and $G_2^s > 0$ in the $(b_{11}, -b_{12})$-plane. In this example, $G^s > 0$ if $b_{11} < (11/15)$ and $G_1^s > 0$ if

$b_{11} > (1/3) + (2/3)(-b_{12})$. For $-b_{12} > 0.6$, there is zero provision of the generic public good and group 1's preferred identity good at an intermediate range of values of b_{11}. Further, for fixed values of b_{11} and b_{22}, the provision of identity goods is not socially optimal as inter-group distance becomes large.

3.2 Political equilibrium

Our model of electoral competition follows the standard structure in probabilistic voting (Lindbeck and Weibull, 1987; Persson and Tabellini, 2002; Polo, 1998). Recall that a voter in group i votes for A or B based on (3). Fixing a platform q_A for party A and q_B for party B, we identify the swing voter in group i as the voter with realized value of γ given by

$$\gamma_i^* = w_i(q_A) - w_i(q_B) - \delta \tag{4}$$

Voters j in group i with realized value γ^{ij} larger than γ_i^* will vote for B and those with value lower than γ_i^* vote for A. Therefore, the vote share for A *within* group i is

$$\pi_{Ai} = \Pr(\gamma^{ij} \leq \gamma_i^*) = \frac{1}{2} + \phi_i \left[w_i(q_A) - w_i(q_B) - \delta\right] \tag{5}$$

Therefore, given a pair of platforms $q = (q_A, q_B)$, the total vote share of party A is

$$\pi_A(q) = \frac{1}{2} + \sum_{i=1}^{n} \beta_i \phi_i \left[w_i(q_A) - w_i(q_B)\right] - \delta \sum_{i=1}^{n} \beta_i \phi_i$$

From now on, we shall write $\Delta w_i(q)$ to denote $w_i(q_A) - w_i(q_B)$. Hence,

$$\pi_A(q) = \frac{1}{2} + \sum_{i=1}^{n} \beta_i \phi_i \Delta w_i(q) - \delta \sum_{i=1}^{n} \beta_i \phi_i \tag{6}$$

Thus, in order to maximize the vote share, party A maximizes $\sum_{i=1}^{n} \beta_i \phi_i \Delta w_i(q)$ and party B minimizes the same. Since the parties are ex-ante identical, we will have convergence, *i.e.*, both parties will offer the same platform $q_A = q_B = q^*$. The following proposition delineates the equilibrium platform q^*.

Proposition 1. *In the political equilibrium, each party offers the same platform*

$q_A = q_B = q^*$. *The allocation of public goods in q^* is given by*

$$G^* = \max\left\{\frac{\alpha \sum_j \beta_j \phi_j (1 - b_{jj})}{\sum_j \beta_j \phi_j \left(\frac{y_j}{\bar{y}}\right)} - 1, 0\right\}$$

$$G_i^* = \max\left\{\frac{\alpha \sum_j \beta_j \phi_j b_{ji}}{\sum_j \beta_j \phi_j \left(\frac{y_j}{\bar{y}}\right)} - 1, 0\right\} \text{ for all } i$$

Proof. In appendix. □

Both candidates end up choosing the same platform—a standard result in probabilistic voting models—yet group-specific characteristics still shape that equilibrium. As shown in (6), by adjusting her policy toward group i, a candidate increases her vote share from that group by $\beta_i \phi_i$ times the policy differential. Thus, ϕ_i, which is a measure of the share of ideologically neutral or policy-responsive voters within group i, contributes to the group's political influence beyond its sheer size.

In equilibrium, each party internalizes voters' marginal costs and benefits weighted by their political influence. For instance, supplying one more unit of the generic public good yields a per-capita benefit of $\frac{\alpha}{1+G}(1 - b_{ii})$ for each member of group i, at a per-capita cost of $y_i/\bar{y}$. Aggregating across all groups—weighting each by $\beta_j \phi_j$—the candidate's effective marginal benefit is $\frac{\alpha}{1+G} \sum_j \beta_j \phi_j (1 - b_{jj})$, and her effective marginal cost is $\sum_j \beta_j \phi_j \left(\frac{y_j}{\bar{y}}\right)$. The equilibrium allocation equates these marginal benefit and cost.

Heterogeneity in ϕ_i across groups causes the equilibrium allocation to diverge from the social optimum, potentially resulting in either over-provision or under-provision of public goods under electoral competition.

Corollary 1. *If $\phi_i = \phi$ for all i, then $G^* = G^s$ and $G_i^* = G_i^s$ for all i.*

4 Allocative inefficiency

We now analyze the allocative inefficiencies that arise in the provision of both the generic public good and the identity goods. In our model, the share of ideologically neutral or policy-responsive voters, captured by ϕ, determines a group's political influence. While heterogeneity in political influence across groups is a necessary condition for deviations from the social optimum, the magnitude of that distortion hinges on how ϕ_i is aligned with other group-specific attributes—such as group size, income, preferences over public goods, and inter-group distance.

4.1 Generic public good

The following lemma characterizes the relationship between the socially optimal and the equilibrium allocation. For notational convenience, we denote $\underline{\phi} = (\phi_1, \ldots, \phi_n)$, $\underline{\beta} = (\beta_1, \ldots, \beta_n)$, $\underline{b} = (b_{11}, b_{22} \ldots, b_{nn})$, $\underline{y} = (y_1, \ldots, y_n)$, $\mathbb{1}_n = (1, \ldots, 1)$. For any two vectors $\underline{x}$ and $\underline{y}$, the notation $\underline{x} \cdot \underline{y}$ denotes their standard inner (dot) product, while $\underline{x} \circ \underline{y}$ denotes their Hadamard (elementwise) product. Specifically, $\underline{x} \cdot \underline{y} = \sum_{i=1}^{n} x_i \, y_i$, and $\underline{x} \circ \underline{y} = \Big(x_1 y_1,\ x_2 y_2,\ \ldots,\ x_n y_n\Big)$.

Lemma 2. *Consider a set of parameter values for which both the socially optimal and equilibrium allocations of the generic public good are strictly positive. We can express*

$$G^* = \lambda G^s + \eta, \tag{7}$$

where

$$\lambda = 1 - \frac{n\, Cov(\underline{\phi}, \underline{\beta} \circ \underline{y})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}, \text{ and}$$
$$\eta = (\lambda - 1) + \frac{(\alpha n \bar{y})\, Cov(\underline{\phi}, \underline{\beta} \circ (\mathbb{1}_n - \underline{b}))}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}$$

are scalars.

Proof. In appendix. □

In this comparative representation given by (7), λ captures a scale-adjustment effect, indicating how the socially optimal allocation is proportionally adjusted in equilibrium. The term η represents a level adjustment, reflecting how the equilibrium shifts away from the scale adjusted allocation level. These two distinct effects drive the discrepancy between the social optimum and the equilibrium allocation.

When groups with more ideologically neutral or policy responsive voters contribute less to the overall tax base—i.e., $\underline{\phi}$ correlates with $\underline{\beta} \circ \underline{y}$ negatively—then their stronger electoral influence drives down the political parties' effective marginal costs of public-good provision. In other words, the ideologically neutral groups bear a relatively smaller share of the fiscal burden yet command a larger share of the benefits, leading to an upward scale shift and hence over-provision of the generic public good. In our model, this scale adjustment captures the political demand for redistribution induced by the misalignment between political influence and fiscal contribution.

Additionally, when the groups with more ideologically neutral or policy responsive voters exhibit higher aggregate preference for the generic public good—i.e., $\underline{\phi}$

correlates with $\underline{\beta} \circ (\mathbb{1}_n - \underline{b})$ positively, their greater marginal valuation further tilts policy toward public-good spending. This level-distortion also amplifies the gap between the equilibrium and the social optimum.

It follows immediately that if there is no heterogeneity among groups in their political influence so that $\underline{\phi}$ is a constant vector, then all covariance terms are zero, and there will be no distortion. The following proposition, which follows directly from Lemma 2, provides sufficient conditions for over- or under-provision of the generic public good, based on the relationship among groups' political influence, income, and preferences for the public good.

Proposition 2. *Consider a set of parameter values for which both the socially optimal allocation G^s and the equilibrium allocation G^* of the generic public good are strictly positive. Then,*

1. *Over-provision of the generic public good occurs, i.e., $G^* > G^s$, if the following two conditions hold simultaneously:*

$$Cov\Big(\underline{\phi},\, \underline{\beta} \circ \underline{y}\Big) < 0 \quad \textit{and} \quad Cov\Big(\underline{\phi},\, \underline{\beta} \circ (\mathbb{1}_n - \underline{b})\Big) > 0,$$

2. *Under-provision of the generic public good occurs, i.e., $G^* < G^s$, if both inequalities reverse:*

$$Cov\Big(\underline{\phi},\, \underline{\beta} \circ \underline{y}\Big) > 0 \quad \textit{and} \quad Cov\Big(\underline{\phi},\, \underline{\beta} \circ (\mathbb{1}_n - \underline{b})\Big) < 0,$$

These two sufficiency conditions are not exhaustive; when they fail to hold, the direction of allocative distortion remains indeterminate, depending on the relative magnitudes of the scale and level adjustments. However, under the additional assumption of homogeneity—either in preferences or in incomes—the model yields sharper predictions.

The following proposition shows that the direction of allocative inefficiency depends on the alignment between political influence and income when preferences are homogeneous across groups, and on the alignment between political influence and group preferences when incomes are identical. We use the notation $Cov_\beta(\underline{x}, \underline{z})$ to denote beta-weighted covariance between two vectors $\underline{x}$ and $\underline{z}$, specifically, $Cov_\beta(\underline{x}, \underline{z}) = \sum_i \beta_i x_i z_i - (\sum_i \beta_i x_i)(\sum_i \beta_i z_i)$.[1]

[1] The beta-weighted covariance reflects how the two variables x and z co-vary across groups, accounting for the relative importance of each group as determined by the weights β. In contrast, the standard (unweighted) covariance $Cov(\underline{x}, \underline{z})$ treats all observations equally, assigning uniform weight to each.

Proposition 3. *Consider the set of parameter values for which both G^s and G^* are strictly positive.*

1. *Preference homogeneity: Assume $b_{ii} = b$ for all i. The generic public good is over-provided (under-provided) in the political equilibrium if and only if $Cov_\beta\big(\underline{\phi}, \underline{y}\big)$ is negative (positive).*

2. *Income homogeneity: Assume $y_i = \bar{y}$ for all i. The generic public good is over-provided (under-provided) in the political equilibrium if and only if $Cov_\beta\big(\underline{\phi}, \mathbb{1}_n - \underline{b}\big)$ is positive (negative).*

Proof. In appendix. □

To interpret the implications of the above proposition, note that the β-weighted covariance captures how two variables—such as political influence and income—co-vary when individuals are drawn randomly from the population, with group sizes determining the sampling weights. Under the assumption of homogeneous preferences over public goods, if lower-income individuals are more likely to belong to politically influential groups—that is, groups with a larger share of ideologically neutral or policy-responsive voters—the covariance term tends to be negative, increasing the likelihood of over-provision of the generic public good. A group's contribution to this covariance, however, is weighted by its relative size: smaller groups have a more limited effect than larger ones. Likewise, part (2) of the proposition shows that, when incomes are equal across groups, over-provision is more likely if individuals in politically influential groups have stronger preferences for the generic public good.

To analyze how the extent of allocative distortion responds to changes in preferences for the generic public good, we draw on Lemma 2 to express the difference between the equilibrium and the socially optimal allocations as follows:

$$G^* - G^s = -\frac{n\, Cov(\underline{\phi}, \underline{\beta} \circ \underline{y})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}(G^s + 1) + \frac{(\alpha n \bar{y})\, Cov(\underline{\phi}, \underline{\beta} \circ (\mathbb{1}_n - \underline{b}))}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}.$$

Applying $\mathrm{d}G^s/\mathrm{d}b_{ii} = -\alpha\beta_i$ and $\mathrm{d}Cov(\underline{\phi}, \underline{\beta} \circ (\mathbb{1}_n - \underline{b}))/\mathrm{d}b_{ii} = \beta_i((\sum_j \phi_j/n) - \phi_i)/n$, we get

$$\begin{aligned}\frac{\mathrm{d}(G^* - G^s)}{\mathrm{d}(1 - b_{ii})} = -\frac{\mathrm{d}(G^* - G^s)}{\mathrm{d}b_{ii}} &= -\frac{(\alpha n \beta_i)\, Cov(\underline{\phi}, \underline{\beta} \circ \underline{y})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})} - \frac{(\alpha \beta_i \bar{y})\,((\sum_j \phi_j/n) - \phi_i)}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})} \\ &= \frac{\alpha \beta_i \bar{y}}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}\left[\phi_i - \frac{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}{\bar{y}}\right],\end{aligned}$$

which is positive (negative) for groups with sufficiently high (low) values of ϕ_i. Thus, even though an increase in a group's preference for the generic public good raises both the socially optimal allocation G^s and the political equilibrium allocation G^*, its impact on the extent of allocative distortion depends on the group's political influence. Specifically, if the preference for the generic public good increases (i.e., if $1 - b_{ii}$ rises) for a group with relatively high political influence (i.e., $\phi_i > (\underline{\phi} \cdot (\underline{\beta} \circ \underline{y}))/\bar{y}$), then the allocative distortion increases. In contrast, a similar increase in preference for a group with relatively low political influence can reduce the distortion.

4.2 Identity goods

For notational convenience, let $\underline{b}_{\cdot i} = (b_{1i}, \dots, b_{ni}), i = 1, \dots, n$. When both the socially optimal and equilibrium allocations of the identity good G_i are strictly positive, we can express

$$G_i^s = \alpha(\underline{\beta} \circ \underline{b}_{\cdot i}) \cdot \mathbb{1}_n - 1,$$
$$G_i^* = \alpha\bar{y}\, \frac{\underline{\phi} \cdot (\underline{\beta} \circ \underline{b}_{\cdot i})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})} - 1.$$

The following lemma characterizes the relationship between the socially optimal and the equilibrium allocation of the identity good. The proof follows similar steps as Lemma 2 (after replacing $(\mathbb{1}_n - \underline{b})$ by $\underline{b}_{\cdot i}$) and is therefore omitted.

Lemma 3. *Fix $i \in \{1, \dots, n\}$. Consider a set of parameter values for which both the socially optimal and equilibrium allocations of the identity good G_i are strictly positive. We can express*

$$G_i^* = \lambda G_i^s + \eta_i, \tag{8}$$

where

$$\lambda = 1 - \frac{n\, Cov(\underline{\phi}, \underline{\beta} \circ \underline{y})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}, \text{ and}$$
$$\eta_i = (\lambda - 1) + \frac{(\alpha n \bar{y})\, Cov(\underline{\phi}, \underline{\beta} \circ \underline{b}_{\cdot i})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}$$

are scalars.

The interpretation of this finding parallels that of Lemma 2. For instance, if politically influential groups tend to contribute less to the overall tax base, their influence reduces the candidates' effective marginal costs of providing identity goods. This, in turn, results in an upward scale shift in the provision of identity goods. In contrast, the vector $\underline{b}_{\cdot i}$ has a level-adjustment effect. Note that all elements of $\underline{b}_{\cdot i}$

are negative—reflecting the degree of inter-group antagonism between group i and the other groups—except for b_{ii}, which is positive and captures group i's relative preference for its own identity good. Setting aside the effect of b_{ii}, if politically influential groups also exhibit lower inter-group distances—i.e., $|b_{ji}|$ is small for $j \neq i$, meaning the provision of G_i imposes relatively little disutility on others—then their influence can further tilt policy in favor of increased provision of G_i.[2] Note that while the scale-adjustment effect is independent of a group's identity, the level-adjustment effect depends directly on the identity configuration captured by $\underline{b}_{\cdot i}$.

If groups are identical in political influence, all covariance terms are zero, and no allocative distortion arises. Building on Lemma 3, the following proposition establishes sufficient conditions for the over- and under-provision of identity goods, based on the relationship among groups' political influence, income levels, and inter-group distances. We also provide a necessary and sufficient condition under the additional assumption of income homogeneity. he proof follows similar steps as Propositions 2 and 3 and is therefore omitted.

Proposition 4. *Fix $i \in \{1, \ldots, n\}$. Consider a set of parameter values for which both the socially optimal and equilibrium allocations of the identity good G_i are strictly positive. Then,*

1. *Over-provision of group i's identity good occurs, i.e., $G_i^* > G_i^s$, if the following two conditions hold simultaneously:*

$$Cov\Big(\underline{\phi},\, \underline{\beta} \circ \underline{y}\Big) < 0 \quad \text{and} \quad Cov\Big(\underline{\phi},\, \underline{\beta} \circ \underline{b}_{\cdot i}\Big) > 0,$$

2. *Under-provision of group i's identity good occurs, i.e., $G_i^* < G_i^s$, if the followings hold:*

$$Cov\Big(\underline{\phi},\, \underline{\beta} \circ \underline{y}\Big) > 0 \quad \text{and} \quad Cov\Big(\underline{\phi},\, \underline{\beta} \circ \underline{b}_{\cdot i}\Big) < 0,$$

3. *Furthermore, under income homogeneity (assuming $y_i = \bar{y}$ for all i), group i's identity good is over-provided (under-provided) in political equilibrium if and only if $Cov_\beta\Big(\underline{\phi},\, \underline{b}_{\cdot i}\Big)$ is positive (negative).*

It is straightforward to see that when both the scale-adjustment and level-adjustment effects act in the same direction—either increasing or decreasing the provision of G_i—the equilibrium exhibits over-provision or under-provision, respectively. As in previous cases, the model yields sharper predictions under income

[2] We elaborate on this in the Section 5, where we isolate the effect of inter-group distance by excluding the role of b_{ii}.

homogeneity. Specifically, when political influence and group i's preference for its own identity good, as captured by $b_{\cdot i}$, are positively aligned, after adjusting for group sizes, over-provision is more likely. In such cases, candidates can attract additional support from group i while imposing relatively little disutility on voters from other groups.

The relationship between inter-group distance and the level of distortion is moderated by the political influence of individual groups. For given $i \in \{1, \ldots, n\}$, we can express the difference between the equilibrium and the socially optimal allocations of the identity good G_i as follows:

$$G_i^* - G_i^s = -\frac{n\, Cov(\underline{\phi}, \underline{\beta} \circ \underline{y})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}(G_i^s + 1) + \frac{(\alpha n \bar{y})\, Cov(\underline{\phi}, \underline{b}_{\cdot i})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}.$$

For any $j \in \{1, \ldots, n\}$, applying $\mathrm{d}G_i^s/\mathrm{d}b_{ji} = \alpha\beta_j$ and $\mathrm{d}Cov(\underline{\phi}, \underline{\beta} \circ \underline{b}_{\cdot i})/\mathrm{d}b_{ji} = \beta_j[\phi_j - (\sum_k \phi_k/n)]/n$, we get

$$\begin{aligned} \frac{\mathrm{d}(G_i^* - G_i^s)}{\mathrm{d}b_{ji}} &= -\frac{(\alpha n \beta_j)\, Cov(\underline{\phi}, \underline{\beta} \circ \underline{y})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})} + \frac{(\alpha \beta_j \bar{y})\,[\phi_j - (\sum_k \phi_k/n)]}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})} \\ &= \frac{\alpha \beta_j \bar{y}}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}\left[\phi_j - \frac{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}{\bar{y}}\right]. \end{aligned}$$

To interpret the above result, consider a group j distinct from group i. Since $b_{ji} < 0$, an increase in b_{ji} corresponds to a reduction in inter-group animosity between groups i and j. While a marginal increase in b_{ji} raises both the socially optimal and the equilibrium provision of identity good G_i, its effect on allocative distortion depends on the political influence of group j. Specifically, the distortion is exacerbated if group j's political influence exceeds a weighted average of political influence, where the weights reflect each group's relative contribution to total income. In such cases, group j's influence generates a positive externality for the provision of group i's identity good.

Similarly, an increase in b_{ii}, reflecting a stronger preference for its own identity good, raises both the socially optimal and the equilibrium allocation of G_i. However, it increases allocative inefficiency only if the group's political influence is sufficiently high, that is, above the weighted average of political influence.

Our analysis yields two distinct findings. First, in the absence of heterogeneity in political influence across groups, electoral competition does not generate allocative distortions. While preferences and inter-group distances may still affect the provision of generic and identity goods, these effects operate independently of political competition. Second, our findings reveal how the alignment between political influence and group-specific characteristics governs the direction and magnitude of allocative distortions. Specifically, distortions arise not simply from political targeting, but from misalignment between political influence (as captured by ϕ_i) and other considerations such as fiscal contribution, preference for public goods, or the disutility imposed on others by identity goods.

For instance, when ideologically neutral voters are concentrated in groups that contribute relatively little to the tax base, their electoral influence translates into redistributive over-provision of both the generic public good and identity goods. These groups, by attracting political attention while bearing less of the fiscal burden, receive more than what a socially optimal allocation would prescribe. Similarly, if these politically influential groups also have stronger preferences for the generic public good (and consequently less for the identity good), the distortion is compounded through a favorable level-shift in provision of the generic public good. Conversely, under-provision can emerge when influence is concentrated in groups with higher fiscal contribution or with lower preference for the generic public good.

The structure of distortion is not limited to the generic public good. In the case of identity goods, the direction and size of misallocation also hinge on inter-group externalities. Groups may secure greater identity good provision, not merely due to their own preferences, but also because their identity-based proximity to politically influential groups. This mechanism generates spillover effects: proximity to electorally pivotal groups can enhance a group's de facto access to political rents. Taken together, these findings offer a broader interpretation of political favoritism: electoral competition produces allocative patterns shaped by the intersection of political influence, preferences, and group identities.

5 Networks and identity goods

To better understand the broader effects of identity configurations beyond pairwise identity distances, we draw on network concepts to characterize the structure of inter-group relations. We begin by defining two network features central to our analysis: *centrality* and *fractionalization*. Centrality captures the relative position of a group within the identity network—groups that are more interconnected or proximate to others are considered more central. Fractionalization reflects the degree of identity-based division within a collection of groups, with higher values indicating a more fragmented and polarized structure. We formally define these concepts below.

Let S denote the set of all groups, and define the network structure on S as follows. Let there be n nodes, each representing a distinct group, where the weight of node i is given by β_i. For each pair of groups (i, j), define the following distance function:

$$d_{ij} = \begin{cases} -b_{ij} & \text{if } i \neq j, \\ 0 & \text{if } i = j. \end{cases}$$

We let $\underline{d}_{\cdot i} = (d_{1i}, \ldots, d_{ni}), i = 1, \ldots, n$ denote the vector of identity distances from all groups to group i.

Definition 1. *For any subset $A \subseteq S$, the* ***A-centrality*** *of a node i is its weighted distance from all nodes in A:*

$$C_i^A = \frac{1}{\beta_A} \sum_{j \in A} d_{ji} \beta_j, \quad \textit{where } \beta_A = \sum_{j \in A} \beta_j.$$

If $A = S$, we refer to this simply as the node's ***centrality*** *in the identity network: $C_i = \sum_{j \in S} d_{ji} \beta_j$.*

The centrality measure, defined for a group (node) with respect to a collection of groups A, captures the group's relative identity position in relation to the members of A. A lower A-centrality value indicates that the group is, on average, perceived more favorably—or with less animosity—by the groups in A, suggesting greater societal integration or acceptance from the perspective of A.

Definition 2. *For any subset $A \subseteq S$, the* ***A-fractionalization*** *is defined as the weighted sum of identity distances between all pairs of nodes in A:*

$$F^A = \frac{1}{\beta_A} \sum_{i,j \in A} (\beta_i + \beta_j) d_{ij}, \quad \textit{where } \beta_A = \sum_{i \in A} \beta_i.$$

The fractionalization measure, defined for a subset of groups, captures the extent of internal identity-based fragmentation within that collection. Lower values indicate higher cohesion and weaker inter-group antagonism. Since identity distances are symmetric (i.e., $d_{ij} = d_{ji}$), the fractionalization measure of a collection of groups aggregates the centrality measures of its members::

$$\sum_{i \in A} C_i^A = \frac{1}{\beta_A} \sum_{i \in A} \sum_{j \in A} d_{ji} \beta_j = \frac{1}{\beta_A} \sum_{i,j \in A} d_{ij} (\beta_i + \beta_j) = F^A. \tag{9}$$

Thus, a union of more closely related groups will exhibit lower fractionalization. The next proposition establishes how the provision of identity goods is shaped by groups' centrality and the degree of fractionalization in the identity network.

Proposition 5. *The equilibrium allocations of the identity goods satisfy the following characterizations:*

1. *For $i \in S$,*

$$G_i^* = \lambda G_i^s + \eta_i, \tag{10}$$

where

$$\lambda = 1 - \frac{n\, Cov(\underline{\phi}, \underline{\beta} \circ \underline{y})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})},$$
$$\eta_i = \underbrace{(\lambda - 1) + \frac{\alpha \bar{y} \beta_i b_{ii}(\phi_i - \sum_{j \in S} \phi_j / n)}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}}_{\substack{\text{term independent of} \\ \text{inter-group network}}} - \underbrace{\frac{\alpha n \bar{y}\, \mathrm{Cov}(\underline{\phi}, \underline{\beta} \circ \underline{d}_{\cdot i})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}}_{\substack{\text{term contingent on} \\ \text{inter-group network}}},$$

and G_i^s can be expressed in terms of the centrality measure as

$$G_i^s = \alpha \left[\beta_i b_{ii} - C_i\right] - 1 \tag{11}$$
$$= \alpha \left[\beta_i b_{ii} - \beta_A C_i^A - \beta_{A^c} C_i^{A^c}\right] - 1, \text{ for any } A \subseteq S, A^c = S \setminus A. \tag{12}$$

2. *Further, for any $A \subseteq S$, the total amount of identity goods received by members of A is*

$$G_A^* := \sum_{i \in A} G_i^* = \lambda G_A^S + \sum_{i \in A} \eta_i \quad , \tag{13}$$

where G_A^s, the total amount of identity goods received by members of A at the first-best level, can be expressed in terms of the fractionalization measure as:

$$G_A^s := \sum_{i \in A} G_i^s = \alpha \left[\sum_{i \in A} \beta_i b_{ii} - \beta_A F^A - \beta_{A^c} \sum_{i \in A} C_i^{A^c}\right] - |A|. \tag{14}$$

Proof. In appendix. □

To understand the implications of Proposition 5, consider first the role of centrality in shaping the first-best allocation of identity goods, as characterized in (11). A more central group—one that is identity-proximate to others—imposes less disutility on others when its identity goods are expanded. As a result, the socially optimal provision of identity goods increases with a group's centrality in the network (recall that a lower C_i corresponds to greater centrality). The formulation in (12) reinforces that this effect holds even when a group enhances its proximity to only a subset of other groups, while keeping its distance to the remaining groups unaffected.

The decomposition in (10) illustrates the extent to which the centrality-driven gain is realized in political equilibrium. To clarify this, suppose group i becomes more central by uniformly reducing its inter-group distances by a constant $\varepsilon > 0$ with respect to a subset of groups $A \subseteq S$, while its distances to the remaining groups remain unchanged. The resulting change in the equilibrium allocation of G_i can be expressed as:

$$\Delta(G_i^*) = (\lambda - 1)\Delta(G_i^s) + \Delta(\eta_i),$$

where $\Delta(X)$ denotes the change in variable X resulting from the shift in centrality.

The reduction in inter-group distance lowers the group's centrality measure C_i by $\varepsilon\beta_A$ and increases its first-best allocation G_i^s by $\Delta(G_i^s) = \alpha\varepsilon\beta_A$. In political equilibrium, however, this allocative gain is subject to a scale adjustment, determined by the alignment between political influence and tax contributions across groups. When politically influential groups contribute relatively less to the tax base (i.e., when $Cov(\underline{\phi}, \underline{\beta} \circ \underline{y}) < 0$), there is, in general, greater political pressure for redistribution. As a result, candidates scale up the provision of G_i, and the resulting change in the equilibrium allocation is given by $(\lambda - 1)\alpha\varepsilon\beta_A$ where $\lambda > 1$.

Additionally, there is a level adjustment, the direction of which depends on the distribution of political influence across groups. The change in level adjustment resulting from the shift in centrality can be derived as[3]

$$\Delta(\eta_i) = \frac{\alpha\bar{y}\beta_A\varepsilon(\phi_A - \sum_{j\in S}\phi_j/n)}{\underline{\phi}\cdot(\underline{\beta}\circ\underline{y})},$$

where $\phi_A = \sum_{j\in A}\phi_j(\beta_j/\beta_A)$ denotes the weighted average political influence within the subset of groups A. Note that the groups in A are the direct beneficiaries of group i's improved centrality, and that larger groups among them experience a greater reduction in disutility. It follows that if the size-weighted political influence of these direct beneficiaries exceeds the average political influence across all groups, the level adjustment becomes positive. This, in turn, further increases the equilibrium provision of G_i.

[3]This is because

$$\begin{aligned}&Cov\left(\underline{\phi}, , \underline{\beta} \circ (\underline{d}\cdot i + \varepsilon.\mathbb{1}_A)\right) - Cov(\underline{\phi}, , \underline{\beta} \circ \underline{d}\cdot i)\\ &= \varepsilon\left(\frac{1}{n}\sum_{j\in A}\phi_j\beta_j - \frac{1}{n^2}\sum_{j\in A}\beta_j\sum_{j\in S}\phi_j\right) = \frac{\varepsilon\beta_A}{n}\left(\phi_A - \sum_{j\in S}\phi_j/n\right),\end{aligned}$$

where $\mathbb{1}_A$ is an $n\times 1$ indicator vector whose j-th element equals 1 if $j \in A$ and 0 otherwise, and $\phi_A = \sum_{j\in A}\phi_j(\beta_j/\beta_A)$.

The key mechanism at play is that an improvement in group i's centrality generates a positive externality by reducing the disutility experienced by other groups. From a social planner's perspective, this reduction enhances overall welfare and justifies a higher allocation of G_i. However, whether and to what extent this gain is realized in a voting equilibrium depends on two forces. First, when politically influential groups bear relatively less tax burden, there is greater political demand for redistribution, which amplifies the allocative response—potentially leading to over-provision of G_i. Second, when those groups that benefit most from this positive externality also possess greater political influence, a feedback effect emerges in the electoral process, further reinforcing the expansion of G_i in equilibrium.

To put this result in perspective, consider a country like India, where the majority religion (Hinduism) comprises various sects that are often fragmented along caste lines. Suppose one particular sect becomes more central within the broader Hindu identity network by reducing its identity distance from other sects. This improved centrality can lead to a greater provision of identity goods (such as temples aligned with the sect's specific practices), but only if the other sects within Hinduism hold relatively greater political influence than groups affiliated with other religions. This dynamic reveals a strategic incentive: a group may enhance its access to identity-based public goods by fostering closer identity ties with electorally influential groups, even within a broader, ostensibly unified religious category.

Part (2) of Proposition 5 further elucidates the role of within-group fragmentation in shaping electoral competition over the provision of identity goods. To illustrate, consider a society with two major competing groups, each potentially fragmented internally. For instance, these groups could correspond to distinct religious communities, where each religion comprises multiple sects. If these sects share similar beliefs and practices, the identity distances among them will be small, resulting in a low fractionalization measure. Conversely, if the sects differ substantially in doctrine or practice, leading to greater inter-group distances, the resulting fractionalization will be higher—signaling deeper internal divisions within the group.

In our framework, this can be modeled as two disjoint subsets of nodes in the identity network, A and A^c, each representing a collection of subgroups. Proposition 5 implies that the more fragmented group (the one with higher *A-fractionalization*) contributes less to social welfare through its identity goods provision, thereby receiving a lower first-best allocation. Moreover, if the less fragmented group holds disproportionately greater political influence, it can further shift the political equilibrium in its favor, increasing its collective allocation through the adjustment term $\sum_{i \in A} \Delta(\eta_i)$.

These results are related to, but distinct from, those in Dasgupta and Neogi (2018), who analyze how internal fragmentation influences public good provision in a setting where groups allocate resources to political rent-seeking. In their framework, higher within-group fragmentation reduces incentives for political rent-seeking, thereby lowering the provision of group-specific public goods. Low political rent-seeking however implies high incentives for productive activities, which can raise aggregate income for the opposing group and, under certain conditions, even for the fragmented group itself. In contrast, our model highlights how fragmentation directly affects both the marginal utility and the political demand for identity goods. In a political equilibrium, less fragmented groups—if they hold relatively greater political influence—can systematically obtain higher allocations of identity goods, even after accounting for differences in size or income.

6 Banning group-specific public goods

Consider a scenario in which politicians are prohibited from allocating identity goods—an institutional arrangement intended as a safeguard against identity politics. Under such a regime, the role of politicians can be restricted to determining only the level of generic public goods, which in turn implicitly determines the optimal level of taxation. This raises a natural question: who benefits from such an institutional arrangement? Analyzing this case offers a useful benchmark for evaluating the social welfare implications of alternative policy regimes.

We modify the utility of a voter from group i under party K's platform as

$$w_i(q_K) = y_i(1 - t^K) + \alpha(1 - b_{ii}) \log(1 + G^K).$$

Recall from (6) that party A's vote share, given the policy platform $q = (q_A, q_B)$, is given by

$$\pi_A(q) = \frac{1}{2} + \sum_{i=1}^{n} \beta_i \phi_i \Delta w_i(q) - \delta \sum_{i=1}^{n} \beta_i \phi_i,$$

where $\Delta w_i(q) = w_i(q_A) - w_i(q_B)$. As before, to maximize its vote share, party A maximizes $\sum_{i=1}^{n} \beta_i \phi_i \Delta w_i(q)$, while party B minimizes it. Since the parties are ex-ante identical, the equilibrium involves full convergence: $q_A = q_B$. Applying standard optimization techniques used in Proposition 1, the equilibrium level of the generic public good can be derived as:

$$G^* = \max\left\{\frac{\alpha \bar{y} \sum_j \beta_j \phi_j (1 - b_{jj})}{\sum_j \beta_j \phi_j y_j} - 1,\ 0\right\},$$

which coincides with the level derived in the general model.

This equivalence implies that voters, under the alternative regime, substitute identity goods with increased private consumption made possible through tax savings. Letting Δt denote the tax savings, it is determined by equating the aggregate reduction in public expenditure on identity goods: $\bar{y}\Delta t = \sum_{i=1}^{n} G_i^*$, where G_i^* denotes the allocation of identity goods to group i under the original regime.

We can now compare welfare under the two regimes to identify which groups gain from banning identity goods. Group i is better off under the alternative regime if:

$$\begin{aligned} y_i \Delta t &\geq \sum_{j=1}^{n} b_{ij} \alpha \log(1 + G_j^*) \\ \iff \frac{y_i}{\bar{y}} &\geq \frac{\sum_{j=1}^{n} b_{ij} \alpha \log(1 + G_j^*)}{\sum_{j=1}^{n} G_j^*}. \end{aligned} \tag{15}$$

That is, group i prefers the alternate regime if its normalized per capita income exceeds the average utility derived per unit of identity goods allocated in the original regime. It follows that sufficiently high-income groups are strictly better off under the alternative institutional arrangement. Interestingly, the comparative statics with respect to preference intensity (b_{ii}) and inter-group antagonism ($-b_{ji}$) are non-monotonic, as the right-hand side of (15) is not monotonic in these parameters.

7 Conclusion

We develop a probabilistic-voting framework to examine how politicians allocate generic public goods and identity goods in electorates divided by group identity. By embedding both heterogeneous preferences and the negative externalities—identity distances—that identity goods impose on non-recipients, we show that unequal political influence induces systematic deviations from the social planner's allocation. We characterize the conditions under which political competition generates under- or over-provision of both generic and identity goods. These results illuminate the trade-offs and efficiency challenges faced in managing public-goods provision amid identity fragmentation.

We further show that groups with greater share of persuadable swing voters and strong preferences for identity goods can leverage their clout to secure above-optimal transfers. For instance, when groups have similar incomes, the alignment of swing-voter shares with their preferences for generic versus identity goods can push the equilibrium toward under- or over-provision of the generic public good, underscoring how electoral influence, rather than fiscal capacity, drives redistribution. In sum, our analysis reveals a nuanced interplay between group's share of policy-responsive voters, economic strength, and identity preferences in shaping how public resources are allocated.

We conclude by noting several avenues for extension. First, endogenizing group's share of policy responsive voters so that provision of identity goods affect a group's swing-voter share, could capture feedback loops between policy promises and polarization. Second, allowing asymmetric identity distances would reflect that some groups resent each other more intensely. Third, introducing alternative party motivations (e.g. policy-motivated or clientelist incentives) may yield additional insights. Finally, our network framework naturally lends itself to modeling coalition formation and bargaining among identity blocs. Exploring these directions would deepen our understanding of identity dynamics in electoral politics.

Appendix

The Appendix contains the proofs that are not already contained in the text.

Proof of Lemma 1. Let the Lagrangian be defined as

$$\begin{aligned}\mathcal{L} = {} & y(1-t) + \sum_{i=1}^{n} \beta_i (1-b_{ii}) \alpha \log(1+G) \\ & + \sum_{i=1}^{n} \beta_i \left[\sum_{j=1}^{n} b_{ij} \alpha \log(1+G_j) \right] - \lambda(G + \sum_{i=1}^{n} G_i - yt). \end{aligned} \tag{A.1}$$

The first-order conditions are:

$$\begin{aligned}\frac{\partial \mathcal{L}}{\partial t} &= -y + \lambda y = 0, \\ \frac{\partial \mathcal{L}}{\partial G} &= \frac{\alpha[\sum_{i=1}^{n} \beta_i (1-b_{ii})]}{1+G} - \lambda = 0, \\ \frac{\partial \mathcal{L}}{\partial G_i} &= \frac{\alpha \sum_j \beta_j b_{ji}}{1+G_i} - \lambda = 0.\end{aligned}$$

Solving these equations yields the optimal values of G, G_i, and t for all i. □

Proof of Proposition 1. To maximize the vote share, party A maximizes

$$\mathcal{L} = \sum_{i=1}^{n} \beta_i \phi_i \Delta w_i(q) - \lambda(G^A + \sum G_j^A - yt)$$

and party B minimizes the same. Since the parties are ex-ante identical, we will have convergence, *i.e.,* both parties will offer the same platform $q_A = q_B = q^*$. We thus provide proof only for A. Observe that

$$\begin{aligned}\Delta w_i(q) &= w_i(q_A) - w_i(q_B) \\ &= y_i(t_B - t_A) + (1-b_{ii})\alpha[\log(1+G^A) - \log(1+G^B)] \\ &+ \sum_j b_{ij} \alpha [\log(1+G_j^A) - \log(1+G_j^B)]\end{aligned} \tag{A.2}$$

Therefore,

$$\begin{aligned}\frac{\partial \mathcal{L}}{\partial t^A} &= -\sum_{i=1}^{n} \beta_i \phi_i y_i + \lambda y = 0, \\ \frac{\partial \mathcal{L}}{\partial G} &= \frac{\alpha[\sum_{i=1}^{n} \beta_i \phi_i (1-b_{ii})]}{1+G} - \lambda = 0, \\ \frac{\partial \mathcal{L}}{\partial G_i} &= \frac{\alpha \sum_j \beta_j \phi_j b_{ji}}{1+G_i} - \lambda = 0.\end{aligned}$$

Solving these equations yields the equilibrium platform of both A and B. $\square$

Proof of Lemma 2. Observe that when both the socially optimal and equilibrium allocations of the generic public good are strictly positive, we can express

$$\begin{aligned} G^s &= \alpha(\underline{\beta} \circ (\mathbb{1}_n - \underline{b})) \cdot \mathbb{1}_n - 1, \\ G^* &= \alpha\bar{y}\, \frac{\underline{\phi} \cdot (\underline{\beta} \circ (\mathbb{1}_n - \underline{b}))}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})} - 1. \end{aligned}$$

Using the fact that for any two arbitrary $n \times 1$ vectors $\underline{x}$ and $\underline{z}$,

$$\underline{x} \cdot \underline{z} = \frac{1}{n}(\underline{x} \cdot \mathbb{1}_n)(\underline{z} \cdot \mathbb{1}_n) + n\, Cov(\underline{x}, \underline{z}), \tag{A.3}$$

we get

$$\begin{aligned} G^* &= \frac{\alpha\bar{y}}{n}\, \frac{(\underline{\phi} \cdot \mathbb{1}_n)((\underline{\beta} \circ (\mathbb{1}_n - \underline{b})) \cdot \mathbb{1}_n)}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})} + \frac{(\alpha n\bar{y})\, Cov(\underline{\phi}, \underline{\beta} \circ (\mathbb{1}_n - \underline{b}))}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})} - 1 \\ &= \frac{\bar{y}(\underline{\phi} \cdot \mathbb{1}_n)}{n\,(\underline{\phi} \cdot (\underline{\beta} \circ \underline{y}))}(1 + G^s) + \frac{(\alpha n\bar{y})\, Cov(\underline{\phi}, \underline{\beta} \circ (\mathbb{1}_n - \underline{b}))}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})} - 1 \\ &= \lambda G^s + \eta, \end{aligned} \tag{A.4}$$

where $\eta = (\lambda - 1) + \dfrac{(\alpha n\bar{y})\, Cov(\underline{\phi}, \underline{\beta} \circ (\mathbb{1}_n - \underline{b}))}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}$, and

$$\begin{aligned} \lambda = \frac{\bar{y}(\underline{\phi} \cdot \mathbb{1}_n)}{n\,(\underline{\phi} \cdot (\underline{\beta} \circ \underline{y}))} &= \frac{(\underline{\phi} \cdot \mathbb{1}_n)((\underline{\beta} \circ \underline{y}) \cdot \mathbb{1}_n)}{n\,(\underline{\phi} \cdot (\underline{\beta} \circ \underline{y}))} \\ &= \frac{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y}) - n\, Cov(\underline{\phi}, \underline{\beta} \circ \underline{y})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})} \quad \text{(applying (A.3))} \\ &= 1 - \frac{n\, Cov(\underline{\phi}, \underline{\beta} \circ \underline{y})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})}. \end{aligned}$$

This gives us the representation in (7). $\square$

Proof of Proposition 3. First, we proof part 1. Given $b_{ii} = b$, we have $G^s =$

$\alpha(1-b)-1$. Replacing $(1+G^*)$ by $\alpha(1-b)$ in (A.4), we get

$$\begin{aligned} G^* &= \alpha(1-b)\left[\frac{\bar{y}(\underline{\phi}\cdot\mathbb{1}_n)}{n\,(\underline{\phi}\cdot(\underline{\beta}\circ\underline{y}))} + \frac{n\,\bar{y}\,Cov(\underline{\phi},\underline{\beta})}{\underline{\phi}\cdot(\underline{\beta}\circ\underline{y})}\right]-1 \\ &= \alpha(1-b)\left[\frac{(\underline{\phi}\cdot\mathbb{1}_n)((\underline{\beta}\circ\underline{y})\cdot\mathbb{1}_n)}{n\,(\underline{\phi}\cdot(\underline{\beta}\circ\underline{y}))} + \frac{n\,Cov(\underline{\phi},\bar{y}\,\underline{\beta})}{\underline{\phi}\cdot(\underline{\beta}\circ\underline{y})}\right]-1 \\ &= \alpha(1-b)\left[\frac{\underline{\phi}\cdot(\underline{\beta}\circ\underline{y}) - n\,Cov(\underline{\phi},\underline{\beta}\circ\underline{y})}{(\underline{\phi}\cdot(\underline{\beta}\circ\underline{y}))} + \frac{n\,Cov(\underline{\phi},\bar{y}\,\underline{\beta})}{\underline{\phi}\cdot(\underline{\beta}\circ\underline{y})}\right]-1 \text{ (using (A.3))} \\ &= \alpha(1-b)\left[1+\frac{n\,Cov\Big(\underline{\phi},\,\underline{\beta}\circ(\bar{y}\cdot\mathbb{1}_n-\underline{y})\Big)}{\underline{\phi}\cdot(\underline{\beta}\circ\underline{y})}\right]-1, \end{aligned}$$

which is higher (lower) than G^s if and only if the expression inside the square bracket is above (below) 1, or, equivalently, if and only if $Cov\Big(\underline{\phi},\,\underline{\beta}\circ(\bar{y}\cdot\mathbb{1}_n-\underline{y})\Big)$ is positive (negative). Further, we can simplify this covariance terms as

$$\begin{aligned} Cov\Big(\underline{\phi},\,\underline{\beta}\circ(\bar{y}\cdot\mathbb{1}_n-\underline{y})\Big) &= \frac{1}{n}\sum_i \phi_i\beta_i(\bar{y}-y_i) \quad \text{(applying } \sum_i \beta_i(\bar{y}-y_i)=0) \\ &= -\frac{1}{n}[\sum_i \beta_i\phi_i y_i - \bar{y}\sum_i \beta_i\phi_i] = -\frac{1}{n}Cov_\beta(\underline{\phi},\underline{y}). \end{aligned}$$

Therefore, $Cov\Big(\underline{\phi},\,\underline{\beta}\circ(\bar{y}\cdot\mathbb{1}_n-\underline{y})\Big) \gtreqless 0$ if and only if $Cov_\beta(\underline{\phi},\underline{y}) \lesseqgtr 0$.

To prove part 2, assume $y_i=\bar{y}$ for all i. Then, $G^* = \dfrac{\alpha(\underline{\phi}\cdot(\underline{\beta}\circ(\mathbb{1}_n-\underline{b})))}{\underline{\phi}\cdot\underline{\beta}}$. A direct comparison with G^s gives

$$\begin{aligned} G^* \gtreqless G^s &\iff \underline{\phi}\cdot(\underline{\beta}\circ(\mathbb{1}_n-\underline{b})) \gtreqless (\underline{\phi}\cdot\underline{\beta})((\mathbb{1}_n-\underline{b})\cdot\underline{\beta}) \\ &\iff \sum_i \beta_i\phi_i(1-b_{ii}) \gtreqless (\sum_i \beta_i\phi_i)(\sum_i \beta_i(1-b_{ii})) \\ &\iff Cov_\beta(\underline{\phi},\mathbb{1}_n-\underline{b}) \gtreqless 0, \end{aligned}$$

which completes the proof. □

Proof of Proposition 5. Note that $\underline{b}_{\cdot i} = -\underline{d}_{\cdot i} + b_{ii}.\underline{e}_i$, where $\underline{e}_i$ denotes the standard basis vector $(0,\dots,0,1,0,\dots,0)$ in the direction of the i-th coordinate. Therefore,

$$\begin{aligned} n\mathrm{Cov}(\underline{\phi},\,\underline{\beta}\circ\underline{b}_{\cdot i}) &= n\mathrm{Cov}(\underline{\phi},\,-\underline{\beta}\circ\underline{d}_{\cdot i} + b_{ii}.(\underline{\beta}\circ\underline{e}_i)) \\ &= -n\mathrm{Cov}(\underline{\phi},\,\underline{\beta}\circ\underline{d}_{\cdot i}) + nb_{ii}\mathrm{Cov}(\underline{\phi},\,\underline{\beta}\circ\underline{e}_i) \\ &= -n\mathrm{Cov}(\underline{\phi},\,\underline{\beta}\circ\underline{d}_{\cdot i}) + \beta_i b_{ii}(\phi_i-\phi^e), \end{aligned}$$

where $\phi^e = \sum_{j \in S} \phi_j$. We now return to the characterization of G_i^* in (8), and reformulate η_i and G_i^s as

$$\begin{aligned}
\eta_i &= (\lambda - 1) + \frac{\alpha n \bar{y}\, Cov(\underline{\phi}, \underline{\beta} \circ \underline{b}_{\cdot i})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})} \\
&= (\lambda - 1) + \frac{\alpha \bar{y}\, \beta_i b_{ii} (\phi_i - \phi^e)}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})} - \frac{\alpha n \bar{y}\, Cov(\underline{\phi}, \underline{\beta} \circ \underline{d}_{\cdot i})}{\underline{\phi} \cdot (\underline{\beta} \circ \underline{y})};
\end{aligned}$$

and

$$\begin{aligned}
G_i^s &= \alpha(\underline{\beta} \circ \underline{b}_{\cdot i}) \cdot \mathbb{1}_n - 1 = \alpha(\underline{\beta} \circ (-\underline{d}_{\cdot i} + b_{ii} \cdot \underline{e}_i)) \cdot \mathbb{1}_n - 1 \\
&= \alpha \beta_i b_{ii} - \alpha(\underline{\beta} \circ \underline{d}_{\cdot i}) \cdot \mathbb{1}_n - 1 = \alpha[\beta_i b_{ii} - C_i] - 1;
\end{aligned}$$

which give us the characterization of G_i^* as derived in (10) and (11). Further, since C_i can be expressed as $\beta_A C_i^A + \beta_A^c C_i^{A^c}$ for any $A \subseteq S$, we derive the expression in (12).

To derive (13), we aggregate (10) over all $i \in A$ for any $A \subseteq S$. Using (9), we derive the expression of G_A^s in (14). $\square$

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