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Electoral Uncertainty, Income Inequality and the Middle Class[1]

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ABSTRACT

We investigate how increased electoral competition — by influencing the equilibrium policies of competing parties — affects the income distribution in society. Our model is embedded in a standard probabilistic voting setup where parties compete at two stages: (i) they allocate resources *across* various districts and (ii) then, for each district, they divide the resources among the different constituent groups. We show that an increase in electoral competition in a district results in a tendency towards equalization of incomes therein. We check for these relationships using data from the Indian national elections which are combined with household-level consumption expenditure data rounds from NSSO (1987-88 and 2004-05) to yield a panel of Indian districts. We find that districts which have experienced tight elections exhibit lower inequality and polarization which indicates a larger "middle class".

JEL codes: D72, D78, O20

Keywords: Income distribution, polarization, political economy, targeting.

1. Introduction

In any democracy, uncertainty over electoral outcomes is likely to influence the proposed policies of competing political parties, as long as the politicians are office–motivated. Recognizing that these policies are able to differentially impact the incomes of an income–wise heterogeneous electorate, leads us to ask the following questions. How do close elections — via their effect on equilibrium policies — affect the income distribution in society? In particular, does greater electoral competition *reduce* or *exacerbate* existing income disparities? Also, does this lead to an increase in the size of the "middle class" or not?[2] These are precisely the questions we seek to address here by first constructing a theoretical model and then conducting a related empirical exercise with data from India.

The literature so far has focused on how resources are targeted to districts which are "non–partisan" — and hence electorally more unpredictable — as opposed to districts which are strongly inclined towards some party. Models of political competition which have directly addressed questions of this nature (see for e.g., Lindbeck and Weibull (1987), Dixit and Londregan (1996, 1998), etc.) have generally concluded that non–partisan or "swing" districts get more targeted resources in the aggregate. Such theoretical findings have been empirically investigated. For instance, Arulampalam et al (2009) find evidence, in the case of India, of the central government making transfers to state governments on the basis of political considerations. They find that a state which is both aligned and swing in the last state election is estimated to receive 16% higher transfers than a state which is unaligned and non-swing. Bardhan and Mookherjee (2010) investigate political determinants of land reform implementation in the Indian state of West Bengal since the late 1970s. Their findings are consistent with a quasi-Downsian theory stressing the role of opportunism (re–election concerns) and electoral competition.

In this paper, we take a step towards investigating which groups *within* the swing districts get the larger share of the benefits. Of course, one is tempted to re-apply the "swing group benefits the most" argument here for analyzing the within–district gains distribution issue. In fact, this raises the question of what we mean by a *group* in this context. Moreover, what if one were to entertain the hypothesis that the all groups (whatever may be the classification: income, occupation, ethnicity, etc.) are all equally ideological *ex ante*?

We present a simple two–stage model of political competition drawing on ideas from standard models of probabilistic voting like Lindbeck and Weibull (1987) and Dixit and Londregan (1996), among others. In the first stage, the two competing parties decide on how to allocate resources to a mutiltude of districts (which comprise the entire nation). In the second stage, the fielded candidates of these two parties in each district decide on how to allocate the proposed district–level resources (decided by the party leaders in the prior stage) among the various groups in the district.[3] The members of each group cast their vote based on the transfer promised to them and on their ideological taste for the parties.

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[2]The rise of India's "middle class" has been the subject of intense debate in recent times. There have been several studies (see Topalova (2005) , Bhagwati and Srinivasan (2002) etc.) which have tried to link the growth of the "middle class" to the policies of trade liberalization pursued since the 1990s.

[3]As explained in detail later, we use the term "group" in a rather flexible manner; it could stand for income or occupation or even ethnicity.

Our model (re-assuringly) delivers — in line with existing probabilistic voting models — that as the level of electoral competition increases in the district, the equilibrium level of transfer to that district increases. In other words, there is greater transfer to the electorally "swing" districts. But perhaps what is more intriguing is the following. Our model puts us in a position to evaulate the relative gains to each group (within a district) as the district *ceteris paribus* becomes more swing. We deliberately endow each group within a district with the same ideology distribution to switch off the "swing group benefits the most" channel.

Our main result is that the more "swing" a district — ceteris paribus — the greater the tendency towards equalization of incomes in that district. The intuition behind this result is quite straightforward. Assume that there is some heterogeneity in incomes: both within each group and also across the groups. Hence, we can call some groups poorer than others. Now take any ideology distribution (political) within a district and endow every constituent group with this same distribution; this effectively makes every group equally "swing". In such a situation, it is the poorer groups which get higher transfers. Why? Note, even though all groups are equally ideologically–motivated, an additional dollar to the poor delivers a higher marginal utility than it does to the rich. In equilibrium, the groupwise transfers are meant to equalize the per–capita marginal gain in votes with respect to transfers (for either of the two parties) *across all the groups*. Therefore, poorer groups within a district gain more and this reduces income disparities across the groups for any *given* ideology distribution.

Now suppose the ideology distribution for this district changes so as to make it more volatile electorally, thus more swing. As noted above, the overall transfer to the district increases. Notice, our earlier intiuition still applies: poorer groups within a district still gain more than their richer counterparts, and this reduces income disparities across the groups *just as before*. However, now there is an additional difference: every group now gets a higher transfer as compared to when the district was less swing. This implies, for every group, the within–group disparities are now reduced in relation to the group's average income; thus, there is lower within-group inequality. This combination of lower within–group disparity and (similar) across–group convergence is the key intuition behind our main result.

We then check for the relationship between close elections, income inequality and polarization for the case of national elections in India.[4] Our main variable representing electoral "swing" is the actual *margin of winning*; in other words, we look at the difference between the percentage vote shares of the two parties that obtain the highest number of votes in any constituency. The two National Sample Survey (NSS) consumer expenditure rounds we utilize have almost 16 years between them and these intervening years have been witness to several national elections.[5]

We also experiment with alternative variables for electoral swing; for example, we take an average of the winning margins over several elections prior to each of the NSS expenditure rounds to

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[4]There is a strong relationship between the size of the middle class and the degree of income polarization in society (see Esteban and Ray (2010) for a comprehensive discussion). In particular, a high degree of income polarization is suggestive of society dominated by two income groups — the "haves" and the "have–nots" and thus a *smaller* middle class. This is, in principle, quite different from income inequality and from an empirical standpoint most measures of the two concepts often diverge over various ranges.

[5]The two rounds are the 43rd round (conducted in 1987-88) and the 61st round (conducted in 2004-05). Also, national elections take place once every 5 years. Sometimes, they are more frequent. For instance, when the incumbent government fails a "vote of confidence" (a sign that the ruling party has the support of the majority of the national legislators) and is forced to resign, fresh elections are called.

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get a measure of the electoral volatility of the districts. The results we get are robust to such variations: more "swing" districts exhibit lower income inequality. The pattern persists when we replace winning margin by the vote share of the winning party. There is also evidence of a similar relationship between polarization and electoral uncertainty. Inter–quartile differences in expenditure (mean—normalized) are also positively associated with higher winning margins.

Recognizing that the empirical strategy is subject to various concerns of endogeneity (like reverse causation and omitted variables bias), we employ an instrumental variables approach as an additional robustness check. We argue that the vote share of *any* one specific national party in the district is a good candidate as an instrument for the *margin of winning* or the *vote share of the winner*. So we take the vote share of the Indian National Congress party as the instrumental variable. We believe that the only way a particular party's performance in the district can affect the district–level income distribution is through the channel of electoral competition. Moreover, in several of these districts the Congress party is not the winner, which reinforces our argument that this specific party's performance can have no direct effect on the district–level income distribution.

Our results from this 2–SLS IV approach are substantially similar to our previous results. Moreover, to assuage concerns regarding the potential endogeniety of our instrument, we employ the IIV estimation procedure posited in Nevo and Rosen (2012). By this method, we are able to generate bounds for our parameter estimates. Our IIV estimation results suggest that our parameter estimates are significantly different from zero and in the direction of our OLS and 2–SLS results.

In sum, our empirical findings clearly suggest that greater electoral uncertainty reduces existing income disparities and promotes the growth of the middle class.

Besley et al. (2010) use panel data on US states and find strong evidence that lack of political competition in a state is associated with anti-growth policies. In the spirit of group–specific transfers like in our model, Foster and Rosenzweig (2001) posit a model with three kinds of public goods which differentially affect the welfare of the landed (and hence better-off) and landless (and hence poor) households.[6] In a related vein, the political economy of public goods provision has been studied in many contexts. For instance, Banerjee and Somanathan (2007) look at the location of public goods between 1971 and 1991 in about 500 parliamentary constituencies in rural India to assess the relative importance of social structures as regards the allocation of public resources over the period. Banerjee et al. (2005) look at the influence of social divisions on public goods availability in India.

Our paper is in some ways also related to the literature on "clientelism". Bardhan and Mookherjee (1999) provide a theoretical framework which can deal with the issue of the connection between electoral competitiveness and clientelism. However, their main focus is the relationship between the degree of decentralization and clientelism, whereas here we concentrate on the link between electoral competitiveness and inequality/polarization. In a related context, Bardhan and Mookherjee (2012) posit a theory of clientelism which sheds light on the allocation of public services, welfare and empirical measurement of government accountability in service delivery. They also present some empirical evidence using household surveys from rural West Bengal consistent with their model.

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[6]They show that public expenditure on road-construction programs primarily benefit landless households by increasing local labor demand and the public purchase of irrigation facilities increases agricultural production and thus raises land rents which boost the incomes of the landed households.

The remainder of the paper is organized as follows. Section 2 presents a simple model designed to address our main questions. Section 3 describes the data, the empirical strategy and findings and Section 4 concludes. All proofs are contained in the appendix.

2. THEORY

2.1. **A Model.** Suppose that a nation is composed of N districts where N is odd and "large". We denote an individual by i and the set of individuals in district n by I_n. The set I_n is partitioned into $K \geq 2$ disjoint groups; denote each partition by $I_n(k)$ where $k \in \{1, ..., K\}$. Let $m_k^n > 0$ be the number of individuals in group k in district n.[7] We assume that the size of the population is the same in every district n; so $\sum_{k=1}^{K} m_k^n$ is the same for each $n \in \{1, ..., N\}$. One can think of this *group* marker as either income or ethnicity or occupation; we do not insist on any particular interpretation.

Within each group (indexed by k) individuals differ in terms of their incomes; we denote the income of individual i by y_i where $y_i \in \mathbb{R}$. We assume that these K groups have different income distributions which are discrete.[8] In particular, one can order them in terms of group incomes — in the sense of *first-order stochastic dominance* — so that $k = 1$ denotes the poorest group and $k = K$ is the richest.[9]

There are two political parties A and B who compete for votes in each of these N districts; so they field candidates in every district. It is useful to think of these parties as national level parties making their decisions (described in detail below) prior to a national election. The game unfolds in two stages. In the first stage, before the elections, each party has to decide on the amount of resources to spend in each district n — call this R_n^A and R_n^B, respectively — where $R_n^A, R_n^B \in \mathbb{R}$ for every $n \in \{1, ..., N\}$. The aggregate balanced budget condition applies, so that

$$\sum_{n=1}^{N} R_n^A = \sum_{n=1}^{N} R_n^B = 0.$$

Hence, some districts are *net gainers* in term of aggregate transfers while others are *net losers* according to each party's allocation rule.[10]

In the second stage, after the two parties simultaneously choose their cross-district allocations, in every district n the fielded candidates decide on the division of the transfer (R_n^A and R_n^B, respectively) across the K groups in the district. Specifically, for $j = A, B$, party j's candidate chooses $\mathbf{x^n(j)} \equiv (x_1^n(j), ..., x_K^n(j))$ where $x_k^n(j) \in \mathbb{R}$ is the transfer to each member of group k (in district

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[7]The arguments presented here can also accomodate $m_k^n = 0$ for some (k, n) combinations. However, for ease of exposition, we continue to assume $m_k^n > 0$ for every k and n.

[8]Hence, there is a certain (non-negative) mass associated with every income level in the support of the distribution.

[9]Clearly, interpreting groups as distinct income classes fits our description quite neatly. However, we do not need the groups to be disjoint in terms of the incomes earned by the group members. Hence, one could think of them as being different occupational sectors with some heterogeniety in income returns; or for the case of India, as being distinct *caste* groups.

[10]Of course, the actual transfer to the district in equilibrium potentially depends upon the identity of the party which wins in that district.

n). Moreover, for every n and j, $\mathbf{x^n(j)}$ satisfies the following (feasibility) restriction:

$$\sum_{k=1}^{K} m_k^n . x_k^n(j) \leq R_n^j.$$

So, essentially there are three sets of players. They are:

(a) Parties A and B (or to be more explicit, the party leadership comprising of the senior members, etc.) who decide on the district level allocations $\{R_n^A, R_n^B\}_{n=1}^N$.

(b) The party candidates in each district, one for each party and

(c) the individual voters residing in all these districts, i.e., $\bigcup_n I_n$.

We describe their actions and payoffs below.

Each party's payoff is closely tied to the performance at the *national level*. This they can influence by their choice of district level allocations $\{R_n^A, R_n^B\}_{n=1}^N$. We can endow party j (where $j = A, B$) with either of the two objectives:

(i) Party j seeks to maximize the probability of winning a majority of the N districts.

(ii) Party j seeks to maximize the expected plurality across all the districts taken together; hence, maximize the number of votes recieved at the national level.

The objective of any fielded candidate in any district is straightforward: he simply chooses the division $\mathbf{x^n(j)}$ — given his rival candidate's proposed allocation and his own feasibility constraint — which maximizes his expected plurality (vote share) in the district.

In any district, an individual voter's preferences over candidates[11] (and their proposed allocations) are described as follows. First, individual i exhibits a bias a_i, positive or negative, for party A. The corresponding bias for B is normalized to be zero, so a_i is really a difference. This ideological bias can stem from many things, say the parties stand on issues other than their redistributive transfers. Moreover, we assume that individual i draws this bias from a distribution with cdf $F_i(.)$ and corresponding density f_i positive everywhere on $\mathbb{R}$. Also, all such draws are statistically independent.

The payoff to any voter is a sum of the payoff from the transfer and the ideological bias. Specifically, take the case of voter $i \in I_n(k)$, i.e, an individual in group k in district n. Suppose party A's candidate offers him $x_k^n(A)$ and party B's candidate offers him $x_k^n(B)$. Then, voter i' payoff is $u(y_i + x_k^n(A)) + a_i$ when party A's candidate wins and $u(y_i + x_k^n(B))$ when party B's candidate wins. Here, u represents the utility function and is standard in the sense that $u' > 0$, $u'' < 0$. We also assume that $u''' \geq 0$.[12] Moreover, we assume that the Inada conditions hold so that $u'(0) = +\infty$.

Thus, a voting decision rule for individuals in district n — call it v_n — is a mapping from the set I_n to the set $\{A, B\}$ for every $n \in \{1, ..., N\}$. Given that we have endowed every voter with the

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[11]Here we do not make a distinction between affiliation for a party and affiliation towards the party's candidate; we simply look at the overall affiliation towards the party–candidate combination. In some contexts, it may make sense to unpack these terms. See for example, Mitra (2011).

[12]Several commonly used utility functions satisfy this condition. For example, the iso-elastic function $u(x) = \frac{x^{1-\sigma}}{1-\sigma}$ for $\sigma > 0$, satisfies this property.

same utility function u, we restrict attention to voting decision rules which are symmetric across n, i.e., $v_n = v$ for every n.

It is clear that voter i in $I_n(k)$ only cares about the transfer to him, namely, $x_k^n(j)$ for $j = A, B$. In other words, he does *not* explicitly care about $\mathbf{x^n(j)}$ for any n other than his *own* district. In this spirit, we stipulate that the information available to voter i in $I_n(k)$ pertains *only* to district n, i.e., he is informed of $\mathbf{x^n(A)}, \mathbf{x^n(B)}, R_n^A$ and R_n^B.

The timing of the game is as follows.[13] First, the party leaders of A and B simultaneously choose the district level allocations $\{R_n^A, R_n^B\}_{n=1}^N$. The allocations R_n^A and R_n^B are revealed to the fielded candidates in district n, for each $n \in \{1, ..., N\}$. Next, in each district, the fielded candidates concurrently announce their within-district allocations $\mathbf{x^n(j)}$ for $j = A, B$ while respecting the corresponding district-level allocations R_n^A and R_n^B. Finally, each voter then draws his bias from F_i (note, F_i is public information but each individual's realization is observed by the individual alone) and then votes for the party who promises him higher utility. The candidate with the highest number of votes is declared the winner in the district; subsequently, the winner's proposed platform is implemented. Note, there is full-commitment from each party's (and candidates') side in keeping with the Downsian tradition.

2.2. 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 inter-district and intra-district allocations, $\{R_n^j; (x_1^n(j), ..., x_K^n(j))\}_{n=1}^N$ for $j = A, B$ which are budget balanced and feasible, respectively and a voting decision rule v all of which together satisfy the following:

(i) The voting decision rule v is a best-response to the intra-district allocations, $\{(x_1^n(j), ..., x_K^n(j))\}$ for $j = A, B$ and for every n.

(ii) The intra-district allocations $\{\mathbf{x^n(A)}, \mathbf{x^n(B)}\}$ constitute mutual best-responses for the fielded candidates in every n given the allocations $\{R_n^A, R_n^B\}$ and the voting decision rule v.

(iii) The allocations $\{R_n^A, R_n^B\}_{n=1}^N$ constitute mutual best-responses for the party leaders of A and B, given the intra-district allocations $\{\mathbf{x^n(A)}, \mathbf{x^n(B)}\}_{n=1}^N$ by the candidates and the voting decision rule v.

Existence: We now specify a sufficient (and by no means necessary) condition for the existence of equilibrium in this game. The condition — adapted from Lindbeck and Weibull (1987) — is the following:

$$sup \frac{|f_i'(x)|}{f_i(x)} \leq inf \frac{|u''(y)|}{(u'(y))^2}$$

for every $i \in \bigcup_n I_n$. This essentially puts a threshold on the minimum degree of concavity of u and ensures that the objective functions (of the maximization problems) are concave.[14]

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

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[13]Depending upon our choice of the parties' payoff structure, we have two different games. It turns out that the results we obtain for both games are substantially similar. For the ease of exposition, we continue to use the singular term "game" than make the distinction.

[14]Many combinations of commonly used utility and density functions satisfy this requirement. For e.g., iso-elastic utility functions $u(x) = \frac{x^{1-\sigma}}{1-\sigma}$ for $\sigma \geq 1$ and the logistic distribution.

We first outline the optimal voting decision rule. Consider voter $i \in I_n(k)$, i.e, an individual in group k in district n. Note, i's payoff is $u(y_i + x_k^n(A)) + a_i$ when party A's candidate wins and $u(y_i + x_k^n(B))$ when party B's candidate wins. Recall, a_i is the net ideological bias voter i has towards party A. Given that there is full commitment on the parties and candidates' side, voter i will simply vote for the party promising the higher payoff. Hence, in any (subgame perfect) equilibrium of this game, every individual votes for the party offering the higher payoff; we will call this voting decision rule v.

Next, we turn to the within-district allocation problem faced by the fielded candidates in any district n. The candidates take R_n^A, R_n^B and the voting rule v as given while choosing their respective intra-district across-group allocations $\mathbf{x^n(A)}$ and $\mathbf{x^n(B)}$. Now, according to v, any individual $i \in I_n(k)$ votes for A when $u(y_i + x_k^n(A)) + a_i > u(y_i + x_k^n(B))$; otherwise he votes for B.[15]

Note, the probability that individual i votes for B is given by $F_i(u(y_i + x_k^n(B)) - u(y_i + x_k^n(A)))$. Hence, the probability that i votes for $A \equiv p_i = 1 - F_i(u(y_i + x_k^n(B)) - u(y_i + x_k^n(A)))$.

Let $d_i \equiv u(y_i + x_k^n(B)) - u(y_i + x_k^n(A))$. So d_i is actually i's utility difference arising from the difference between A's and B's proposed transfers. This is what is traded off against i's ideological bias for the two parties in determining which party he votes for. We can re-write p_i as $1 - F_i(d_i)$.

Note, A's candidate in district n faces the following problem: choose the intra-district across-group allocations $\mathbf{x^n(A)}$ permissible under the allocated budget R_n^A which will maximize his vote share *given B's corresponding choice of $x^n(B)$.*

Formally,

$$max_{\mathbf{x^n(A)}} \sum_{i \in I_n} p_i$$

subject to

$$\sum_{k=1}^{K} m_k^n . x_k^n(A) \le R_n^A.$$

The problem for B's candidate is analogous given that this stage game is constant–sum.

The necessary first-order conditions corresponding to every group k — for A's and B's candidates, respectively — are given by:

$$(1) \qquad \sum_{i \in I_n(k)} u'(y_i + x_k^n(A)) f_i(d_i) = \lambda_n . m_k^n$$

and

$$(2) \qquad \sum_{i \in I_n(k)} u'(y_i + x_k^n(B)) f_i(d_i) = \mu_n . m_k^n$$

where $\lambda_n, \mu_n > 0$ are the associated lagrange multipliers.[16] This implies

$$(3) \qquad \frac{\sum_{i \in I_n(k)} u'(y_i + x_k^n(A)) f_i(d_i)}{\sum_{i \in I_n(k)} u'(y_i + x_k^n(B)) f_i(d_i)} = \frac{\lambda_n}{\mu_n} \equiv \rho_n$$

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[15]Given that the bias distribution for every voter i is assumed to be without any mass points, the probability of indifference for i is 0.

[16]It is clear that in our setup $\sum_{k=1}^{K} m_k^n . x_k^n(A) = R_n^A$ and $\sum_{k=1}^{K} m_k^n . x_k^n(B) = R_n^B$.

for every $k \in \{1, ..., K\}$.

As regards R_n^A and R_n^B, there are three possibilities: (i) $R_n^A = R_n^B$, (ii) $R_n^A < R_n^B$ or (iii) $R_n^A > R_n^B$. Of course, which of these will transpire in equilibrium — for any district n — will be determined by the parties' choice in the first stage of the game. But the fielded candidates simply take R_n^A and R_n^B as given when choosing their respective within–district across–group allocations.

The following lemma explicitly deals with case (i).

LEMMA **1.** *Suppose that in equilibrium $R_n^A = R_n^B$ for some district n. Then it must be that the proposed intra-district allocation in n is identical for both parties, i.e., $\mathbf{x^n(A)} = \mathbf{x^n(B)}$.*

Proof. See Appendix. ∎

Next, we look at case (ii) where the budgetary allocation by party A for district n is lower than that of prty B's. Here it must be that for some group k, we have $x_k^n(A) < x_k^n(B)$. This immediately implies — by Equation (3) — that $\rho_n > 1$ and hence $x_k^n(A) < x_k^n(B)$ for every $k \in \{1, ..., K\}$. Hence, $d_i > 0$ for every i in district n. In other words, every individual in this district gets promised a higher transfer from party B as compared to A.

An analogous argument applies to case (iii) where $R_n^A > R_n^B$; here $\rho_n < 1$ and $d_i < 0$ for every i in district n.

So the probability that district n elects party A' candidate — call it P_n— is given by

$$P_n \equiv \sum_{i \in I_n} p_i = \sum_{i \in I_n} [1 - F_i(d_i)].$$

Now we return to the first stage of this game and focus on the problem faced by the two parties. As mentioned earlier, the parties may be imputed either of the two objectives:

(I) Each party seeks to maximize the probability of winning a majority of the N districts.

(II) Each party seeks to maximize the expected plurality across all the districts taken together; hence, maximize the number of votes recieved at the national level.

It turns out that the results we obtain are substantially similar under either of the two cases. We start with case (I).

Define $z_n = 1$ if district n elect's party A's candidate and 0 otherwise. Hence, the probability that party A will win a majority (call it π_A) is given by

$$\pi_A = Prob.(\sum_{n=1}^{N} z_n > N/2).$$

Therefore, the probability that party B wins a majority — call it π_B — is simply $1 - \pi_A$.

Recall, that π_A and π_B depend upon the chosen $\{R_n^A, R_n^B\}_{n=1}^N$. Focus on any district n; party A's payoff can be thought of as follows:

$$\pi_A = Prob.(\sum_{d \neq n} z_d > N/2) + Prob.(\sum_{d \neq n} z_d = (N-1)/2).P_n$$

The first term captures the probability that the outcome at the national level *does not* depend upon the election outcome in district n. The second term denotes the case when party A just achieves a majority and district n is part of it (hence the term P_n). Notice that the expression for π_A above has only one term which depends upon (R_n^A, R_n^B) — namely, P_n.[17]

Party $A's$ problem is therefore

$$max_{\{R_n^A\}_{n=1}^N} Prob.(\sum_{d \neq n} z_d > N/2) + Prob.(\sum_{d \neq n} z_d = (N-1)/2).P_n$$

subject to

$$\sum_{n=1}^N R_n^A = 0.$$

Party $B's$ problem is analogous.

The following lemma characterizes the equilibrium choices of R_n^A and R_n^B.

LEMMA **2.** *Suppose each party seeks to maximize the probability of winning a majority of the N districts. For any district $n \in \{1, ..., N\}$, it must be that $R_n^A = R_n^B$.*

Proof. See Appendix. ∎

Hence by Lemma 1 and Lemma 2, we conclude that in every district n, it must be that
$$R_n^A = R_n^B$$
and
$$\mathbf{x^n(A)} = \mathbf{x^n(B)}.$$

Note, this implies the following relation which we will utilize later repeatedly:

(4)
$$\frac{1}{m_k^n} \sum_{i \in I_n(k)} u'(y_i + x_k^n) f_i(0) = \lambda$$

in for every k and for every n, in equilibrium.

LEMMA **3.** *Suppose each party seeks to maximize the probability of winning a majority of the N districts. $\mathbf{x^n(A)} = \mathbf{x^n(B)} \equiv \mathbf{x^n}$ for any district n implies that $\mathbf{x^n}$ — and thereby $R_n^A = R_n^B \equiv R_n$ — is unique.*

Proof. See Appendix. ∎

Now we come to Case (II) where we assume that each party seeks to maximize the expected plurality across all the districts taken together; hence, maximize the number of votes recieved at the national level.

Here, Party $A's$ problem is

$$max_{\{R_n^A\}_{n=1}^N} \sum_{n=1}^N P_n$$

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[17]We can write π_A in this manner since we assume that the ideology shocks (a_i) are drawn indepedently by the individual voters.

subject to

$$\sum_{n=1}^{N} R_n^A = 0.$$

Party B's problem is to *minimize* the same objective function with an analogous constraint.

It is quite straightforward to see that essentially party A will allocate $\{R_n^A\}_{n=1}^N$ so as to equalize $\frac{\partial P_n}{\partial R_n^A}$ across all the N districts; party B will behave analogously. This will basically lead us to Equation (9); from where we can deduce — like in Case (1) — that $R_n^A = R_n^B$ and $\mathbf{x^n(A)} = \mathbf{x^n(B)}$ in every district n. Equation (4) will naturally follow.

The discussion above is summarized in the following proposition.

PROPOSITION **1.** *There is a unique equilibrium of this game. In this unique equilibrium, both the parties and their respective candidates behave in a symmetric fashion, i.e, $R_n^A = R_n^B$ and $\mathbf{x^n(A)} = \mathbf{x^n(B)}$ in every district n.*

This completes our description of the equilibrium of this simple game and sets the ground for our main results.

2.3. **Electoral competition and Income distribution.** There are basically three sets of (related) questions which we investigate here. They are: (i) Which type of districts typically receive more aggregate transfers, i.e., higher $R_n^A = R_n^B \equiv R_n$? (ii) Given R_n, which groups — within district n — gain the most? (iii) Finally, what is the effect on income inequality as electoral competition increases?

We have assumed that all districts have the same population and the latter are partitioned into K disjoint groups. However, we have imposed no restrictions on the wealth levels across districts: in the context of our model, this means the terms m_k^n are allowed to vary across n. So some districts are poor while others are rich. There is another dimension along which districts may exhibit heterogeniety, namely, in the distribution of ideological bias among the voters: some districts may have large sections of the population who are partisan while some may have many voters who are ideologically detached from *both* parties. Hence, the word "type" in question (i) above may be interpreted in two ways: one, is in terms of income distribution while the other is in terms of ideology distribution.[18]

Let us start with the simple case where every individual draws his ideological bias from the *same* distribution — i.e., $F_i = F$ for every $i \in \bigcup_n I_n$. Here, clearly, every district is identical in terms of the distribution in ideology; so by "type" of a district, we mean the income dsitribution therein. In light of question (i) above, we make two observations.

OBSERVATION **1.** *Suppose all districts are identical in terms of income distribution apart from being homogeneous in ideology distribution as defined above. Then it must be that $R_n = 0$ for every n, in equilibrium. In other words, there is no redistribution across the different districts.*

Proof. See Appendix. ∎

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[18]Of course, income levels and ideology distribution may be correlated in a certain manner; in which case "type" will encompass both entities simultaneously. In the model presented here, we treat these as independent. We do discuss the ramifications of possible correlations between income levels and ideology distribution in the section 2.4

Observation 1 tells us that when all districts look *identical* there can be no asymmetry in the district-level allocation in equilibrium; in other words, all districts are treated equally in terms of aggregate transfers.

Take any district n. We will say that this district becomes "poorer" if the following applies: some individuals belonging to some groups (within n) experience a reduction in their incomes. Hence, some people simply become poorer. More formally, let $\mathbf{y}$ denote the income distribution of I_n initially and let $\mathbf{y}'$ denote the same afterwards. We say n has become *poorer* — in the shift from $\mathbf{y}$ to $\mathbf{y}'$ — if $y_i' \leq y_i$ for every $i \in I_n$ with the inequality strict for at least one i.

OBSERVATION **2.** *Impose homogeneity in ideology distribution as defined above. Then, the poorer a district — ceteris paribus — the higher the aggregate transfer it receives in equilibrium.*

Proof. See Appendix. ∎

Observation 2 tells us that *ceteris paribus* the poorer a district, the more transfers it receives. In a way, there is a trend towards equalization of incomes across districts *given the assumption of homogeneity in ideology distribution*. Now, we relax this assumption to a certain degree — henceforth, we allow for ideology distribution to vary *across* districts but require that it be the same for all voters *within* a district. Specifically,

$$F_i = F^n$$

for all $i \in I_n$ and for each $n \in \{1, ..., N\}$. Thus, we now allow for heterogeniety across districts in terms of ideology distribution. We can re-examine question (i) posed above, in this context. In a manner analogous to Observation 2 above, we can compare districts which are similar in all respects but in ideology distribution.

In keeping with the previous literature[19], we interpret the density of the ideological bias evaluated at 0 (the cut–point, so to speak) to be an index of how *swing* or non-partisan the district happens to be. To see this in a more intuitive sense, consider density functions which are *symmetric and unimodal*. Now consider two districts s and t where $f^s(0) > f^t(0)$. This is roughly equivalent to saying that s, in relation to t, has a higher proportion of citizens who are ideologically equidistant (or detached) from either party. Thus, s is more *swing* than t and so the former can be more unpredictable in terms of election results.

The preceding discussion suggests that competition should be tighter in s as compared to t. This, in turn, leads to s being more favored — in terms of aggregate transfers — by the competing parties than t. In fact, in line with the findings of the previous literature, this is what is stated in the observation below.

OBSERVATION **3.** *Suppose that the ideology distribution varies across districts but is the same for all voters within a district. Then, the more "swing" a district — ceteris paribus — the higher the aggregate transfer it receives in equilibrium.*

Proof. See Appendix. ∎

This brings us to the next question, i.e., question (ii), which tries to identify the *gainers* and *losers* — in terms of the group-wise allocations — within a district.

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[19]For instance, see Arulampalam et al (2009).

OBSERVATION **4.** *Suppose that the ideology distribution varies across districts but is the same for all voters within a district. Then, the poorer the group, the higher the transfer they obtain in equilibrium.*

Proof. See Appendix. ∎

Now we are equipped to confront question (iii): *what is the effect on income inequality in a district as it becomes more "swing", i.e., electoral competition therein increases?* We will utilize Observations 3 and 4 to guide our intuition.

Recall, Observation 3 states that the more "swing" a district, the more aggregate transfers it gets in equilibrium. Observation 4 relates to the distribution of benefits across the K groups *given a fixed level of transfer at the district level.* Hence, it is not obvious as to what happens to income inequality — within a district — as the aggregate transfer increases owing to an increase in electoral competition in that district. There are various measures of income inequality in the literature several of which use Lorenz-ordering as a precept.[20] Here, we do not pick any particular measure(s) but refer to "equalization of incomes" in the following sense. We have the utility function u defined over income. Recall, that $u' > 0$, $u'' < 0$ and $u''' \geq 0$. Take two income levels y_1 and y_2, where $0 < y_1 < y_2$; further, suppose these are the *only* income levels in the economy with the population evenly split by these two income levels.

Clearly, the "difference" between y_1 and y_2 is crucial in determing the extent of inequality, where by "difference" one could mean $y_2 - y_1$, $1 - \frac{y_1}{y_2}$ or many other such terms. For us, "difference" is in the sense of the (absolute) difference in marginal utilities, i.e., $u'(y_2) - u'(y_1)$. Note, given the rather standard assumptions on u, this way of defining "difference" is closely connected to either $y_2 - y_1$ or $1 - \frac{y_1}{y_2}$. Hence, our usage of "equalization of incomes" is to be interpreted as *convergence in the marginal utilities*.

The following proposition informs us that the more "swing" a district, the greater the drive towards equalization of incomes in that district.

PROPOSITION **2.** *Suppose that the ideology distribution varies across districts but is the same for all voters within a district. Then, the more "swing" a district — ceteris paribus — the greater the tendency towards equalization of incomes in that district.*

Proof. See Appendix. ∎

The basic idea behind Proposition 2 is simple: the intuition is partly similar to the idea of a *mean–preserving increase in spread*. The mean of the marginal utilities — the $u'(.)$'s — for every group k is equalized across all K groups in both districts s and t (hence, the analogy with the *mean–preserving* part). However, the within–group spread in u' is lower in the more swing district, namely, s (hence, the analogy with the *increase in spread* part).

2.4. **A Possible Extension.** There are several ways to extend this simple model. Here we discuss one possibility, namely, where the ideology distribution is allowed to vary across the K groups *even within a district* n. So one may think of the individual i's bias draw a_i as having two (additive)

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[20]Foster (1985) offers a comprehensive summary; see also Sen (1997).

independent components — one which is district-specific (a_n) and one which is group-specific (a_k). So that one could think of a_i as $a_i \equiv a_n + a_k$ where a_n is drawn from some distribution F_n and is *independent* of the distribution from which a_k is drawn; call the latter distribution F_k.

Note, the probability that voter i votes for party A — denoted by p_i — would depend on both F_n and F_k. Clearly, this complicates the analysis to some extent. We do not pursue it here because of the following reason: we are interested in the effect *district–level* electoral competition has on *district–level* overall inequality (encompassing *within–* group and *across–* group inequality). Hence, variations in the *across–* district ideology shock suffices for our purpose; the group-specific shock introduces another channel of heterogeniety which although plausible does not really address our questions. Morever, we conjecture that the main intuition will survive even in this (extended) framework.

The main empirically testable prediction that our model generates is stated in Proposition 2. We now turn to our findings with regard to data from India.

3. EMPIRICAL ANALYSIS

3.1. **Data.** We need to combine data on incomes with the data on election outcomes. In the case of India, nationally representative data on personal incomes is hard to obtain since a vast majority of Indian households (primarily residing in rural parts) are exempt from payment of income taxes (see Banerjee and Pikkety (2003)). However, there is data on consumer expenditure in India which is publicly available; thus consumer expenditure serves as an excellent proxy for income in our analysis. These data are collected by the National Sample Survey Organization (NSSO) .

The National Sample Survey (NSS) is a large-scale consumer expenditure survey which is conducted quinquennially and covers the entire nation; the unit of observation is a household. The recall period used is 30 days, i.e., the surveyed households are asked to provide information on consumption expenditure incurred over the past 30 days. For the current study we use the 43rd and 61st rounds of the NSS. The 43rd round was conducted during July 1987 – June 1988 and the 61st round was conducted during July 2004 – June 2005. Alongside information on consumer expenditure, the survey also collects data on other socio-economic characteristics of the (surveyed) households such as religion, caste, education, etc.

This information on household expenditure is combined with election data obtained from the Election Commission of India. We use the data for the parliamentary (or federal level) elections from 1977 to 2004. During this period, 11 such general elections took place in India. Our theory requires us to use some measure of the electoral competitiveness of the district — the "swing" nature, so to speak. We primarily utilize the difference in percentage vote shares of the two parties that obtain the highest number of votes in any constituency. This is in line with Arulampalam et al (2009). We use the winning margin and the vote share of the winning party in the election prior to each expenditure round — in turn to capture the extent of electoral competition in the district. As an additional check, we also use an average of the margin and vote share (respectively) — each averaged over the 3–4 elections — prior to the corresponding expenditure round.

The Indian National Congress party is one of the most prominent national parties in India (established in 1885) and is closely associated with the Indian freedom struggle. We also use the information about whether the constituency had a shift away from or to a Member of Parliament
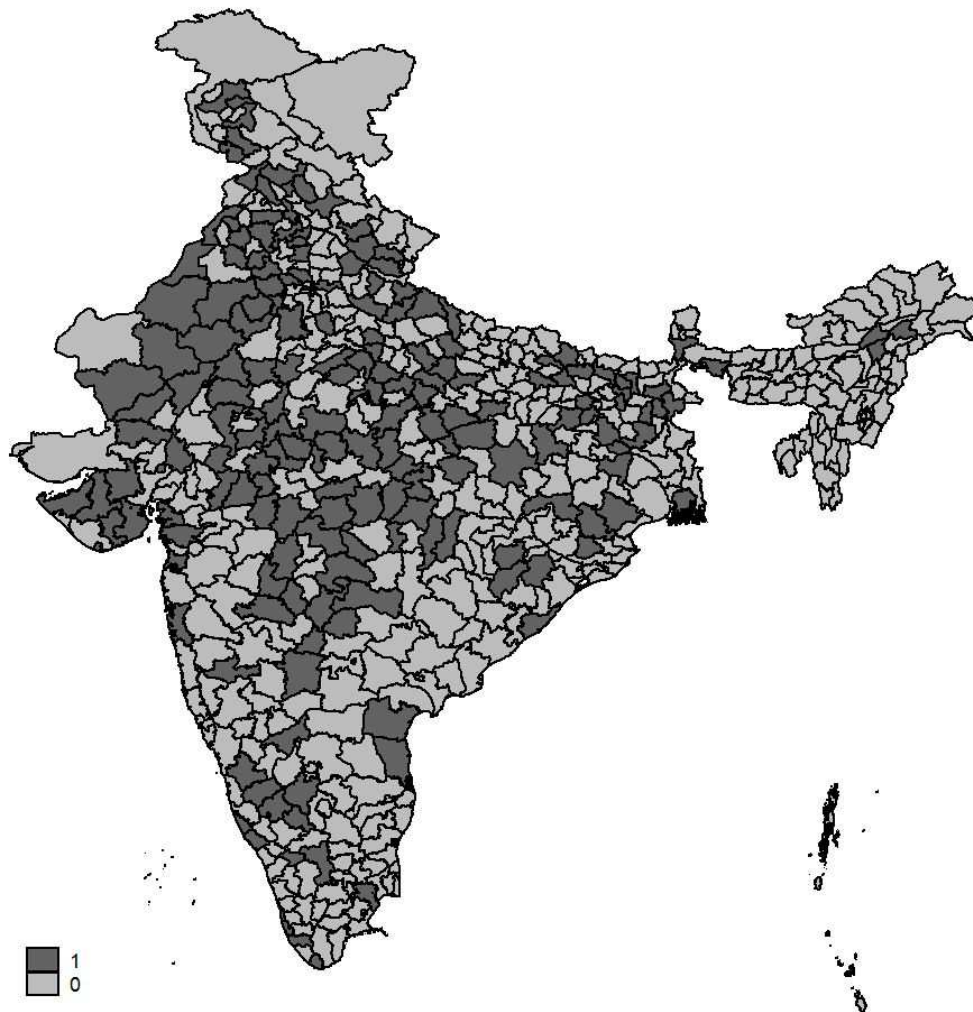
FIGURE 1. **Map of the Indian districts.** *Notes:* The 179 districts in our sample are shaded dark grey (denoted by 1). The rest of the districts in light grey (denoted by 0) nest multiple constituencies and hence are not in our sample.

(MP) from the Indian National Congress party. The use of a more refined measure of swing which takes into account movements to and from different parties is not possible for the following reason. There has been an immense proliferation of political parties at both the state and central levels, most of it arising from the splitting up of the main existing national or even regional parties. Moreover, various coalitions — *ad hoc* and otherwise — became popular from the 1980s onward. This makes it very difficult to say whether there really has been an effective shift of regime when say person X wins the same seat first as a candidate of party L and then as a candidate of party R. Given the way the nature of politics and political parties evolved during this period, we chose to proceed with a rather conservative division of parties into "Congress" and "Non-Congress" camps and recorded the movements of a district between these camps over the different election periods.

A brief word about the Indian political system is in order. The Indian Parliament is bicameral in nature. However, the Lok Sabha is the popularly elected House and is *de facto* more powerful than the other House (Rajya Sabha). The popularly elected Members of Parliament (MP) enjoy

a five-year term after which fresh Lok Sabha elections are held. There were 518 (Lok Sabha) constituencies in 1971. This went up to 542 after a Delimitation order in 1976 and then to 543 in 1991.

Population is the basis of allocation of seats of the Lok Sabha. As far as possible, every state gets representation in the Lok Sabha in proportion to its population as per census figures. Hence, larger and more populous states have more seats in the Lok Sabha as compared to their smaller and sparsely-populated counterparts. For example, Uttar Pradesh (a north Indian state) with a population of over 166 million has 80 Lok Sabha seats while the state of Nagaland with a population of less than 2 million has only one Lok Sabha seat.

The NSSO expenditure rounds allow identification of the sureveyed household upto the district to which it belongs; no finer identification is possible. However, it is often the case that a single district houses more than one electoral constituency; this is especially true for more populous districts. Given the nature of our hypotheses, we have to restrict attention to only single-constituency districts, i.e. to those places where a district corresponds to just one single constituency [21]. In our sample, there are 179 such districts which we follow for two time periods. These NSS 'thick' round surveys are representative at the district level.[22]

Figure 1 provides a visual representation of the districts in India. The 179 districts in our sample are spread all over the country.

Tables 1 and 2 provide the summary statistics of the variables used in the analysis. Comparing the election data across the two periods, we see that elections clearly became more competitive over the years. For instance, in the elections prior to 1988, the average winning margin varied between 4% and 51%. On the other hand, in the elections between 1988 and 2004 the same statistic was never higher than 31% for any constituency. A similar observation applies to the vote share of the winning candidate.

Between the two periods, both poverty and inequality have fallen on average across the districts suggestive of a trend towards a secular balanced growth. Notably, polarization as measured by the Foster-Wolfson index[23] registers a decline – on average – when comparing across the two periods; this is suggestive of the growth of the "middle class" over time. Altogether, these tables clearly indicate that there was a lot of dynamism both on the income distribution frontier and in the political scene in India during the period of our study.

Figures 2 and 3 provide a simple yet compelling visual representation of the empirical patterns which we subsequently reinstate with our empirical specifications. In each of the figures we provide a basic scatterplot where we pool the observations over the two rounds. The gini coefficients corresponding to the 358 observations are plotted on the vertical axis. The horizontal axis plots

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[21] In a district with several constituencies, the link between electoral competitivess and polarization (or inequality) cannot be clearly established. For example, any change in polarization (or inequality) in any one of the constituencies (presumably as a response to electoral competition in that constituency) does not necessarily reflect a similar change in polarization (or inequality) in the district overall.

[22] Several authors have used these NSS data at the district level. See, e.g., Topalova (2010), Edmonds et al (2010), Cutler et al (2010), Chaudhuri and Gupta (2009) and Chattopadhyay (2010) among others.

[23] The measure of polarization posited by Foster and Wolfson (1992, 2010) is well–disposed towards capturing the size of the middle class. Hence, this is the measure we use in the empirical analysis.

	Mean	Std. Dev	Min	Max
Vote share of winner	54.347	8.299	35.910	81.080
Winning margin	22.055	14.025	0.030	64.080
Swing Congress	0.240	0.428	0.000	1.000
Congress's vote share	51.791	11.673	0.000	79.660
Average winning margin	23.587	8.837	3.930	51.370
Average vote share of winner	55.356	5.126	41.907	74.405
Average Congress vote share	42.659	10.295	0.000	65.180
Per capita monthly expenditure	190.047	51.251	89.037	350.526
Literacy rate	42.120	14.360	14.077	90.848
Population	0.199	0.078	0.042	0.408
Rural population (percentage)	80.662	14.001	21.622	100.000
Headcount poverty rate	36.620	18.477	2.760	90.818
Poverty gap ratio	9.346	6.515	0.276	38.366
Gini Coefficient	30.038	5.065	15.816	47.209
Hindu population (percentage)	84.448	18.017	0.779	100.000
SC population (percentage)	18.620	9.608	0.185	55.304
Inter–Quartile Range (mean–normalized)	0.531	0.083	0.272	0.810
Foster–Wolfson index of Polarization	0.127	0.025	0.057	0.209

TABLE 1. Descriptive Statistics (1987-88). *Notes:* The information on electoral outcomes is from the Election Commission of India statistical reports. The national elections were held in 1977, 1980 and 1984-85. The data on the consumer expenditure and other demographic characteristics comes from the NSS 43rd round which was conducted during 1987-88.

	Mean	Std_Dev	Min	Max
Vote share of winner	48.794	8.189	26.540	69.830
Winning margin	11.270	8.970	0.190	40.660
Swing Congress	0.291	0.455	0.000	1.000
Congress's vote share	33.282	17.277	0.000	65.340
Average winning margin	11.433	5.820	2.573	30.433
Average vote share of winner	46.211	6.183	29.837	62.823
Average Congress vote share	31.750	14.034	2.065	56.750
Per capita monthly expenditure	670.780	236.418	346.695	1,780.682
Literacy rate	59.320	13.699	27.629	96.826
Population	0.207	0.103	0.050	0.605
Rural population (percentage)	80.252	15.320	17.741	97.753
Headcount poverty rate	22.907	16.903	0.000	65.109
Poverty gap ratio	4.262	3.916	0.000	18.386
Gini Coefficient	26.164	5.801	13.021	44.044
Hindu population (percentage)	83.947	19.754	0.174	100.000
SC population (percentage)	19.610	11.404	0.000	65.176
Inter–Quartile Range (mean–normalized)	0.483	0.121	0.241	1.003
Foster–Wolfson index of Polarization	0.122	0.034	0.053	0.243

TABLE 2. Descriptive Statistics (2004-05). *Notes:* The information on electoral outcomes is from the Election Commission of India statistical reports. The national elections were held in 1991-92, 1996, 1998 and 1999. The data on the consumer expenditure and other demographic characteristics is from the NSS 61st round which was conducted during 2004-05.

FIGURE 2. **Scatterplot of *Gini* and *Margin*.** *Notes:* The gini coefficients corresponding to the 179 districts are pooled over the two rounds and plotted on the vertical axis. The horizontal axis plots the corresponding winning margins. A linear fit is also plotted which is clearly upward–sloping.

the corresponding *winning margin* in Figure 2 and *winner's voteshare* in Figure 3. The upward–sloping linear fit in each of the two figures provides a basic sense of the association between the variables.

We now move on to the details of our empirical strategy for the identification of the relevant parameters.

3.2. **Empirical Specification.** Our data provides a two-period panel spanning 1987-88 and 2004-05. We use a linear fixed effects specification for the empirical exercise. Specifically, for every district d in time period t, we have :

$$y_{dt} = \alpha_d + \gamma_t + \beta \mathbf{X}_{dt} + \rho \mathbf{Z}_{dt} + \epsilon_{dt}$$

where y_{dt} is a measure of inequality or polarization, $\mathbf{X}_{dt}$ includes a vector of variables describing the political climate in the district, (like winning margin, average margin in the last 3-4 elections, winner's vote share, etc.). $\mathbf{Z}_{dt}$ is the set of demographic and geographic controls such as the population share of the district, percentage of Hindus in the district, literacy rates and average monthly per capita expenditure for the district. α_d represents the district fixed effects while γ_t captures the time effect. Also, ϵ_{dt} is the error term in this panel specification.
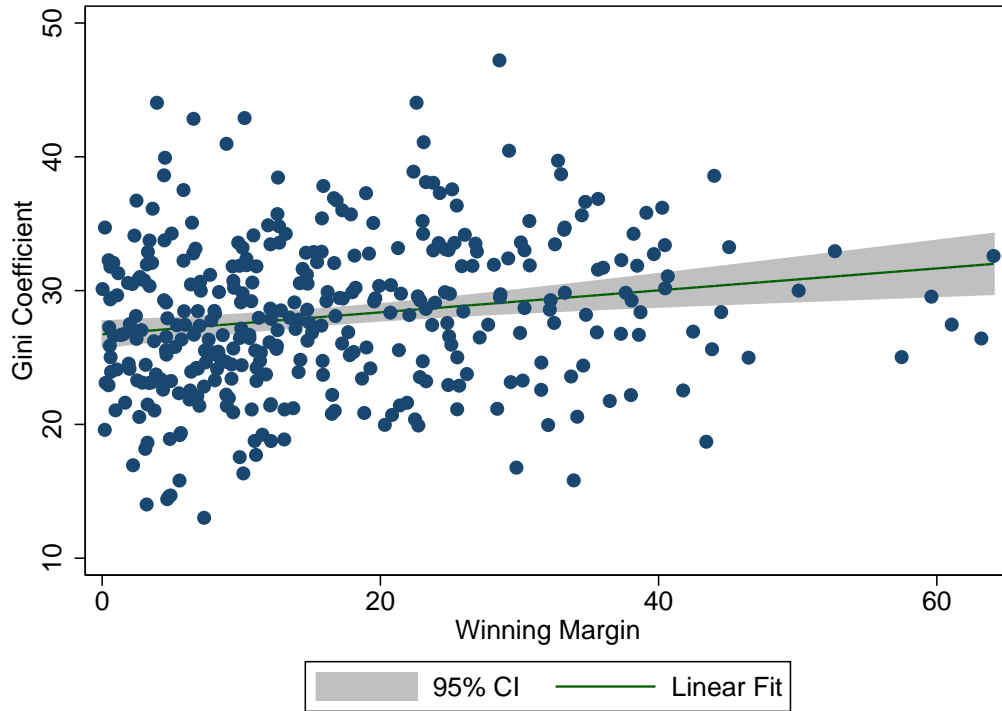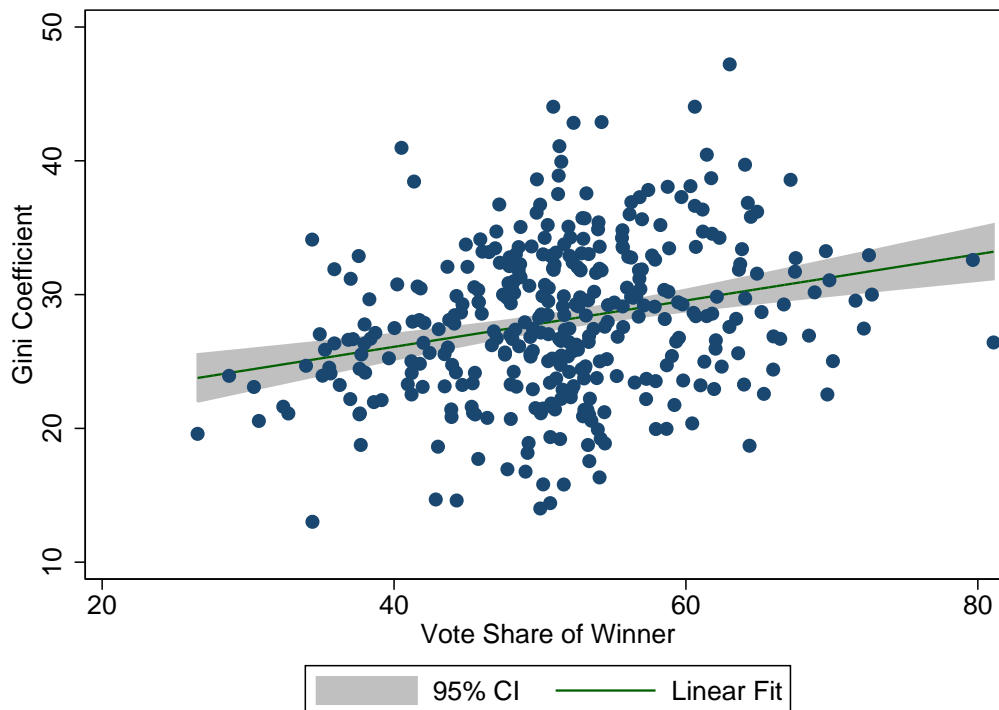
FIGURE 3. **Scatterplot of *Gini* and *Vote share of the winner***. *Notes:* The gini coefficients corresponding to the 179 districts are pooled over the two rounds and plotted on the vertical axis. The horizontal axis plots the corresponding winner's voteshare. A linear fit is also plotted which is clearly upward–sloping.

The primary results are collected below.

3.3. **Results.** We first turn to the relationship between electoral uncertainty and inequality in income (in our case, proxied by consumer expenditure). As discussed above, we construct several measures to capture the extent of political competition in a district. The primary proxy for electoral uncertainty exploits the difference in percentage vote shares of the two parties that obtain the highest number of votes in any constituency. This is in the spirit of Arulampalam et al (2009).

We use (i) the winning margin and (ii) the vote share of the winning party in the election prior to each corresponding expenditure round — in turn — to capture the extent of electoral competition in the district. The average margin in the previous 3 to 4 general elections is used as an alternative variable to describe how closely the elections have been in a district. The average vote share of the winner is also used as a measure of electoral competition. Clearly, the higher the percentage of votes obtained by the winner on average, the lower the degree of electoral competitiveness in the district.

3.3.1. *Main results.* Table 3 gives the results for our benchmark case. Here we report the effect of winning margin and (separately) the effect of the winner's vote share on the gini coefficent. We find that an increase in the political competition —either by a fall in the margin of victory or winner's vote share — is associated with lower inequality.

	[1]	[2]	[3]	[4]	[5]	[6]
Winning margin	0.054**	0.038	0.049*			
	(0.023)	(0.026)	(0.026)			
Vote share of winner				0.091***	0.069*	0.076**
				(0.034)	(0.037)	(0.037)
Population		0.890	1.701		1.242	2.021
		(5.310)	(5.084)		(5.354)	(5.099)
Rural population (percentage)		-0.161***	-0.129**		-0.160***	-0.131***
		(0.051)	(0.051)		(0.049)	(0.050)
Hindu Population (percentage)			0.014			0.012
			(0.053)			(0.054)
SC population (percentage)			-0.062			-0.060
			(0.049)			(0.049)
ST population (percentage)			-0.187***			-0.181***
			(0.069)			(0.069)
Headcount poverty rate			0.040*			0.039*
			(0.023)			(0.022)
Observations	358	358	358	358	358	358
Adjusted R^2	0.304	0.341	0.378	0.307	0.344	0.378

TABLE 3. Linear panel regression. *Notes:* Dependent variable is the Gini coefficient. *Winning margin*= difference in percentage vote shares of the two top parties. *Vote share of the winner* is expressed in percentage terms. All regressions contain district fixed effects and time dummies. Robust standard errors clustered by district in parentheses. *significant at 10% **significant at 5% ***significant at 1%.

Columns (1) and (4) represent the relationship devoid of any controls (district–specific effects and time dummies are present always). The patterns are robust to the inclusion of controls like population shares of different castes/tribes, religious groups and the poverty levels in the district as can be seen from the remaining columns of Table 3.

Next, we turn to the relationship between electoral uncertainty and income polarization. Here we use the Foster-Wolfson index of polarization as our measure of the (inverse of the) middle class. Columns (1) — (3) in Table 4 shows that polarization is also higher when there is lesser political competition as measured by the winning margin. Recall, this is essentially saying that greater political competetion in a district is *positively* associated with a larger middle class in the district.

Additionally, we use the inter-quartile range — normalized by the mean —- as a proxy for the level of inequality and also for the size of the middle class. Even then we see that a higher winning margin results in greater difference between the two income quartiles thus normalized; see columns (4) — (6) in Table 4.

3.3.2. *Robustness checks.* We subject our basic findings to a multitude of robustness checks.

	[1]	[2]	[3]	[4]	[5]	[6]
Winning margin	0.003**	0.003*	0.003**	0.003***	0.002**	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Population		0.365	0.385		-0.128	-0.111
		(0.313)	(0.305)		(0.270)	(0.263)
Rural population (percentage)		-0.006**	-0.005*		-0.005**	-0.004*
		(0.003)	(0.003)		(0.002)	(0.002)
Hindu Population (percentage)			-0.003			0.001
			(0.003)			(0.003)
SC population (percentage)			-0.001			-0.001
			(0.003)			(0.003)
ST population (percentage)			-0.004			-0.004
			(0.003)			(0.003)
Headcount poverty rate			0.002			0.002
			(0.001)			(0.001)
Observations	358	358	358	358	358	358
Adjusted R^2	0.063	0.095	0.120	0.172	0.195	0.206

TABLE 4. Linear panel regression. *Notes:* Dependent variable in columns (1) — (3) is the Foster–Wolfson Polarization measure; in columns (4) — (6) the dependent variable is the Inter-Quartile Range (normalized by the mean). *Winning margin*= difference in percentage vote shares of the two top parties. All regressions contain district fixed effects and time dummies. Robust standard errors clustered by district in parentheses. *significant at 10% **significant at 5% ***significant at 1%.

First, we report some results obtained with some alternative measures of income dispersion. Specifically, we considered Generalized Entropy measures (The Mean Log Deviation and the Theil index), the Atkinson index (for parameter values 0.5, 1 and 2) and the Decile Dispersion Ratio (top 10% by bottom 10%). By and large, the results we obtain with these alternative measures resonate with our original findings. We report some regressions in Table 5.[24]

Next we introduce some alternative measures of electoral competition and check for the persistence of our main findings.

Rather than using the margin and vote share of winner from the election *prior* to each corresponding expenditure survey round, one could also use the average values for the proxies of electoral competition in the previous 3—4 elections. We do so and our results are similar to the earlier ones; we report some such regressions in Table 6.

[24]Here we report the specifications with the full set of controls. In the regressions with varying subsets of controls, the results are very similar. Hence, we do not report them.

	[1]	[2]	[3]	[4]	[5]	[6]
Winning Margin	0.000*		0.000*		0.011**	
	(0.000)		(0.000)		(0.004)	
Voteshare of winner		0.001*		0.001*		0.015**
		(0.000)		(0.000)		(0.006)
Population	0.061	0.064	0.047	0.050	0.602	0.661
	(0.049)	(0.049)	(0.041)	(0.041)	(0.967)	(0.958)
Rural Population (percentage)	-0.001***	-0.001***	-0.001***	-0.001***	-0.028***	-0.029***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.009)	(0.009)
Hindu Population (percentage)	0.000	0.000	0.000	0.000	0.005	0.004
	(0.000)	(0.001)	(0.000)	(0.000)	(0.010)	(0.010)
SC Population (percentage)	-0.001	-0.001	-0.001	-0.001	-0.012	-0.011
	(0.000)	(0.000)	(0.000)	(0.000)	(0.009)	(0.009)
ST Population (percentage)	-0.002***	-0.002***	-0.002***	-0.002***	-0.017*	-0.016
	(0.001)	(0.001)	(0.001)	(0.001)	(0.010)	(0.010)
Headcount poverty rate	0.000	0.000	0.000	0.000	0.005	0.004
	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.004)
Observations	358	358	358	358	358	358
Adjusted R^2	0.346	0.348	0.355	0.357	0.242	0.240

TABLE 5. Linear panel regressions (Alternative measures of inequality and polarization). *Notes:* Dependent variable in columns (1) and (2) is the Mean Log Deviation, in columns (3) and (4) is the Atkinson index (parameter value 1), in columns (5) and (6) is the Decile Dispersion Ratio (top 10% by bottom 10%). All regressions contain district fixed effects and time dummies. Robust standard errors clustered by district in parentheses. *significant at 10% **significant at 5% ***significant at 1%.

Columns (1) — (3) Table 6, correspond to the first three columns in Table 3; columns (4) — (6) in Table 6 correspond to the remaining three columns in Table 3. The realtionship observed in each of these specifications are similar to those in Table 3.

Another way to capture the idea of a swing district would be the following. One could possibly identify whenever there is a change in the political party which wins the election in the district. However in 1977 (the first election year we look at) there were only 20 recognized political parties which contested the elections. By 1999 the number of recognized political parties had risen to 47. This significant rise in the number of political parties was not merely a case of greater participation of the general populace in the political domain — it was more the case that several political parties were created by the splintering of existing politcal parties. Therefore, for the time horizon we consider, we are unable to track whether there was a swing away from a particular political party or that merely a segment of the old party came back into power.

The only political party which has remained relatively "stable", in the sense of somewhat maintaining its core identity, is the Indian National Congress. Given the way the nature of politics and political parties evolved during this period, we chose to proceed with a rather conservative division

	[1]	[2]	[3]	[4]	[5]	[6]
Average winning margin	0.114***	0.099**	0.104**			
	(0.043)	(0.046)	(0.046)			
Average vote share of the winner				0.138**	0.122**	0.120**
				(0.060)	(0.062)	(0.060)
Population		-0.503	0.139		-0.194	0.497
		(5.247)	(4.995)		(5.281)	(5.001)
Rural population (percentage)		-0.157***	-0.129***		-0.162***	-0.135***
		(0.049)	(0.049)		(0.048)	(0.048)
Hindu population (percentage)			0.009			0.006
			(0.053)			(0.053)
SC population (percentage)			-0.056			-0.055
			(0.045)			(0.047)
ST population (percentage)			-0.177***			-0.171**
			(0.067)			(0.068)
Headcount poverty rate			0.041*			0.039*
			(0.023)			(0.023)
Observations	358	358	358	358	358	358
Adjusted R^2	0.319	0.356	0.390	0.311	0.351	0.382

TABLE 6. Linear panel regression. *Notes:* Dependent variable is the Gini coefficient. *Average winning margin* is constructed using data from the previous 3–4 general elections. *Average vote share of the winner* is the winner's vote share in percentage terms averaged over the previous 3–4 general elections. All regressions contain district fixed effects and time dummies. Robust standard errors clustered by district in parentheses. *significant at 10% **significant at 5% ***significant at 1%.

of parties into "Congress" and "Non–Congress" camps and recorded the movements of a district between these camps over the different election periods.

As our additional measure of political regime change, we use whether or not the district moved away from/towards a Congress MP. We create a dummy variable which takes the value of 1 if there was a change to or from a Congress MP in the district for the election prior to the corresponding expenditure round, and 0 otherwise. Note, the *swing congress* variable is a very crude measure of the district's electoral volatility and it exhibits much less variation vis-a-vis our other measures of electoral competition.

Table 7 contains some of the results using this *Swing Congress* variable. Columns (1) — (3) have the gini coeffecient as the dependent variable. Note, that the *Swing Congress* variable exhibits a negative effect on the degree of inequality in the district as captured by the gini coeffecient; this is substantively similar to our previous results which used other measures of electoral uncertainty.

	[1]	[2]	[3]	[4]	[5]	[6]
Swing Congress	-2.073***	-1.721***	-1.587**	-0.075**	-0.063*	-0.057*
	(0.689)	(0.668)	(0.669)	(0.033)	(0.033)	(0.033)
Population proportion		1.577	2.224		0.384	0.394
		(5.334)	(5.034)		(0.313)	(0.305)
Rural population (percentage)		-0.156***	-0.135***		-0.007***	-0.006**
		(0.049)	(0.050)		(0.002)	(0.003)
Hindu population (percentage)			0.029			-0.003
			(0.054)			(0.003)
SC population (percentage)			-0.060			-0.001
			(0.048)			(0.003)
ST population (percentage)			-0.171**			-0.003
			(0.070)			(0.003)
Headcount poverty rate			0.035			0.002
			(0.023)			(0.001)
Observations	358	358	358	358	358	358
Adjusted R^2	0.321	0.355	0.384	0.057	0.092	0.106

TABLE 7. Linear panel regression. *Notes:* Dependent variable in columns (1) — (3) is the Gini coefficient; in columns (4) — (6) the dependent variable is the Foster–Wolfson Polarization measure. *Swing Congress* is a dummy variable which equals 1 if there was a change to or from a Congress MP in the district for the election prior to the corresponding expenditure round, and 0 otherwise. All regressions contain district fixed effects and time dummies. Robust standard errors clustered by district in parentheses. *significant at 10% **significant at 5% ***significant at 1%.

Columns (4) — (6) in Table 7 have the Foster–Wolfson index of polarization as the dependent variable. These columns reveal a strong negative relationship between *Swing Congress* and polarization in accordance with our previous findings. This effect is robust to the inclusion of several controls; see columns (5) and (6). Therefore, these results re-iterate our basic findings.

The correlation between all the proxies of how 'swing' a district is provided in Table 11 (in the "Appendix" section). As can be seen, the different proxies are somewhat correlated though the amount varies for different pairs of variables. The variables for the two periods have been pooled together; hence the number of observations is 358. The corresponding figures for each period are also similar.

Our baseline results use two NSS rounds, namely the 43rd and the 61st. There is another round which we could potentially use: the 55th round which was conducted in 1999–2000. However, in the 55th round, for some consumption items the surveyed households were asked to report their expenditure based on a 7-day recall period as opposed to the 30-day recall period used in the earlier rounds. Several authors have argued that this change would lead to biased reporting by the households. As a robustness check we do use the 55th round in addition to the 43rd and 61st rounds. We use the election prior to 1999–2000 to construct the political competition variables for

this round: so that is from the national election conducted in 1998. For the other two rounds, the political competition variables are as before.

Our new results are substantially similar to the original ones. We report a selection in Table 10 (in the "Appendix" section). These essentially correspond to the regressions in our baseline tables (Tables 3 and 4). However, we treat these results with caution given the debate over comparability issues regarding the 55th round.

3.3.3. *Concerns.* We discuss two of the main concerns involving our empirical exercise. The first one is endogeneity due to reverse causality. One could argue that the members of middle income groups vote in a certain way so as to make the political contest close. The second is the issue of migration as a result of political transfers/ public goods provision. We briefly discuss each issue below.

Let us entertain the following hypothesis about voting behavior of individuals. Say, it is the case that the more extreme the income group — either rich or poor — the greater *ex ante* bias for one or the other of the two main parties. Hence, middle income voters are more ambivalent towards the two competing parties.

Focus on a district populated by largely low income income groups and a few very rich income groups; hence, we have a rather unequal income distribution in this district. Given the assumption about voting behavior, this district is likely to have high margins of victory with the low income voters (the majority) voting for one party and the rich (minority) voting for the other party. Contrast this with a district with fairly low levels of income dispersion; say, most individuals fall in the middle income category. Here, the margin of victory is likely to be small since the bulk of the population is indifferent between the two parties.

In other words, one would see the *same* patterns we observe in the data with causation running the other way — from income distribution to electoral competition.

Bardhan et al (2008) study political participation and targeting of public sevices in the Indian state of West Bengal. In their words "...the difference in reported registration rates and turnouts were modest, more similar to the European patterns rather than the steep asymmetries in the United States. With regard to voting disturbances, there was no clear correlation with socio-economic status." They also find that attendance rates (in political meetings, such as rallies, election meetings called by political parties) did not exhibit any marked unevenness across different land classes. So this does not seem to pose a serious problem. Also, in all of the regressions presented so far, we look at the effect of elections on *subsequent* polarization (and inequality) — so that there is enough of a time lag with elections preceding the corresponding expenditure rounds.

As to the second concern — namely, migration as a response to political transfers/public goods provision — we can take some comfort in the fact that migration rates in India are rather low in comparison with other developing nations. In fact, Munshi and Rosenzweig (2009) explicitly state that "Among developing countries, India stands out for its remarkably low levels of occupational and spatial mobility." They delve into the proximate causes behind this phenomenon and using a unique panel dataset (identifying sub-caste (*jati*) membership) find that the existence of sub-caste networks that provide mutual insurance to their members play a key role in restricting mobility.

To further bolster our case against reverse causality and omitted variables, we turn to an *instrumental variables* approach which is described in detail below.

3.3.4. *A 2-SLS IV approach.* The basic idea is to use a variable which exhibits a high (partial) correlation with our main variable of interest — namely, *winning margin* or *Vote share of winner* — and has no *independent* effect on our dependent variable, i.e., the gini coefficient for the district.

We argue that the performance of *any* particular national party — in our case, the Indian National Congress party (henceforth, INC) — is a good candidate as an instrument. Specifically, we emphasize that the vote share of INC in a district (at a particular election) has two properties: (i) it is highly correlated with the amount of electoral competition in the district and (ii) by itself, this variable does not have any effect on the income distribution in the district. All that INC's performance in the district can affect — in terms of district-level income distribution — is through the channel of electoral competition. Moreover, in several of these districts INC is *not* the winner, which reinforces our argument that INC's performance can have no direct effect on the district-level income distribution.

There is no compelling reason to believe that the INC is necessary specially (dis)liked by any particular income group(s). In fact, in principle, any national level political party's vote share could be used for this exercise. We pick the INC since it has been historically an important national level party in India.

We use INC's vote share in a district in the election prior to the expenditure round as an instrument for our potentially endogenous variable of interest, i.e, *Winning margin*. We report some results in Table 8. Columns (1) — (3) in Table 8 reveal that the effect of *Winning margin* on the gini coefficient is positive and significant — just as we had before — when we instrument for it by using INC's vote share. We repeat the exercise for our alternative measure of electoral competition, namely, the vote share of the winner. The results are substantively similar; see columns (4) — (6) of Table 8.

We get similar results when we use the Foster–Wolfson index of polarization as the dependent variable instead of the gini coefficient. Thus, the findings from our 2–SLS IV approach corroborates with our previous results and points to the robustness of our findings.

A particularly critical reader may still question the 2–SLS results by arguing that the instrument is possibly endogenous like the original variables of political competition; in other words, we have an instrument which is *imperfect*.[25] Nevo and Rosen (2012) offers an attractive approach towards dealing with imperfect instrumental variables (IIV).[26] They assume (i) the correlation between the instrumental variable and the error term has the same sign as the correlation between the endogenous regressor; (ii) and the error term and that the instrumental variable is less correlated with the error term than is the endogenous regressor. Using these assumptions, they derive analytic bounds for the parameters. Their approach is very much applicable to our case. Specifically, we are able to generate one-sided bounds for our parameters of interest.[27]

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[25]We do not face problems of having a *weak* instrument as our first stage F–statistics are quite sizeable.

[26]A recent paper using this approach is Aragon and Rud (2013).

[27]We follow Nevo and Rosen (2012) closely in the estimation procedure. In particular, Proposition 2 in their paper is relevant to our case. By means of that proposition we are able to generate one-sided lower bounds for the coefficients of interest.

	[1]	[2]	[3]	[4]	[5]	[6]
Winning margin	0.220**	0.212**	0.249**			
	(0.100)	(0.100)	(0.109)			
Vote share of winner				0.259**	0.249**	0.284**
				(0.119)	(0.119)	(0.125)
Population		1.853	2.845		2.724	3.592
		(6.386)	(6.879)		(5.911)	(6.037)
Rural population (percentage)		-0.106*	-0.048		-0.127**	-0.085
		(0.060)	(0.071)		(0.052)	(0.057)
Hindu population (percentage)			-0.029			-0.025
			(0.055)			(0.055)
SC population (percentage)			-0.058			-0.051
			(0.053)			(0.051)
ST population (percentage)			-0.184**			-0.165**
			(0.073)			(0.067)
First stage coefficient:						
Congress party's vote share	0.243***	0.236***	0.236***	0.206***	0.200***	0.207***
	(0.061)	(0.061)	(0.061)	(0.049)	(0.048)	(0.048)
F–statistic	15.712	15.139	15.076	18.004	17.599	18.948
Observations	358	358	358	358	358	358

TABLE 8. Linear panel: 2–SLS IV regressions. *Notes:* Dependent variable is the Gini coefficient for all second–stage results reported in columns (1) — (6). *Congress party's vote share* is used an instrument for *Winning margin* in columns (1) — (3), and for *Vote share of winner* in columns (4) — (6). The lower panel reports the first stage coefficients and the corresponding F–statistics. All regressions contain district fixed effects and time dummies. Robust standard errors clustered by district in parentheses. *significant at 10% **significant at 5% ***significant at 1%.

Table 9 lists some of our results from using the IIV estimation method. In every specification, the coefficents on the variables *winning margin* and *Vote share of the winner* are estimated to be within some intervals the lower bounds of which are strictly positive. In particular, columns 1 and 3 report the coefficient intervals where no controls are included in the linear panel specification. Columns 2 and 4 report the same for the spefications with the full set of controls. In every column we find that the coefficients on the political competition variables are positive and bounded away from zero.

The results from using the Nevo and Rosen (2012) approach certainly serve to mitigate endogeneity concerns regarding our 2–SLS IV estimation.

Taking stock of our entire empirical findings, we find that there is a strong relationship between the degree of electoral competition in a district and the nature of redistribution pursued therein. More specifically, we find that districts which have experienced tighter elections tend to evince lower

	[1]	[2]	[3]	[4]
Winning margin	$[0.219, \infty)$	$[0.300, \infty)$		
	$(0.023, \infty)$	$(0.040, \infty)$		
Vote share of the winner			$[0.259, \infty)$	$[0.330, \infty)$
			$(0.025, \infty)$	$(0.051, \infty)$
Estimation method	IIV	IIV	IIV	IIV
Controls	No	Yes, all	No	Yes, all
Fixed effects	Yes	Yes	Yes	Yes
Observations	358	358	358	358

TABLE 9. Linear Panel: IIV estimation. *Notes:* The figures in parantheses give the 95% confidence interval of the estimated parameter intervals. For all regressions, the dependent variable is the Gini coefficient. We use the Nevo and Rosen (2012) estimation procedure to produce the interval estmates for our potentially imperfect instrumental variable, namely, the vote share of the Congress.

levels of inequality and polarization suggesting that the middle class thrives where political parties are perceived to be relatively balanced in the eyes of the voters.

4. CONCLUSION

In this paper, we study how the extent of electoral competition affects the distribution of income in society, particularly, the effect on income inequality and the growth of a middle income group. We build a theory based on the intuition from standard probabilistic models. In our model, the parties compete at two stages: (i) they allocate resources *across* the districts and (ii) then they pander to different groups *within* a district. We show that an increase in electoral competition leads to reduction in income disparities. The existing literature has stressed the role of political competition in directing tranfers and have generally concluded that "swing" districts get more targeted resources in the aggregate. To the best of our knowledge, no other work has looked at the effect of increased political competition on the *distribution of incomes* in society.

We use data from the Indian parliamentary elections which are combined with household-level consumption expenditure data rounds from NSSO (1987-88 and 2004-05) to yield a panel of Indian districts. India has had a vibrant democracy since the nation's independence in 1947. Although there have been several political parties since the 1950s, the national elections had been by and large dominated by the Indian National Congress (INC) party. However, since the 1980s there have been a tremendous proliferation of political parties both at the state and the national levels. In fact, 1977 was witness to a non-Congress led government at the centre for the first time since India's independence. Although the INC continues to be a major player in national elections till this day, it no longer enjoys the kind of monopoly it did prior to the mid-1960s. Moreover, a majority of elections in the 1990s resulted in "hung Parliaments" meaning that no single party obtained a clear majority of seats and thus began the era of coalitional politics in India. Our period

of study corresponds to the time *after* the INC had lost its quasi-monopoly in the political arena. So our data is from the phase where national elections were more intensely fought. All of these factors contribute in making India an interesting candidate for testing our hypotheses.

In several different panel specifications, we obtain that a district which has experienced close elections tends to exhibit lower income inequality. The same is true in case of income polarization. We also employ an instrumental variables approach as a robustness check. Our results from this 2–SLS IV approach are essentially similar to our previous findings. Overall our empirical results — in the context of India — clearly suggest that greater electoral uncertainty reduces existing income disparities and promotes the growth of the middle class.

In a way our results seem to highlight some interesting features of the electoral mechanism. The key issue here is the presence of people who are highly ideologically inclined towards some political party or the other. A party which rides to victory on the back of large popular support feels less inclined to cater to the toiling masses. After all, if the electorate likes the party to begin with, why should the latter bother working hard to reduce existing disparities? However, if one extends this to a dynamic setting, the voters would potentially change their opinion over time about the inactive (and ineffective) incumbent party. The problem often is that the opponent party — the challenger, so to speak — may not be much of a viable alternative. However, the very realization that perhaps each political party is *ex–ante* as good as the other should drive this voter bias close to nil in expected terms thus inducing better promises (and action) from both parties in future. This would be an interesting avenue to explore.

The fact is that parties themselves change their stand and nature over time. This makes any kind of convergence on part of voter biases quite unlikely. Incidentally, voter biases in regions tend to persist over time. For example, in the context of the US, New York has traditionally been a Democrat stronghold. In India as well, this kind of party loyalty is fairly common — for e.g., West Bengal (a state in eastern India) had been under the rule of a Left–led coalitional government for over 30 years. There may be clientelistic relationships which develop between incumbents and certain sections of the voters (see Bardhan and Mookherjee (1999), Bardhan and Mookherjee (2012), etc.) which create such long spells of governance by a party; perhaps longer than what a dynamic extension of our simple model (with updating of voter biases) would predict.

Finally, it would be interesting to explore how different political parties have re–invented themselves over time and what impact has this had on their loyalists — perhaps the conservatives of today would have been liberal half a century ago. A more holistic view of the interplay between party evolution and changing voter loyalties could provide meaningful insights to policy–making.

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APPENDIX

LEMMA 1:

Proof. Suppose not and w.l.o.g. assume that $\rho_n > 1$ (see Equation (3)). This immediately implies $x_k^n(A) < x_k^n(B)$ for every $k \in \{1, ..., K\}$ by the strict concavity of u and violates $R_n^A = R_n^B$. Hence, we have $\rho_n = 1$ which in turn implies $x_k^n(A) = x_k^n(B)$ for every $k \in \{1, ..., K\}$, i.e., $\mathbf{x^n(A)} = \mathbf{x^n(B)}$ and $d_i = 0$ for every i in district n. ∎

LEMMA 2:

Proof. Suppose $\{R_n^A, R_n^B\}_{n=1}^N$ is part of an equilibrium allocation This implies, for every n, the following necessary first-order conditions (for parties A and B) have to be met.

For party A:

(5)
$$Prob.(\sum_{d \neq n} z_d = (N-1)/2).\frac{\partial P_n}{\partial R_n^A} = \lambda'$$

For party B:

(6)
$$-Prob.(\sum_{d \neq n} z_d = (N-1)/2).\frac{\partial P_n}{\partial R_n^B} = \mu'$$

Note, λ' and μ' are the associated (positive) lagrange multipliers. Recall

$$P_n = \sum_{i \in I_n} p_i = \sum_{i \in I_n} [1 - F_i(d_i)].$$

Hence, by the chain rule, we have:

$$\frac{\partial P_n}{\partial R_n^A} = \sum_{k=1}^K \sum_{i \in I_n(k)} \frac{\partial p_i}{\partial x_k^n(A)} \frac{\partial x_k^n(A)}{\partial R_n^A} = \sum_{k=1}^K \frac{\partial x_k^n(A)}{\partial R_n^A} \left[\sum_{i \in I_n(k)} u'(y_i + x_k^n(A)) f_i(d_i) \right]$$

and

$$\frac{\partial P_n}{\partial R_n^B} = \sum_{k=1}^K \sum_{i \in I_n(k)} -\frac{\partial p_i}{\partial x_k^n(B)} \frac{\partial x_k^n(B)}{\partial R_n^B} = \sum_{k=1}^K -\frac{\partial x_k^n(B)}{\partial R_n^B} \left[\sum_{i \in I_n(k)} u'(y_i + x_k^n(B)) f_i(d_i) \right].$$

We can re-write $\frac{\partial P_n}{\partial R_n^A}$ and $\frac{\partial P_n}{\partial R_n^B}$ as:

$$\frac{\partial P_n}{\partial R_n^A} = \sum_{k=1}^K m_k^n . \frac{\partial x_k^n(A)}{\partial R_n^A} \left[\frac{1}{m_k^n} \sum_{i \in I_n(k)} u'(y_i + x_k^n(A)) f_i(d_i) \right]$$

$$\frac{\partial P_n}{\partial R_n^B} = \sum_{k=1}^K m_k^n . \frac{\partial x_k^n(B)}{\partial R_n^B} \left[-\frac{1}{m_k^n} \sum_{i \in I_n(k)} u'(y_i + x_k^n(B)) f_i(d_i) \right].$$

Using the relations from equations (1) and (2), we get, for every n:

$$\frac{\partial P_n}{\partial R_n^A} = \sum_{k=1}^{K} m_k^n \cdot \frac{\partial x_k^n(A)}{\partial R_n^A} \cdot \lambda_n = \lambda_n \sum_{k=1}^{K} m_k^n \cdot \frac{\partial x_k^n(A)}{\partial R_n^A}$$

$$\frac{\partial P_n}{\partial R_n^B} = \sum_{k=1}^{K} m_k^n \cdot \frac{\partial x_k^n(B)}{\partial R_n^B} \cdot (-\mu_n) = -\mu_n \sum_{k=1}^{K} m_k^n \cdot \frac{\partial x_k^n(B)}{\partial R_n^B}$$

Moreover, in equilibrium we must have $\sum_{k=1}^{K} m_k^n \cdot x_k^n(j) = R_n^j$ for $j = A, B$. Hence,

$$\sum_{k=1}^{K} m_k^n \cdot \frac{\partial x_k^n(j)}{\partial R_n^j} = 1$$

for every n and k. Substituting these relations into the expressions for $\frac{\partial P_n}{\partial R_n^A}$ and $\frac{\partial P_n}{\partial R_n^B}$ obtained above, yield:

$$\frac{\partial P_n}{\partial R_n^A} = \lambda_n$$

and

$$\frac{\partial P_n}{\partial R_n^B} = -\mu_n.$$

Hence, substituting these relations back into equations (5) and (6) we get:

(7) $$Prob.(\sum_{d \neq n} z_d = (N-1)/2) . \lambda_n = \lambda'$$

and

(8) $$Prob.(\sum_{d \neq n} z_d = (N-1)/2) . \mu_n = \mu'.$$

This, in turn, implies

(9) $$\frac{\lambda_n}{\mu_n} = \rho_n = \frac{\lambda'}{\mu'}$$

for every n. In other words, the value of ρ_n is the same across all the N districts. This implies ρ_n must be unity for every n; otherwise the aggregate balanced-budget condition $\sum_{n=1}^{N} R_n^A = \sum_{n=1}^{N} R_n^B$ is violated. Hence, $R_n^A = R_n^B$ for every n. ∎

LEMMA 3:

Proof. Suppose that both $\mathbf{x^n}$ and $\mathbf{z^n}$ satisfy the equilibrium condition outlined above in Equation (4). The strict concavity of u immediately delivers that $\mathbf{x^n} = \mathbf{z^n}$. A unique $\mathbf{x^n}$ for every district n automatically implies a unique corresponding R_n by $\sum_{k=1}^{K} m_k^n \cdot x_k^n = R_n$. ∎

OBSERVATION 1:

Proof. Given that the districts look identical in terms of income distribution and ideology distribution, it is clear that $\{R_n\}_{n=1}^{N} = \mathbf{0}$ can be supported in equilibrium. It remains to show that it is the *unique* equilibrium district-level allocation possible.

Suppose there is an equilibrium with $\{R_n\}_{n=1}^{N} \neq \mathbf{0}$. Clearly, there exists districts s and t such that $R_s > 0$ and $R_t < 0$. Hence, $\exists k \in \{1, ..., K\}$ such that $x_k^s \neq x_k^t$. But this violates Equation (4) since districts s and t have the same income distribution and ideology distribution. ∎

OBSERVATION 2:

Proof. The homogeneity in ideology distribution implies (from Equation (4)) the following for every k and for every n:

$$f(0).\frac{1}{m_k^n} \sum_{i \in I_n(k)} u'(y_i + x_k^n) = \lambda.$$

Now, by the definition of "poorer", $y_i' \leq y_i \; \forall i$ in every group $k \in \{1, ..., K\}$ with strict inequality for some k; call such a group k'. Let x_k^n denote the transfer to any group $k \in \{1, ..., K\}$ initially and z_k^n the same afterwards. From the equation above, it must be that $z_k^n \geq x_k^n$ with the inequality strict for the group k', given the strict concavity of u. Thus, $\sum_{k=1}^{K} m_k^n.x_k^n < \sum_{k=1}^{K} m_k^n.z_k^n$. This establishes the observation. ∎

OBSERVATION 3:

Proof. Consider two districts s and t where $f^s(0) > f^t(0)$; hence, s is more *swing* than t. Suppose that s and t are otherwise identical.[28] In this context, Equation (4) takes the form:

$$f^n(0).\frac{1}{m_k^n} \sum_{i \in I_n(k)} u'(y_i + x_k^n) = \lambda$$

for $n = s, t$ and for every group k. This makes it clear that $x_k^s > x_k^t$ for every group k, given the strict concavity of u. Thus, $\sum_{k=1}^{K} m_k^s.x_k^s > \sum_{k=1}^{K} m_k^t.x_k^t$. This establishes the observation. ∎

OBSERVATION 4:

Proof. Recall the FOSD ordering of groupwise income distributions, so that $k = 1$ denotes the poorest group and $k = K$ is the richest. Pick any two groups $k_1, k_2 \in \{1, ..., K\}$ such that $k_1 < k_2$. Further, let the set $Y(k_j) \equiv \{y_i\}_{i \in I_n(k_j)}$ contain the income of every individual in group k_j, for $j = 1, 2$. So, $|Y(k_j)| = m_{k_j}$. We claim:

(10) $$\frac{1}{m_{k_1}^n} \sum_{i \in I_n(k_1)} u'(y_i) > \frac{1}{m_{k_2}^n} \sum_{i \in I_n(k_2)} u'(y_i).$$

Given the FOSD assumption for the groups k_1 and k_2, there are two possibilities: (a) The sets $Y(k_1)$ and $Y(k_2)$ are disjoint and (b) they have a non-empty intersection.

For case (a), FOSD implies that all incomes in group k_2 exceed the highest income in group k_1. Hence, given that u is concave, Equation (10) follows.

Consider, case (b). Here, there are some individuals in group k_1 who earn the same as some others in group k_2. Pick the largest of these sets and call it $I(k_1 k_2)$; denote the number of such

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[28]Specifically, we require them to have the same income distribution.

individuals by m, i.e., $|I(k_1 k_2)| = m$.[29] Let ψ denote $\frac{1}{m} \sum_{i \in I(k_1 k_2)} u'(y_i)$. Now consider the sets $I_n(k_1) \setminus I(k_1 k_2)$ and $I_n(k_2) \setminus I(k_1 k_2)$. The income distribution pertaining to these sets are like in case (a). Let $\psi_{k_j} = \frac{1}{m_{k_j}^n - m} \sum_{i \in I_n(k_j) \setminus I(k_1 k_2)} u'(y_i)$ for $j = 1, 2$. By the argument in case (a), we have $\psi_{k_1} > \psi_{k_2}$.

Now, $\frac{1}{m_{k_1}^n} \sum_{i \in I_n(k_1)} u'(y_i)$ can be written as

$$\frac{m_{k_1}^n - m}{m_{k_1}^n} . \psi_{k_1} + \frac{m}{m_{k_1}^n} . \psi.$$

Also, $\frac{1}{m_{k_2}^n} \sum_{i \in I_n(k_2)} u'(y_i)$ can be written as

$$\frac{m_{k_2}^n - m}{m_{k_2}^n} . \psi_{k_2} + \frac{m}{m_{k_2}^n} . \psi.$$

Noting $\psi_{k_1} > \psi_{k_2}$, we have that Equation (10) is satisfied.

This establishes the claim made in Equation (10). Note, by Equation (4), $\frac{1}{m_k^n} \sum_{i \in I_n(k)} u'(y_i + x_k^n)$ is equalized across k. This delivers $x_{k_1}^n > x_{k_2}^n$ thus establishing the observation. ∎

PROPOSITION 2:

Proof. Consider two districts s and t where $f^s(0) > f^t(0)$; hence, s is more *swing* than t. Suppose that s and t are otherwise identical, like in Observation 3. We know from Observation 3 that $x_k^s > x_k^t$ for every group k.

Pick any group $k \in \{1, ..., K\}$. Note, every $i \in I_n(k)$ is has more income (post-transfer) in district s than t. Also, the *absolute* difference in incomes between i and any other member j in group k is the same in both s and t: namely, $|y_i - y_j|$. However, the difference in $u'(y_i)$ and $u'(y_j)$ is (weakly) lower in s as compared to t since $u''' \geq 0$. Thus, there is greater equalization of incomes *within* group k as one moves from t to s. Note, this is true for *every* $k \in \{1, ..., K\}$.

This leads us to the question of across–group income equalization. Observation 4 tells us that poorer groups get higher transfers. Using Equation (4), we note $\frac{1}{m_k^n} \sum_{i \in I_n(k)} u'(y_i + x_k^n)$ is equalized across k: this is true for both $n = s$ and $n = t$. So, in terms of equalization of incomes *across* the K groups, both s and t perform similarly.

So, overall there is greater equalization of incomes in district s than t. This completes the proof. ∎

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[29]By the set $I(k_1 k_2)$ we mean those individuals from group k_1 who earn the same incomes as some others in group k_2 if the former are smaller in number than the ones in the latter group, and *vice versa*. Hence, set $I(k_1 k_2)$ denotes the smaller of the two overlapping sets and strictly speaking contains either members from group k_1 or from k_2. However, by a slight abuse of notation, we use $I(k_1 k_2)$ to just identify those income-earners who are "common" to both groups in the sense of earning the same incomes.

	[1]	[2]	[3]	[4]	[5]	[6]
Winning Margin	0.056***	0.058***			0.002**	0.002**
	(0.021)	(0.020)			(0.001)	(0.001)
Voteshare of winner			0.076**	0.078**		
			(0.030)	(0.031)		
Population		7.785**		7.931**		0.398***
		(3.094)		(3.138)		(0.139)
Rural Population (percentage)		-0.133***		-0.132***		-0.004***
		(0.027)		(0.028)		(0.001)
Hindu Population (percentage)		-0.013		-0.017		-0.002
		(0.032)		(0.032)		(0.001)
SC Population (percentage)		-0.024		-0.027		-0.001
		(0.031)		(0.031)		(0.002)
ST Population (percentage)		-0.093***		-0.089**		-0.006***
		(0.035)		(0.034)		(0.002)
Headcount poverty rate		0.040**		0.040**		0.002*
		(0.019)		(0.019)		(0.001)
Observations	537	537	537	537	537	537
Adjusted R^2	0.161	0.275	0.159	0.272	0.030	0.140

TABLE 10. Linear panel regression with 3 NSS rounds (43rd, 55th and 61st). *Notes:* Dependent variable in columns (1) — (4) is the Gini coefficient; in columns (5) — (6) the dependent variable is the Foster–Wolfson Polarization measure. All regressions contain district fixed effects and time dummies. Robust standard errors clustered by district in parentheses. *significant at 10% **significant at 5% ***significant at 1%.

	Margin	Vote share	Average margin	Average vote share	Swing Congress
Vote share	0.7601	1			
Average margin	0.725	0.5438	1		
Average vote share	0.5377	0.7158	0.7923	1	
Swing Congress	-0.1524	-0.0892	-0.1361	-0.0787	1

TABLE 11. Raw correlations between proxies for "swing". *Notes:* The variables for the two periods have been pooled together. Hence 358 observations in all cases.