

# Do Parties Matter at the Subdistrict Level of Politics? Evidence from mandals in Andhra Pradesh

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## Abstract

Does the overall economic performance of at the local level in India at all depend upon the party identity of the party or ideology of the politicians in power? Are there economic gains from being aligned across different levels of government? We examine such questions in the context of mandal (subdistrict) level elections in the Indian state of Andhra Pradesh, using unique mandal-level election results from 2001 and 2006 and nighttime light data. Our findings consistently show that the effect of party identity on economic outcomes as proxied by nighttime lights is not statistically significant and that we can reject even small effects. This suggests that ideology matters little when it comes to economic outcomes in this context. We also find no evidence of alignment gains in terms of economic activity.

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# 1 Introduction

A central theme in the study of political economy in India is how election results affect the distribution of resources. Studies at the state level have pointed to how Indian states have had vastly different development trajectories due to differences in their political choices (e.g. see Sinha, 2005). Khemani (2003), Rodden and Wilkinson (2004) and Arulampalam et al (2009) also show that India's central government distributes more resources to states with governments that are politically aligned with the center. However, at the lower levels of government there is little evidence that party or ideology matters. Whereas a large literature has shown evidence of particularistic targeting to co-partisans and co-ethnics (see Jha et al., 2009; Min, 2011; Dunning and Nilekani, 2013; Besley et al., 2012), few studies have even looked at whether it matters which party is voted into power. Bhavnani and Jensenius (2015b) explore whether the growth in literacy over the 30-year period 1971 to 2001 depend on the party in a state assembly constituency or the alignment of the party with the state government, but find no evidence in differential development trajectories. Bardhan and Mookherjee (2010a) 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 of parties primarily acting out of opportunism (re-election concerns) rather than ideological concerns.

So does the overall development of a region at all depend upon the party identity of the politician in power? Is it really the case that leftist parties implement more “redistributive” policies, while right-wing parties emphasize policies which are more “pro-growth”? Or is it the case that when in power, all Indian parties and politicians simply distribute a bit to their supporters but otherwise look alike? The theoretical models in political economy give us very different answers. On the one hand, there are models of probabilistic voting (see Lindbeck and Weibull, 1987a; Dixit and Londregan, 1996a, 1998a, and others) which predict convergence in policy outcomes in equilibrium models. This is in the spirit of Downsian competition and median-voter models. On the other hand, there are *citizen candidate* models of political competition (see Besley and Coate, 1997a; Osborne and Slivinski, 1996a) which posit that citizens with some inherent policy preferences will voluntarily run for office and in equilibrium will implement their own preferred policy. So in this class of models the outcome very much depends upon the pool of candidates who contest.<sup>1</sup>

In this paper we contribute to this ongoing discussion by looking at an hitherto almost unexplored level of government in India's electoral system: the district- and subdistrict-level councils that implement most of India's development programs. Despite their importance in the implementation

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<sup>1</sup>Levy (2004) extends such a framework to account for the endogenous formation of political parties to demonstrate that under certain conditions parties can credibly offer more policies than a single “citizen candidate” can.

in development project, the difficult access to data at such a local level have meant that these councils have hardly received any attention in the academic literature. This is the gap we seek to fill in this paper, both by contributing a new subdistrict-level electoral dataset and by building a theoretical model to streamline our intuition about the importance of party ideology and party ideology in multi-level electoral systems like the one we have in India.

Our model has the following setup. Take two levels of government: centre and state.<sup>2</sup> For simplicity, we have one central government and two states and hence two state governments. Suppose there are two parties who are active at each level.<sup>3</sup> In particular, there is an incumbent central party who decides to allocate resources across the two states. Next, based on these allocations the two parties compete for votes in elections held at each of the two states. The allocation proposed by each of these competing politicians is basically a division of the aggregate resource (apportioned by the central incumbent) across various groups of voters residing in each of the states. In the spirit of Dixit and Londregan (1996a, 1998a), we endow parties and voters with certain ideologies.<sup>4</sup> Voters face a potential trade-off between economic transfers (consumption) and ideological stand.

Our model delivers the following: in equilibrium both parties promise the same allocation of transfers at the state level. Furthermore, there is no targeting of resources to the aligned state by the central incumbent; hence, no alignment gains in economic terms. Our results obtain from the fact that at all levels politicians primarily care about winning votes. The fact that the two parties have distinct ideologies and that the voters are distributed all along the ideology spectrum does not prevent convergence in economic transfers and neither does it deliver alignment gains. However, if politicians care *sufficiently* about factors other than winning votes (e.g., rewarding loyal supporters) then the equilibrium economic outcomes need not be the same by party. Nonetheless, alignment gains may still not accrue.<sup>5</sup> Based on our model, we should therefore neither expect to see differential economic outcomes when different parties are in power, nor alignment effects *as long as parties and politicians are predominantly concerned with winning votes*: party ideology should not matter.<sup>6</sup>

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<sup>2</sup>In our empirical exercise, subdistricts stand for *states* and the district containing them represents the *centre*.

<sup>3</sup>This is similar to Arulampalam et al (2009) and Dixit and Londregan (1998a).

<sup>4</sup>Ideology broadly refers to a party/voter's stand on various issues. For example, privatisation, foreign policy or even growth-vs-redistribution stance.

<sup>5</sup>We discuss this in detail later.

<sup>6</sup>The model in Arulampalam et al (2009) utilise uncertainty over the accrual of benefits to generate alignment effects. A non-aligned state receives less transfer from the centre since the ultimate beneficiaries (the voters in that state) cannot effectively discern who the benefactor is: the party at the centre or the one at the state. With aligned states, this issue does not arise. In our model, there is no such uncertainty and hence no possibility of dilution of "taking credit" in non-aligned states.

To test this intuition empirically, we focus on *mandal* (subdistrict) level elections in the southern state of Andhra Pradesh. Specifically, we use election data for mandals in Andhra Pradesh for the elections in 2001 and 2006. We have a total of 1,057 mandals with election data in 2001 and 1,095 mandals in 2006, allowing us to use panel data techniques. In particular, we use mandal and year fixed effects in our main specifications and test whether there is an effect of shifting party on nighttime light. We also map the mandals into the districts and electoral districts they belong to. This enables us to check for alignment effects between the party in power at the mandal level and the party in power at higher levels of government.

Our measures of economic outcomes are based on data on *nighttime lights* satellite images from the US Air Force DMSP and its Operational Linescan System. Several recent studies have provided empirical evidence showing that nighttime light corresponds well to economic activity and wellbeing (see e.g., Alder et al. (2013), Alesina et al. (2014), Almås et al. (2014), Chen and Nordhaus (2011), Doll et al. (2006), Ghosh et al. (2010), Henderson et al. (2012), Michalopoulos and Papaioannou (2013), Pinkovskiy (2013) and Sutton et al. (2007)). Using the Indian census from 2001 we show that our measure of nighttime light is correlated with literacy rates, transportation, and access to medical facilities at the mandal level and hence we believe that the measure indeed captures economic activity. Moreover, while the census data is only available for every 10 years, the nighttime light data is an annual measure, allowing us to look for associations between election results and changes in development patterns.

Our findings consistently show that the effect of party identity on economic outcomes as proxied by nighttime lights is not statistically significant. In fact, the coefficients are very close to zero and we can reject small effects of party identity. This is true both for the level of economic activity (captured by the average intensity of nighttime lights in a mandal) and within-mandal inequality (captured by the standard deviation in nighttime lights in the smaller areas for which we have data within a mandal). These results clearly suggest that in the local elections in Andhra Pradesh, ideology matters little when it comes to economic outcomes. We also find no evidence of alignment gains in terms of economic activity: it is not the case that mandals which are aligned with the party at the district level receive any extra economic perks.

These robust empirical patterns taken together with our theoretical model suggest that in the Indian context at sub-district levels, parties and politicians primarily care about securing electoral success. So winning votes trumps other considerations like rewarding core supporters. This is a possible explanation as to why we observe no differences in economic outcomes across mandals governed by different political parties; party ideology fails to make its mark on economic factors at these local level elections.

The rest of the paper is organized as follows. Section 2 contains a brief theoretical framework. Section 3 outlines the details of the Indian political system which is relevant for our empirical analyses. Section 4 describes the different datasets used, in section 5 we outline the empirical strategy and present our baseline results. Section 6 contains some concluding remarks.

## 2 The Model

We build on the Dixit and Londregan (1996a, 1998a) models of political competition. Like in Dixit and Londregan (1998a) and Arulampalam et al. (2009), we have two levels of government: call them *centre* and *state*. Also, there are two political parties,  $L$  and  $R$  who compete against each other at the different levels of government. Each party is associated with a certain ideology. Specifically, we assume that ideological position is represented by a point on the real line and party  $i$ 's position is given by  $X_i \in \mathbb{R}$ . The parties are ideologically distinct which we capture by  $X_L \neq X_R$ . We assume, without loss of generality,  $X_L < X_R$ .

To highlight the main mechanism clearly, we deliberately keep the environment simple and stark. We have just two states; call them  $s_1$  and  $s_2$ . In each state, there are  $G \geq 2$  disjoint groups; denote a group by  $g$ . Let  $n(g, s) \geq 0$  be the number of individuals in group  $g$  in state  $s$ . Each member of group  $g$  in state  $s$  is endowed with income  $Y(g, s)$ . These citizens form a continuum and they are distributed along the ideology spectrum. Denote this distribution function by  $F_g^s(\cdot)$  with corresponding density function  $f_g^s(\cdot)$  which is assumed to be continuous throughout its domain.

We can characterize the political process as a game proceeding in two stages. In the first stage, the incumbent party at the centre decides on how much to redistribute across the two states. In the second stage, the two parties in each of the states decide how to allocate the resources allotted in the first stage, among the  $G$  groups.

More formally, let  $R_s \geq 0$  denote the allocation to state  $s$  as decided by the incumbent central party. In each state  $s$  the fielded candidates decide on the division of the allocation ( $R_s$ ) across the  $G$  groups in the state. Specifically, for  $j = L, R$ , party  $j$ 's candidate chooses  $\mathbf{x}^s(\mathbf{j}) \equiv (x_1^s(j), \dots, x_G^s(j))$  where  $x_g^s(j) \in \mathbb{R}$  is the transfer to each member of group  $g$  in state  $s$ . Moreover, for every  $s$  and  $j$ ,  $\mathbf{x}^s(\mathbf{j})$  satisfies the following (feasibility) restriction:

$$\sum_{g=1}^G n(g, s) \cdot x_g^s(j) \leq R_s.$$

So the central incumbent party has the say on the aggregate amount of resources available to each

of the states. Once that amount is apportioned, the two parties decide on how to split it among the constituent groups.

The state level decision is driven by electoral motives. In each state, the candidates from the parties  $L$  and  $R$  allocate resources across the  $G$  groups with the aim of maximizing their respective voteshares.<sup>7</sup> We will return to the objective function of the central incumbent party shortly.

Voters care both about ideology and consumption, as is standard. In particular, they may compromise their ideological position in exchange of higher consumption. This trade-off is inherent in their payoff function. Take a voter from group  $g$  with ideal point  $X$  who is subjected to the ideology of the winning party  $K$  (where  $K = L, R$ ). This voter's payoff is given by

$$V(C_K, X_K, X) = \rho_g u(C_K) - \frac{1}{2}(X - X_K)^2$$

where  $C_K$  is the voter's post-redistribution consumption (determined by party  $K$ ) and  $\rho_g$  captures group  $g$ 's valuation of private consumption relative to ideology. We assume that  $u(\cdot)$  is a standard utility function with the usual properties, i.e.,  $u' > 0$  and  $u'' < 0$ .

Suppose party  $K$  offers consumption  $C_g^K$  to each member of group  $g$ . The threshold level of ideology in this group — call it  $X_g$  — comes from the following (indifference) relation

$$\rho_g u(C_g^L) - \frac{1}{2}(X_g - X_L)^2 = \rho_g u(C_g^R) - \frac{1}{2}(X_g - X_R)^2.$$

This implies that the cutoff point  $X_g$  is  $\frac{1}{2}(X_L + X_R) + \frac{\rho_g}{(X_R - X_L)} \left( u(C_g^L) - u(C_g^R) \right)$ . Therefore, all voters in group  $g$  with ideal point to the left (resp., right) of this threshold  $X_g$  will vote for party  $L$  (resp., party  $R$ ).

## 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 centre and state allocations,  $\{R_s; (x_1^s(j), \dots, x_G^s(j))\}_{s=s_1, s_2}$  for  $j = L, R$  which are budget balanced and feasible, respectively and all of which together satisfy the following:

- (i) The within-state allocations  $\{\mathbf{x}^s(\mathbf{L}), \mathbf{x}^s(\mathbf{R})\}$  constitute mutual best-responses for the fielded candidates in every  $s$  given the allocation  $R_s$ .
- (ii) The across-state allocation  $\{R_s\}_{s=s_1, s_2}$  is optimal from the central incumbent party's perspective.

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<sup>7</sup>The candidates at the state level play a zero-sum game.

tive given the intra-state allocations  $\{\mathbf{x}^s(\mathbf{L}), \mathbf{x}^s(\mathbf{R})\}$  by the competing candidates.

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

Consider the state level competition between  $L$  and  $R$ 's candidates in the second stage when the across-state allocation  $\{R_s\}_{s=s_1, s_2}$  is known. Take any state  $s$ . The following observation outlines the properties of the equilibrium allocation within  $s$ .

**OBSERVATION 1.** *In any state  $s$ , given  $R_s$ , in equilibrium it must be that the proposed across-group allocation is identical for both parties, i.e.,  $\mathbf{x}^s(\mathbf{L}) = \mathbf{x}^s(\mathbf{R})$ . Moreover, this equilibrium allocation is unique.*

*Proof.* Recall the ideology cutoff point  $X_g$  for group  $g$  which is  $\frac{1}{2}(X_L + X_R) + \frac{\rho_g}{(X_R - X_L)}(u(C_g^L) - u(C_g^R))$ . Consider party  $L$ . A marginal increase in transfer to this group by  $L$ 's candidate results in the following shift of the cutoff:  $\frac{\partial X_g}{\partial C_g^L} = \frac{\rho_g}{(X_R - X_L)}u'(C_g^L)$ . Hence, the marginal gain in votes to  $L$  is  $f_g(X_g)\frac{\rho_g}{(X_R - X_L)}u'(C_g^L)$ . In equilibrium this term must be equalized across groups. Similar considerations apply to party  $R$ 's candidate. Hence,  $f_g(X_g)\frac{\rho_g}{(X_R - X_L)}u'(C_g^R)$  is equalized across groups by  $R$ . Note, both  $L$  and  $R$  must respect the common budget constraint given by  $\sum_{g=1}^G n(g, s) \cdot x_g^s(j) \leq R_s$ . This along with the strict concavity of  $u(\cdot)$  guarantees that  $C_g^L = C_g^R$  for every group  $g$ . This establishes  $\mathbf{x}^s(\mathbf{L}) = \mathbf{x}^s(\mathbf{R})$ .

The uniqueness part follows from the strict concavity of  $u(\cdot)$  and the fact that the budget constraint binds in equilibrium.  $\square$

Observation 1 informs us that in the state level competition, candidates from both parties end up proposing the same allocation across the  $G$  groups. This, in turn, implies that regardless of which party wins at the state-level the allocation of consumption is going to be the same. To be sure, the actual winner ( $L$  or  $R$ ) will also implement the winning party's ideological policy ( $X_L$  or  $X_R$ , respectively). Hence, the overall payoff to each voter does indeed depend upon which party wins.

Suppose there is a cost to transferring resources both across groups within a state and also across states. There are several ways to interpret such a cost; one can just think of them as administrative costs associated with implementing tax-and-transfer policies. In particular, assume that whenever resources are transferred across an entity (group or state) a fraction  $\delta \in (0, 1)$  is "lost". Therefore, if either of the two candidates in state  $s$  decides to transfer resources across groups the budget available to that candidate becomes  $(1 - \delta)R_s$ . Note, introducing this cost makes no qualitative difference to the result stated in Observation 1 if  $\delta$  is sufficiently small.<sup>8</sup>

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<sup>8</sup>Alternatively, if  $\delta$  is indeed very close to unity then neither candidate would make transfers across groups; so

Recall, we are interested in examining how the (first stage) allocation  $\{R_s\}_{s=s_1, s_2}$  by the central incumbent is affected by the identity of the winner in the state elections. Specifically, we are interested in checking if there is any gains from being *aligned* with the central incumbent party. In our setup, the state elections happen *after* the central incumbent makes the choice of  $\{R_s\}_{s=s_1, s_2}$ . However, all players are rational and forward-looking and therefore can correctly anticipate the equilibrium play in all stages.

To get at any potential alignment effects, we make two assumptions: (i) Party  $L$  is the central incumbent party and (ii) one of the states has a bias in favor of  $L$  while the other is biased towards  $R$ . Notice that (i) is without any loss of generality and (ii) is necessary to analyze potential alignment effects. So say  $s_1$  is biased towards  $L$  and  $s_2$  towards  $R$ .

We hardwire in these biases by assuming

$$F_g^{-1}\left(\frac{1}{2}\right) < \frac{1}{2}(X_L + X_R)$$

$\forall g$  in  $s_1$  and the opposite inequality in  $s_2$ . This bias structure is sufficient to guarantee that party  $L$  wins in  $s_1$  and party  $R$  wins in  $s_2$  in a *first-past-the-post* system or a majoritarian system.<sup>9</sup>

Now we turn to the first stage of the game, namely, the issue of the choice of  $\{R_s\}_{s=s_1, s_2}$  by the central incumbent  $L$  party. We first need to specify what this incumbent party aims to maximize. As a starting point, we can suppose that this central incumbent is interested in maintaining its position in the (upcoming) central elections where all citizens vote: specifically, every voter in states  $s_1$  and  $s_2$  is eligible to vote in the central elections. So party  $L$  at the centre values the total support from these two states taken together. Like in Arulampalam et al (2009), the central incumbent may be viewed as promoting the cause of his party in both the states. So greater support for  $L$ 's candidate in either state is important for the central incumbent. Also, the central incumbent cares about overall welfare from redistribution (like in Arulampalam et al (2009) and is sensitive to the loss associated with it (as captured by  $\delta$ ). Specifically, the central incumbent seeks to maximize:

$$\sum_{i=1}^2 \sum_{g=1}^G n(g, s_i) F_g(X_g) - \delta^* \sum_{i=1}^2 \sum_{g=1}^G n(g, s_i) \cdot Y(g, s_i)$$

where the first term (double summation) represents the overall voteshare of  $L$ 's candidates and

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Observation 1 still applies. The possibility that – in equilibrium – one candidate would choose to make transfers across groups while the other chooses not to, holds only for some very specific configuration of the parameters and functional forms. Therefore, we choose to ignore it.

<sup>9</sup> In the *first-past-the-post* system, the candidate with the highest votes is declared the winner. This is the case in Indian elections. Consult Observation 1 to see that the cutoff point for every group is  $\frac{1}{2}(X_L + X_R)$ . So this bias structure implies that a majority of voters in each group vote for  $L$  ( $R$ , resp.) in  $s_1$  ( $s_2$ , resp.).



$\delta^* = \delta$  if the central incumbent redistributes across the states and 0 otherwise.

Note, the following budget constraint has to be met

$$R_{s_1} + R_{s_2} \leq (1 - \delta^*) \sum_{i=1}^2 \sum_{g=1}^G n(g, s_i) \cdot Y(g, s_i).$$

In other words,  $s_1$  may stand to gain as a whole at the cost of  $s_2$  or vice versa. To be concrete, alignment gains are defined as follows:  $R_{s_1} > (1 - \delta) \sum_{g=1}^G n(g, s_1) \cdot Y(g, s_1)$  and  $R_{s_2} < (1 - \delta) \sum_{g=1}^G n(g, s_2) \cdot Y(g, s_2)$ . In this scenario, we can now ask if the central incumbent will allocate resources in favor of the aligned state ( $s_1$ ) or not. The following observation provides the answer.

**OBSERVATION 2.** *The central incumbent  $L$  will not redistribute resources across the two states in equilibrium. In particular, resources from  $s_2$  (non-aligned state) will not be transferred to  $s_1$  (aligned state).*

*Proof.* The central incumbent  $L$  when deciding on the optimal allocation of  $\{R_{s_1}, R_{s_2}\}$  is aware of the equilibrium outcome in the subsequent stage game. Take any feasible  $\{R_{s_1}, R_{s_2}\}$ . Note,  $L$  (at the centre) can correctly anticipate the  $\{\mathbf{x}^s(\mathbf{L}), \mathbf{x}^s(\mathbf{R})\}$  for  $s = s_1, s_2$  in equilibrium. In particular, that  $C_g^L = C_g^R$  for every  $g$  in either state.

This implies that the total voteshare of  $L$ 's candidates is  $\sum_{g=1}^G n(g, s) F_g((X_L + X_R)/2)$ .

This term is independent of the level of  $R_{s_1}$  and  $R_{s_2}$ . In addition, redistributing is costly since  $\delta > 0$  and results in no gain in votes. This establishes the claim.  $\square$

The main intuition behind Observation 2 is straightforward. All players being rational can anticipate the outcome in the subsequent stage of the game. Therefore, the incumbent is aware that regardless of how much money is pumped into the aligned state there is going to be convergence in terms of consumption; so no electoral gains can be reaped by favoring the aligned state. Even a *tiny* cost to redistributing (notice,  $\delta$  can be arbitrarily small) is sufficient to wipe out any alignment effects. There is an important asymmetry here: a positive  $\delta$  no matter how small rules out alignment gains. But this same  $\delta$  has no qualitative effect on the state level competition.<sup>10</sup>

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<sup>10</sup>To be sure, one could generate alignment gains in our setup. Suppose one were to introduce an element of patronage in the central incumbent's payoff alongside the (larger) consideration of winning votes. Say, the incumbent  $L$  at the centre gains in terms of utility from a higher consumption level of its support group state. Then this will induce some alignment effect even with  $\delta > 0$ . However, even then there would be no effects on within- $s_1$  inequality as measured in terms of consumption. Moreover, alignment gains would be quantitatively small as long as winning votes is sufficiently important for the central incumbent.

A few words about the convergence result in Observation 1 are in order. Here again, convergence in transfers is the only possible equilibrium outcome since the state level politicians care solely about winning votes in the (state level) election. This obtains even when parties have distinct ideologies and voters are distributed all along the ideology spectrum. However, we need to remember that there is non-convergence in one important dimension: the *ideology* implemented in either state. It is  $X_L$  in  $s_1$  and  $X_R$  in  $s_2$ . From an empirical standpoint, this ideology variable may be difficult to identify, especially given the convergence in economic platforms.

Non-convergence in transfers is possibility (in the second stage) when candidates care about things other than winning votes. Again, in light of the preceding discussion, one can endow the state level candidates with a direct concern about the consumption of their core supporters. In fact, this is what we do explicitly in subsection 2.1. We also explore the implications of non-convergence for alignment gains.

## 2.1 An Extension

Here we introduce the following change to each state-level candidates' payoff. We assume that in addition to winning votes, a candidate also cares about “rewarding” his supporters. To operationalize this idea, first assume that the  $G$  groups in any state can be ranked in terms of their ideological affiliation to the parties. Recall, there is heterogeneity in ideology within each group.

To simplify matters, let  $X_L$  and  $X_R$  denote the two extreme points in the ideology space and let all voters be distributed between these extremes. Now, say  $E(X_1) \leq E(X_2) \leq \dots \leq E(X_G)$  with at least one inequality strict. In this sense, group 1 ( $G$ , resp.) is ideologically closer to  $L$  ( $R$ , resp.) than group  $G$  (1, resp.) is. Now focus on any state  $s$ . The objective function of candidate  $L$  in this state is now given by<sup>11</sup>:

$$\sum_{g=1}^G n(g)F_g(X_g) + \chi \sum_{g=1}^G n(g)\omega_g[u(C_g^L) - u(C_g^R)]$$

where  $\chi > 0$  and  $\omega_1 \geq \omega_2 \geq \dots \geq \omega_G$  with at least one inequality strict. Hence,  $L$  prefers to outperform  $R$  especially for those groups which are  $L$ -supporters. The parameter  $\chi$  measures the strength of this valuation of “rewarding” supporters as compared to winning votes.

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<sup>11</sup>We omit the state identifier  $s$  to simplify notation.

In an analogous fashion, we can state the objective function of candidate  $R$  as:

$$\sum_{g=1}^G n(g)(1 - F_g(X_g)) + \chi \sum_{g=1}^G n(g)\omega_{G+1-g}[u(C_g^R) - u(C_g^L)].$$

So  $R$ 's candidate places more emphasis on catering to groups who are ideologically closer to  $R$ . Is this modification sufficient to generate non-convergence in economic platforms? The following observation provides an answer.

**OBSERVATION 3.** *In any state  $s$ , given  $R_s$ , there is always an equilibrium in which the proposed across-group allocation is dissimilar for both parties.*

*Proof.* Consider  $L$ 's candidate. Observe, the marginal gain to  $L$ 's candidate from a marginal increase in  $C_g^L$  is given by  $[f_g(X_g)\frac{\rho_g}{(X_R - X_L)} + \chi\omega_g]u'(C_g^L)$ . It must be the case in equilibrium that this term is equalized across all  $G$  groups. Otherwise,  $L$  could re-allocate to the group with the higher value and gain. Call this common value (which is positive)  $\lambda_L$ .

Similar reasoning with  $R$ 's candidate yields the term  $[f_g(X_g)\frac{\rho_g}{(X_R - X_L)} + \chi\omega_{G+1-g}]u'(C_g^R)$  whose common value (again positive) we denote by  $\lambda_R$ .

Now take any group  $g$ . Clearly, we have

$$\frac{[f_g(X_g)\frac{\rho_g}{(X_R - X_L)} + \chi\omega_g]u'(C_g^L)}{[f_g(X_g)\frac{\rho_g}{(X_R - X_L)} + \chi\omega_{G+1-g}]u'(C_g^R)} = \frac{\lambda_L}{\lambda_R}.$$

There is always an equilibrium with  $\lambda_L = \lambda_R$ .<sup>12</sup> In this equilibrium, we have

$$\left[ f_g(X_g)\frac{\rho_g}{(X_R - X_L)} + \chi\omega_g \right] u'(C_g^L) = \left[ f_g(X_g)\frac{\rho_g}{(X_R - X_L)} + \chi\omega_{G+1-g} \right] u'(C_g^R) \quad (1)$$

Now consider group  $g = 1$ . Since  $\omega_1 > \omega_G$ , we have  $C_1^L > C_1^R$ . Therefore, it is clear that both candidates will *not* promise the same transfers in equilibrium.  $\square$

By equation (1), we also have  $C_G^L < C_G^R$ . This implies that parties will treat their supporters favorably when in power.<sup>13</sup> Notice, the result stated in Observation 3 stands in marked contrast to the one in Observation 1. This begs the question as to what happens to the voteshare for either party in either state.

<sup>12</sup>Other equilibria with  $\lambda_L \neq \lambda_R$  are possible though they exist under more restrictive conditions. So we refrain from focusing on them.

<sup>13</sup>For probabilistic voting-type models with divergent equilibrium platforms see Dixit and Londregan (1998b), Mitra (2015) among others.

Recall that in the baseline model, the equilibrium voteshare for party  $L$ 's candidate in state  $s$  was given by:

$$V_s^L = \sum_{g=1}^G n(g, s) F_g(X_g) = \sum_{g=1}^G n(g, s) F_g((X_L + X_R)/2)$$

since  $C_g^L = C_g^R$  for every  $g \in 1, \dots, G$ .

Here, the same term is

$$\sum_{g=1}^G n(g, s) F_g(X_g)$$

where

$$\begin{aligned} X_g &> (X_L + X_R)/2 & \text{if } C_g^L > C_g^R \\ X_g &= (X_L + X_R)/2 & \text{if } C_g^L = C_g^R \\ X_g &< (X_L + X_R)/2 & \text{if } C_g^L < C_g^R. \end{aligned}$$

Therefore, whether the voteshare is higher/lower/equal to the one in the baseline model depends upon  $\{n(g, s), F_g(\cdot)\}_{g=1}^{g=G}$ . It is important to note that alignment gains becomes a real possibility since economic platforms diverge in equilibrium. As we observed in the baseline model, convergent economic platforms rule out any alignment effects in our setup. However, whether alignment effects with such divergent platforms *will* actually materialize is another matter.

Recall, the central incumbent aims to maximize  $V_{s_1}^L + V_{s_2}^L$  net of the cost of redistribution. Hence, the following condition is *necessary* for alignment gains<sup>14</sup>:

$$\frac{\partial V_{s_1}}{\partial R_{s_1}} > \max \left\{ \frac{\partial V_{s_2}}{\partial R_{s_2}}, 0 \right\}$$

where the derivatives are evaluated at  $R_{s_i} = \sum_{g=1}^G n(g, s_i) \cdot Y(g, s_i)$  for  $i = 1, 2$ . In general, these derivatives are ambiguous in magnitude. The following example demonstrates this in a particularly stark manner.

### An Example.

Suppose  $u(z) = \ln(z)$ . Now equation (1) takes the following form:

$$\frac{f_g(X_g) \frac{\rho_g}{(X_R - X_L)} + \chi \omega_g}{f_g(X_g) \frac{\rho_g}{(X_R - X_L)} + \chi \omega_{G+1-g}} = \frac{C_g^L}{C_g^R} \quad (2)$$

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<sup>14</sup>This would also be sufficient if  $\delta$  was equal to 0.

for  $g = 1, \dots, G$ . Note that  $u(C_g^L) - u(C_g^R) = \ln(C_g^L/C_g^R)$ . Hence,

$$X_g = \frac{1}{2}(X_L + X_R) + \frac{\rho_g}{(X_R - X_L)} \ln(C_g^L/C_g^R).$$

Start with any state  $s$  with aggregate resources  $R_s$ . Clearly, equation (2) must hold in equilibrium. Call the equilibrium transfers for this  $R_s$ ,  $\{\mathbf{x}^s(\mathbf{L}), \mathbf{x}^s(\mathbf{R})\}$  where  $x_g^s(k) \equiv C_g^k(s) - Y(g, s)$  for  $k = L, R$ . Now consider a change to  $R_s$  so that the new budget is  $\gamma R_s$  for some  $\gamma > 0$ .

Look at equation (2). The LHS of this equation is a function of  $\frac{C_g^L}{C_g^R}$  as is the RHS, for every  $g \in \{1, \dots, G\}$ . Now suppose the solution to each such equation is indeed unique; so there is only *one* value of  $\frac{C_g^L}{C_g^R}$  for any given  $g$ .<sup>15</sup> This uniqueness immediately implies that even for the budget  $\gamma R_s$ , the same ratio of consumption (by party) must hold for every group. But notice, that the cutoff points for each group, namely,  $X_g$  is unchanged since  $\frac{C_g^L}{C_g^R}$  is unchanged. Therefore,  $V_s^L = \sum_{g=1}^G n(g, s) F_g(X_g)$  is unchanged. Therefore, there are no gains from shifting resources across the states; hence, no alignment gains.

The above example demonstrates that non-convergence in equilibrium within-state allocations, while necessary, is *not* sufficient to generate alignment gains in our setup. What is crucial is how the vote share to party  $L$  *changes* as a response to an increase (or decrease) of aggregate funds  $(R_{s_1}, R_{s_2})$ . Moreover, if both parties and their candidates care sufficiently about winning votes in relation to appeasing supporters — i.e., if  $\chi$  is close to 0 — then both the extent of platform divergence and the possibility of alignment effects become quantitatively unimportant.

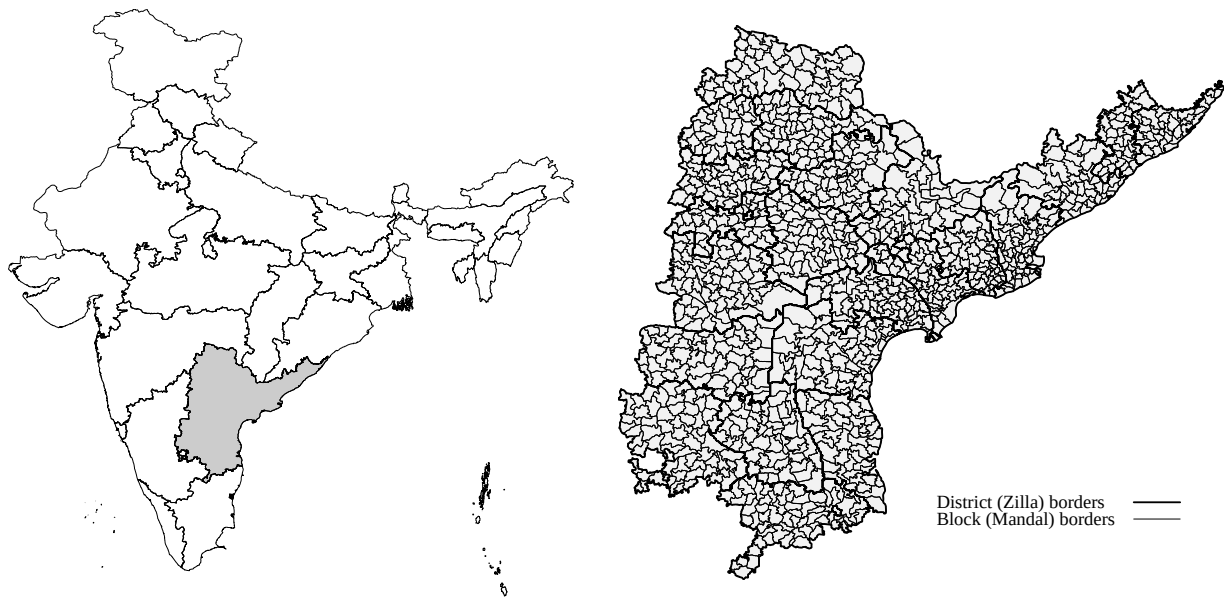
### 3 Context

To test the model developed in the previous section we now turn to data from India, and in particular the southern Indian state Andhra Pradesh (AP). AP is located in the Southeast of India, as shown in the left plot of Figure 1, and used to be one of India's larger states before it was split in two in 2014, with a population of about 84.5 million according to the Indian Census of 2011. It was also a fairly typical Indian state: In the 2011 census it had a reported literacy rate of 67% (compared to the national average of 72%) and it had an average state GDP growth of 8.2% between 2007 and 2012 (compared to the national GDP growth of 8% during the same period).<sup>16</sup> In this paper we look at electoral data at the subdistrict (mandal) level in 2001 and 2006 and nightlight data between 1999 and 2010 in order to see whether the ideology of the party in power or the alignment of parties at

<sup>15</sup>This can happen for certain choices of the parameters like  $\omega_g$ ,  $f_g$ , etc.

<sup>16</sup>Accessed at the Planning Commission website [URL] [planningcommission.nic.in/reports/genrep/ann\\_e13\\_14.pdf](http://planningcommission.nic.in/reports/genrep/ann_e13_14.pdf)

Figure 1: Location of Andhra Pradesh in India, as well as its district and subdistrict boundaries as of 2001



different levels of government are associated with development gains.<sup>17</sup> The right plot in Figure 1 shows how AP was split into administrative districts and subdistrict (mandals) according to the census of India 2001.

India currently has direct democratic elections at 5 levels. Administratively, India is divided into states, districts, subdistricts, and villages/wards, but the electoral districts do not overlap well with these administrative boundaries at all levels. First, there are direct elections to the lower house of the parliament (*Lok Sabha*). In these elections Members of Parliament (MPs) are elected in 543 single-member districts referred to as parliamentary constituencies (PCs). These are drawn by the Delimitation Commission of India and fit into states, but may cross the boundaries of administrative districts. In AP there were, for instance, 23 districts and 42 PC in 2001. Second, each state elects members to its state assembly. As India is federal, each of these state assemblies have considerable power over state legislation. Members of Legislative assemblies are elected from some 4000 single-member districts called state assembly constituencies (ACs). These ACs fit perfectly into parliamentary constituencies and into administrative districts, but may cross subdistrict borders. In AP there were 294 ACs during the years we look at.<sup>18</sup>

In addition, there are three sets of local-level elections: Politicians are elected to district-level

<sup>17</sup>This means that we look at the state of AP before it was split into two states in 2014.

<sup>18</sup>See (Bhavnani and Jensenius, 2015a) for further information about this nesting of subdistricts, AC, PCs, and districts. Information about the exact extent of India's PCs and ACs can be accessed at [URL] <http://eci.nic.in/>.

councils (called *Zilla parishads* in AP), subdistrict-level councils (*Mandal Parishads* in AP), and village-level councils (*Gram Panchayats* in AP).<sup>19</sup> These three levels of government form the Panchayati Raj institutions, and these elections are held at the same time in all Indian states. It is also important to note that elections to the district- and subdistrict-level councils are held on a party basis, while elections to the village councils are (at least officially) un-partisan.

The lowest level of aggregation is the election to the village councils. There are councils in almost all villages (small villages may share a council) and the number of people elected depend on the population in the village(s). For example, a normal-sized village of about 2000 people is supposed to elect 11 representatives (State Election Commission, 2011, 28). Depending on the number of representatives that is to be elected, the village(s) is divided in a corresponding number of territorial single-member constituencies. Voters also vote for a village president (*Sarpanch* in AP) who has a permanent invitation to attend the meetings of the Mandal Parishad.

The next level up is the Mandal Parishad, for which members are elected from Mandal Parishad Territorial Constituencies of about 4000 people. In the 2001 election in AP there were a total of 14,591 of these single-member districts each electing one member to one of the 1,094 Mandal Parishads (Suri, 2001). The elected politicians then elect a president or chairperson among themselves who is responsible for chairing Mandal Parishad meetings. These meetings are held between the elected representatives, as well as the presidents in the Gram Panchayats within the subdistrict, administrative personnel, and also MPs and MLAs whose constituency geographically overlap with the subdistrict. Each Mandal Parishad representative is also a permanent invitee to the Gram Panchayat meetings in the Panchayat he/she is elected from (State Election Commission, 2011, 29).

Each subdistrict (or mandal) also serves as the single-member electoral districts for the district-level Zilla Parishad. For the years we are looking at there were approximately 50 subdistricts in each district, so each Zilla Parishad had about 50 elected members. In the Zilla Parishad meetings the presidents of the Mandal Parishad within the districts, MPs and MLAs with constituencies overlapping the district, and the District Collector are also among the permanent invitees.<sup>20</sup> Zilla Parishad representatives are also permanent invitees to the Mandal Parishad meetings in the Subdistrict he/she is elected from (State Election Commission, 2011, 48).

Table 1 provides an overview of the 5 levels of elected officials in AP in 2001: what constituencies they were elected from, the approximate population size of these constituencies, and approximately

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<sup>19</sup>If not otherwise mentioned, the information in this section is from [URL] <http://www.aponline.gov.in/apportal/departments/departments.aspx?dep=27&org=178&category=about>, accessed February 19 2015.

<sup>20</sup>See a full list of permanent invitees in (State Election Commission, 2011, 53).

Table 1: Direct elections in AP in 2001

| Elected to                                             | Electoral constituency                                     | Approx. pop. in constituency | N elected across the state |
|--------------------------------------------------------|------------------------------------------------------------|------------------------------|----------------------------|
| Parliament (Lok Sabha)                                 | Parliamentary Constituency                                 | 1.7 mill                     | 42                         |
| State Assembly (Andhra Pradesh Legislative Assembly)   | Assembly Constituencies                                    | 250,000                      | 294                        |
| District (Zilla Parishad)<br>N=22, Hyderabad not incl. | Zilla Parishad Territorial Constituency (Subdistricts)     | 65,000                       | 1,094                      |
| Subdistrict (Mandal Parishad)<br>N=1094                | Mandal Parishad Territorial Constituency (Gram Panchayats) | 3,300                        | 14,591                     |
| Village (Gram Panchayat)<br>N=21,943                   | Single-member constituency within one or a few villages    | 300                          | ≈ 240,000                  |

how many politicians were elected at each level.

The responsibilities at different levels of government differ considerably. Whereas the national and state legislatures are responsible for legislating, most of developmental planning is done at the lower levels of government. In Andhra Pradesh it is the Department of Panchayati Raj and Rural Development that is responsible for the planning and execution of programs for rural development, including the development of infrastructure, the provision of clean drinking water, and the execution of minor irrigation and poverty alleviation programs.<sup>21</sup>

More particularly, the Gram Panchayats make demands and claims for funding that are sent to the Mandal Parishads. The Mandal Parishads propose budgets and plans to the Zilla Parishads. The Zilla Parishads are in turn responsible for examining and approving the budgets from the Mandal Parishads in their district, distribute funds allotted to the district by the central and state government among the Mandal Parishads, and coordinate the implementation of development plans within the district. This is done in close collaboration with the district-level administration in charge of development in each district.

The close contact with administrative personnel and the power over the distribution of resources makes the Zilla Parishad an important arena for the negotiation of the distribution of resources. During interviews with politicians across India in 2010 and 2011, the authors were several times told that the Zilla Parishad was considered the level of government that most influenced develop-

<sup>21</sup>This information was retrieved from [URL] <http://www.aponline.gov.in/apportal/departments/PortalListofOrgsbyDepts.aspx?deptdesc=Panchayat%20Raj%20and%20Rural%20Development> on February 22, 2015.



ment at the local level.<sup>22</sup>

While considerable effort has been spent looking for electoral patterns and development at the state, PC and AC levels in India, the lower levels of government have hardly received any attention in the academic literature. In this paper we are looking at the nighttime light in AP between 1999 and 2010, with a particular focus on mandal-level election data. This period provides us with considerable variation in who is in power at different levels of government.

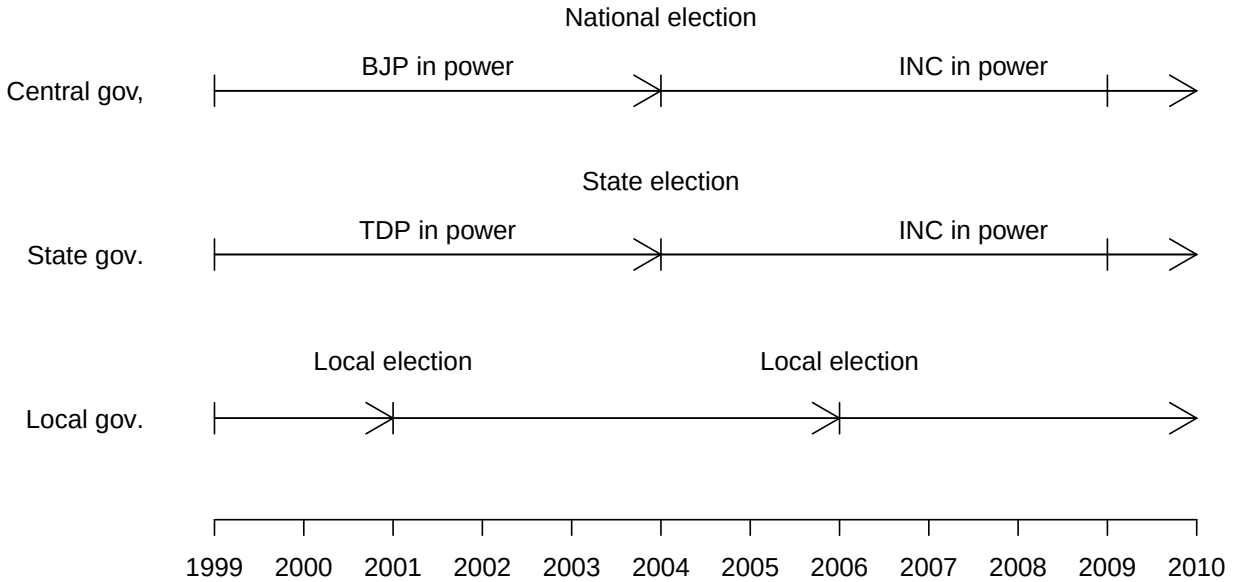
As shown in Figure 2 we can think of four different combinations of regimes during these years. First, we have a baseline between 1999 and 2001 where the right-wing Bharatiya Janata Party (BJP) was in power at the center, the regional center-right party Telugu Desam Party (TDP) was in power in the state, and TDP was dominant in local politics too (they controlled all Zilla Parishads except the one in Cuddapah district). Then, there were local elections in 2001 where many of the local level electoral institutions changed their leadership while the state and central government remained the same. In 2004 there were national and state elections where the center-left party the Indian National Congress (INC) won while the local politicians stayed in power, we therefore see a shift in alignments between the national, state, and local levels. And finally, with the local election in 2006 we see a change in who was in power at district, subdistrict, and village levels while INC stayed in power in both the state and central government. Looking at the subdistrict-level changes in nighttime light over these four time periods therefore allow us to study a variety of hypotheses about the ideology and alignment on who was in powers at different levels of government.

The 2001 election in AP was also particularly interesting when it comes to looking at electricity because a steep hike in the power tariff resulting from the power sector reforms initiation by the ruling party made many farmers struggle (Murthy). The INC particularly campaigned on the promise of free electricity to farmers, particularly for the use of bore-well irrigation (Suri, 2001, 3892). INC was also now aligned with the Communist parties (who used to be aligned with TDP until 1999), while the TDP-BJP alliance that had been on place between 1999 and 2001 was breaking down. In this election we therefore saw a very clear ideological division between Congress and the left parties who talked about “welfare” and redistribution and were criticizing BJP and TDP for their “development” agenda of pro-growth policies and neo-liberal economic reforms (Suri, 2001, 3892).

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<sup>22</sup>For more information about these interviews see (Jensenius, 2015a, 10).

Figure 2: Election years for different levels of government



## 4 Data

### 4.1 Nighttime light

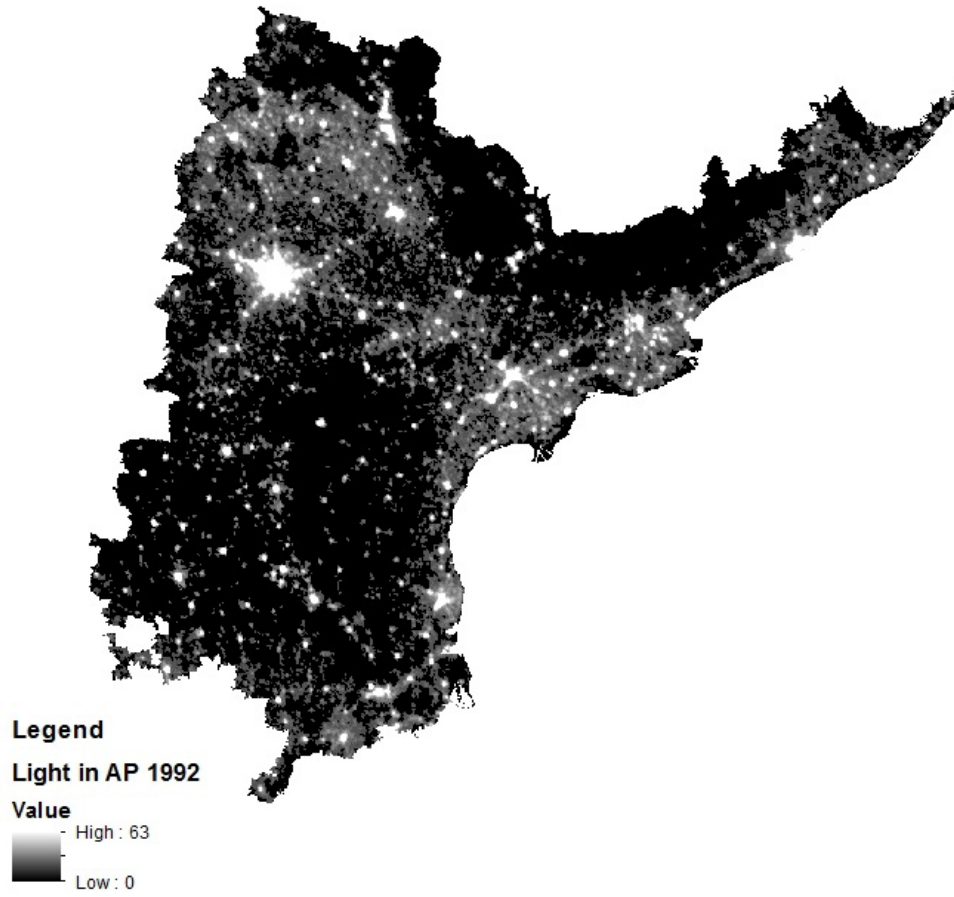
Our measure of nighttime light is from satellite images from the US Air Force DMSP and its Operational Linescan System. The satellites circle the Earth 14 times each day and record Earth-based lights with their Operational Linescan System for grid cells of 30 arc-seconds (corresponding to approximately 1 square kilometer). The entire planet between latitudes 65 degrees N and 65 degrees S is covered. From 1992 and onwards, these data were digitalized and made publicly available. In order to measure human-generated light, the light data is filtered by purging observations with forest fires, auroral activity, cloud cover, and those from months when the sun sets late.

The valid data points for each grid cell for each year are averaged, and the final measure is a yearly nighttime light measure ranging from zero (no light) to 63. Figure 3 shows nighttime light in the state in 1992.<sup>23</sup>

The nighttime light data is available for grid cells of about 1 square kilometere, but in order to link it to electoral outcomes we overlaid it with GIS maps of the subdistrict (mandal) borders in Andhra Pradesh as of 2001, as well as electoral constituencies as of 2001. When doing so, we excluded

<sup>23</sup>For a more detailed description of the satellite light data, see, e.g., National Oceanic and Atmospheric Administration (2013), Chen and Nordhaus (2011), Henderson et al. (2012), and Michalopoulos and Papaioannou (2013).

Figure 3: Nighttime light in Andhra Pradesh in 1992



all water areas since there are glooming effects of water bodies although people do not live there (Pinkovski, 2013). We then calculated zonal statistics for each mandal for each year in which we have luminosity data. The zonal statistics for each mandal were calculated using ArcGIS, giving us the average amount of light and the standard deviation in light across the grid cells within each mandal for each year.

Table 2 shows the number of mandals included in the data for each year, as well as the mean and standard deviation of average light across these mandals. As we can see in the table, there was a steady increase in the amount of light over time, with a particular increase from 2008 and onwards. As can be seen in Figure 2, this period is associated with elections at both the national and state level, and INC maintained control at both levels.

The last column also show the election periods for the local elections that we are interested in for our empirical analyses. The first local elections were held in 1995, but since we only have election data from 2001 and 2006, we call everything before 2001 the pre period. The period between the

2001 and 2006 local elections we refer to as period 1 and 2007-2010 is our period 2.

Table 2: Descriptive statistics over the years

| <i>Year</i> | <i>N</i> | <i>Mean of average light</i> | <i>Mean standard deviation</i> | <i>Period</i> |
|-------------|----------|------------------------------|--------------------------------|---------------|
| 1992        | 1106     | 3.26                         | 2.68                           | Pre           |
| 1993        | 1111     | 4.19                         | 2.61                           | Pre           |
| 1994        | 1111     | 3.85                         | 2.49                           | Pre           |
| 1995        | 1111     | 4.88                         | 2.82                           | Pre           |
| 1996        | 1111     | 5.04                         | 2.83                           | Pre           |
| 1997        | 1111     | 5.13                         | 2.93                           | Pre           |
| 1998        | 1111     | 5.91                         | 3.23                           | Pre           |
| 1999        | 1111     | 6.14                         | 3.45                           | Pre           |
| 2000        | 1111     | 4.74                         | 2.64                           | Pre           |
| 2001        | 1111     | 4.92                         | 2.82                           | Election      |
| 2002        | 1111     | 5.23                         | 2.77                           | Period 1      |
| 2003        | 1111     | 5.06                         | 2.98                           | Period 1      |
| 2004        | 1111     | 4.44                         | 2.31                           | Period 1      |
| 2005        | 1111     | 4.60                         | 2.45                           | Period 1      |
| 2006        | 1111     | 4.88                         | 2.50                           | Election      |
| 2007        | 1111     | 4.92                         | 2.47                           | Period 2      |
| 2008        | 1111     | 7.00                         | 3.14                           | Period 2      |
| 2009        | 1111     | 6.94                         | 3.38                           | Period 2      |
| 2010        | 1111     | 10.39                        | 4.37                           | Period 2      |
| Total       | 21104    | 5.34                         | 2.89                           |               |

#### 4.1.1 What is captured by our measure?

Several recent studies have provided empirical evidence showing that nighttime light corresponds well to economic activity and wellbeing in other contexts (see e.g., Alder et al. (2013), Alesina et al. (2014), Almås et al. (2014), Chen and Nordhaus (2011), Doll et al. (2006), Ghosh et al. (2010), Henderson et al. (2012), Michalopoulos and Papaioannou (2013), Pinkovskiy (2013) and Sutton et al. (2007)). Based on the data we have, we interpret the average amount of light as an indicator for general economic development. The standard deviation is interpreted as inequality within a mandal.

In order to confirm that nighttime lights also capture something meaningful in terms of development at the mandal level in India, we merge variables from the 2001 Indian census with our mandal-level light data, both the primary census abstract and variables from the village directory.<sup>24</sup>

<sup>24</sup>The primary census abstract provides variables such as the total population, the literacy and the number of workers

Table 3: Correlation between light and literacy

|                           | (1)                  | (2)                    | (3)                  |
|---------------------------|----------------------|------------------------|----------------------|
|                           | Average              | ln Average             | Inequality           |
| Percent literate          | 0.11***<br>(0.014)   | 0.034***<br>(0.0032)   | 0.065***<br>(0.0092) |
| Total population in 1000s | 0.043***<br>(0.0054) | 0.0036***<br>(0.00058) | 0.026***<br>(0.0040) |
| <i>Constant</i>           | -3.22***<br>(0.69)   | -0.55***<br>(0.16)     | -1.94***<br>(0.32)   |
| Observations              | 1109                 | 1106                   | 1109                 |
| R-squared                 | 0.43                 | 0.28                   | 0.48                 |

*Notes:* Robust standard errors clustered at the mandal level in parentheses. All regressions include mandal fixed effects.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

A key variable that is related to poverty that is also included in the census is the literacy rate. In Table 3 we see that both average light and logged average light are positively associated with the percentage of literate people in the mandal. As we would expect, population is also positively correlated with light.

Table 4 shows the correlation between logged average light and other variables of interest. In the first column we see that light is not correlated with the percent of the population in the mandal having access to electricity. This may seem surprising at first but it should be noted that in 83 percent of the mandals everyone has access to electricity. This also implies that our light measure is not merely capturing access to electricity but rather use of electricity. In the second column we see that light is positively correlated with the percentage of people having access to bus or trains and in the fourth column we see a positive correlation with the percent of people having access to medical facilities. There is no correlation, however, with the percent of people living in villages with educational facilities, however, since 92 percent of people have such access this may simply be due to the fact that there is little variation in the data.

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in a mandal. The village directory includes a range of variables such as whether or not the village is electrified, the number of schools and medical facilities in a village, and a number of other village amenities. We aggregated the village-level data to the mandal level, and provide measures such as the percentage of the rural population in a mandal that had access to each type of amenity. We chose to use only the rural data, since all of the urban population generally had access to all the amenities, as all towns and cities in Andhra Pradesh were electrified, had at least one school, and so on. [OR DID WE USE SOME OTHER MEASURE??]

Table 4: Correlation between light and other census variables

|                                             | (1)                   | (2)                  | (3)                   | (4)                   |
|---------------------------------------------|-----------------------|----------------------|-----------------------|-----------------------|
|                                             | ln Average            | ln Average           | ln Average            | ln Average            |
| Percent with access to electricity          | -0.0031<br>(0.0020)   |                      |                       |                       |
| Total population in 1000s                   | 0.0064***<br>(0.0012) | 0.012***<br>(0.0015) | 0.0073***<br>(0.0014) | 0.0084***<br>(0.0010) |
| Percent with access to bus/train            |                       | 0.015***<br>(0.0025) |                       |                       |
| Percent with access to educational facility |                       |                      | -0.00042<br>(0.0022)  |                       |
| Percent with access to medical facility     |                       |                      |                       | 0.0038***<br>(0.0014) |
| <i>Constant</i>                             | 1.16***<br>(0.26)     | -0.69**<br>(0.30)    | 0.85***<br>(0.29)     | 0.45***<br>(0.16)     |
| Observations                                | 1097                  | 1097                 | 1097                  | 1097                  |
| R-squared                                   | 0.16                  | 0.25                 | 0.15                  | 0.16                  |

*Notes:* Robust standard errors clustered at the mandal level in parentheses. All regressions include mandal fixed effects.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

## 4.2 Election data

To look at the election outcomes from the local elections held in Andhra Pradesh in 2001 and 2006, we collected mandal-level election data for 1,057 mandals, including the name and party of the mandal president, as well as the reservation status of each mandal. Our dataset is based on public information attainable from the State Election Commission in AP. In addition we have data on the elections of representatives to the district-level government by each mandal, including information about the vote share and party affiliation of each of the candidates in the mandals. These data include the number of valid votes cast, the candidate name and party, as well as the number and percentage of the valid votes secured. We have complete information for the election results of 7,223 candidates in these district-level elections. Finally, we also have data on the ruling parties in the State Assembly (AC).

In Table 5 we see the distribution of the parties of the mandal presidents that got to power in 2001 and 2006. The two most successful parties across both elections are Telugu Desam Party (TDP) and the Indian National Congress (INC) although several other parties also won some areas. In the regressions we let BJP, INC and TDP be included as individual parties and lump the other parties into a “other” category. BJP is included separately even though it has very few winning mandals due to its importance at the national level.

Table 5: Party of the winning president

| Party of president | Year |      |
|--------------------|------|------|
|                    | 2001 | 2006 |
| BJP                | 8    | 1    |
| BSP                | 1    | 2    |
| CPI                | 17   | 23   |
| CPM                | 20   | 6    |
| INC                | 418  | 640  |
| IND                | 43   | 31   |
| TDP                | 475  | 370  |
| TRS                | 62   | 22   |
| Total              | 1044 | 1095 |

## 5 Empirical strategies and results

As shown in Table 2 we divide the mandal-year level data into two different periods following the 2001 and 2006 elections respectively. The first period is from 2002 to 2005 and the second period is from 2007 to 2010. In this section we will look at whether it matters to the luminosity of a mandal who holds the presidency.

There are at least two main reasons why we might expect to see the party of the mandal president affecting luminosity. First, the ideology of the party might matter. The mandal president is responsible for suggesting spending in the mandal to the district authorities and can also help implement development projects. The ideological leaning of the party of the mandal president could therefore matter. In particular, we should expect TDP and BJP in power to be associated with more light, but also more inequality (higher standard deviation) and INC in power to be associated with less light and less inequality. Second, we might expect there to be favoritism in that mandals that are aligned with the district-level government or with higher-ranked politicians might be privileged in their requests and get more development benefits than other mandals, which would be reflected in more light overall.

### 5.1 Effects of parties

Looking first for ideological effects, we regress the mean values of the average luminosity (economic development) as well as the mean value of the standard deviation of luminosity (inequality) in each mandal on the party in power at the mandal level (the party holding the presidency). The

baseline specification is shown in the following equation:

$$Y_{it} = \beta_1 \cdot President_{it} + \alpha_i + g_t + \varepsilon_{it}, \quad (3)$$

Here  $Y$  is our outcome variables of interest for mandal  $i$  in time period  $t$ ,  $\alpha_i$  are mandal fixed effects,  $g_t$  are year fixed effects, and  $\varepsilon_{it}$  are error terms where the standard errors are clustered at the mandal level. Party is defined as the party of the president in the mandal and hence, the coefficient  $\beta_1$  is capturing the effect of a specific party holding the mandal presidency on our outcomes.

Table 6 shows the results of a party winning the election on the subsequent level of economic development and inequality. The first three columns show regressions that do not include year fixed effects. In column 1 we see that as compared to INC winning the election (the excluded party in the regressions) the other parties are associated with lower economic development and the inequality seems to decrease for those mandals as well. However, these patterns are biased by the fact that INC were in power in more areas after the 2006 election, which is also when luminosity went up in the entire state.

In columns 4-6 we instead present regressions including year fixed effects. Hence, the corresponding regressions amount to a two-way fixed effects model, which is a more plausible specification. The party effects on average luminosity are now non-existent at least when taking logs. Similar results are obtained for inequality. The null result as well as the importance of including year fixed effects are seen in Figure 4, showing the trends in average light for the total sample as well as for different sub-samples depending on to which party the power shifted. We see that there is a clear trend of increased light starting in 2008. Most notably, this trend is very similar irrespective of to which party the power shifted to in the 2006 election.

What these patterns show is that that there were major changes to the luminosity across all mandals, irrespective of which party was in power. We do not see any evidence of ideological differences between the parties in power on economic growth or inequality.

## 5.2 Alignment and pre-election effects

Having access to election results at different levels we are also able to investigate if there is a premium for being aligned in the sense that the same party is in power at different levels. In a first regression we test for alignment effects of the mandal and the district level by estimating the



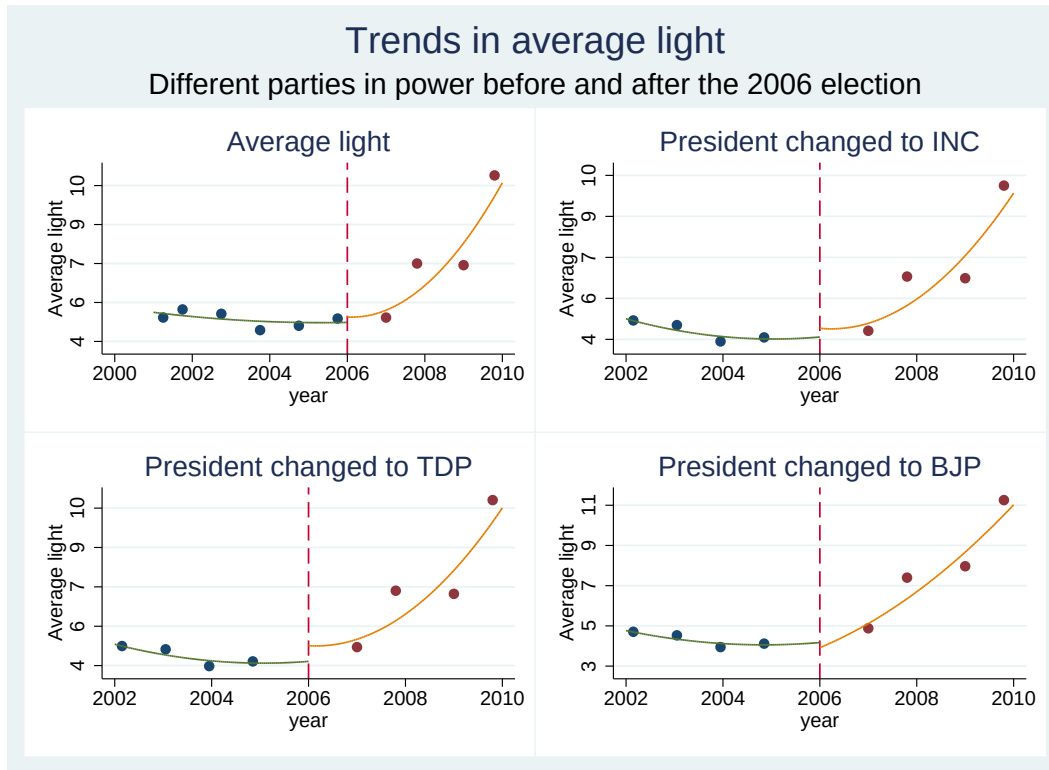
Table 6: Baseline results from fixed effects regressions.

|                                        | (1)                | (2)                 | (3)                 | (4)                | (5)                 | (6)                |
|----------------------------------------|--------------------|---------------------|---------------------|--------------------|---------------------|--------------------|
|                                        | Average            | ln Average          | Inequality          | Average            | ln Average          | Inequality         |
| BJP                                    | -2.51***<br>(0.54) | -0.45***<br>(0.089) | -0.74***<br>(0.14)  | -0.060<br>(0.25)   | 0.00040<br>(0.037)  | 0.010<br>(0.15)    |
| TDP                                    | -0.66***<br>(0.13) | -0.15***<br>(0.021) | -0.24***<br>(0.054) | 0.21***<br>(0.077) | 0.0082<br>(0.0082)  | 0.029<br>(0.046)   |
| Other parties                          | -1.55***<br>(0.21) | -0.30***<br>(0.038) | -0.55***<br>(0.084) | 0.021<br>(0.13)    | -0.012<br>(0.017)   | -0.070<br>(0.077)  |
| <i>Level in INC Tehsils (constant)</i> | 6.05***<br>(0.063) | 1.56***<br>(0.010)  | 3.04***<br>(0.025)  | 9.78***<br>(0.067) | 2.11***<br>(0.0051) | 4.31***<br>(0.034) |
| Observations                           | 8556               | 8539                | 8556                | 8556               | 8539                | 8556               |
| R-squared                              | 0.023              | 0.031               | 0.016               | 0.74               | 0.71                | 0.54               |

Notes: Robust standard errors clustered at the mandal level in parentheses. All regressions include mandal fixed effects. Columns 4-6 also include year fixed effects

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Figure 4: Trends by party



following regression:

$$Y_{it} = \beta_1 \cdot Aligned_{it} + \alpha_i + g_t + \varepsilon_{it}, \quad (4)$$

The results for Mandal-district alignment are seen in Table 7 which includes year fixed effects and and mandal fixed effects. We see no evidence of an alignment effect. Columns 4-6 controls for alignment in estimating the effects of parties and we see that the results are very similar.<sup>25</sup> In Figure 5, we show the alignment results graphically and it is clear that the trend is very similar for aligned and non-aligned areas. It is also clear from the figure that there does not seem to be any strategic pre-election increases in light before the 2006 election.<sup>26</sup>

Table 7: Alignment between party of Mandal-level president and the party of the district-level president

|                     | (1)                | (2)                 | (3)                | (4)                | (5)                 | (6)                |
|---------------------|--------------------|---------------------|--------------------|--------------------|---------------------|--------------------|
|                     | Average            | ln Average          | Inequality         | Average            | ln Average          | Inequality         |
| Parties are aligned | -0.040<br>(0.066)  | 0.0079<br>(0.0077)  | 0.042<br>(0.033)   | -0.025<br>(0.069)  | 0.0079<br>(0.0083)  | 0.039<br>(0.033)   |
| BJP                 |                    |                     |                    | -0.083<br>(0.26)   | 0.0078<br>(0.039)   | 0.047<br>(0.15)    |
| TDP                 |                    |                     |                    | 0.21***<br>(0.078) | 0.0096<br>(0.0087)  | 0.036<br>(0.046)   |
| Other parties       |                    |                     |                    | 0.0066<br>(0.13)   | -0.0071<br>(0.018)  | -0.047<br>(0.077)  |
| <i>Constant</i>     | 9.82***<br>(0.077) | 2.10***<br>(0.0062) | 4.29***<br>(0.041) | 9.74***<br>(0.077) | 2.10***<br>(0.0079) | 4.28***<br>(0.041) |
| Observations        | 8412               | 8395                | 8412               | 8412               | 8395                | 8412               |
| R-squared           | 0.74               | 0.71                | 0.53               | 0.74               | 0.71                | 0.54               |

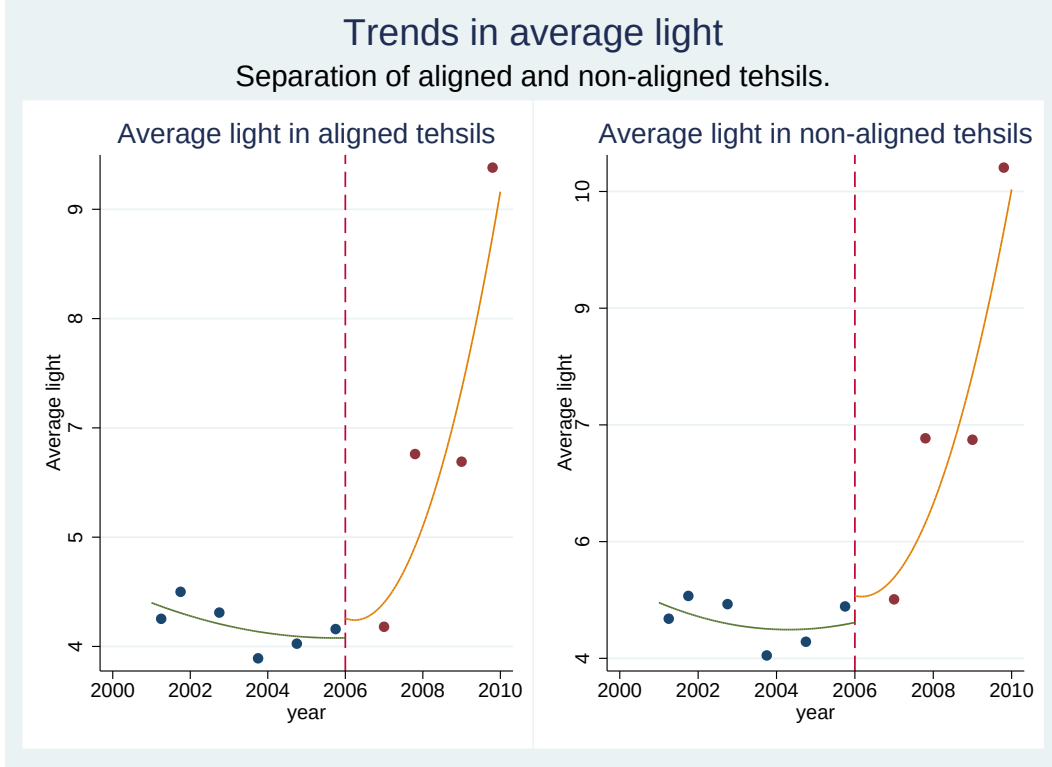
*Notes:* Robust standard errors clustered at the mandal level in parentheses. All regressions include mandal fixed effects and year fixed effects.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

<sup>25</sup>In Appendix Table 1 we show the corresponding results for the alignment of mandal presidents with the party of the Member of Legislative Assembly in power in the same area.

<sup>26</sup>We test this more formally by creating party specific pre-election dummy variables that equals one the year before the 2006 election (i.e 2005) for each party in power during the first election period. The pre-election dummy for BJP, for example, is equal to one if BJP was in power in 2005 and if the year is 2005. This allows us to test if there are any party specific increases in light in the year before the election. We show that there is no pre-election change in our light measures for the different parties and that there are clearly changes over the years, but not related to the years of election. Results from these robustness checks can be found in Table 2 and Table 3 in the Appendix.

Figure 5: Trends by alignment



### 5.3 Mandal voted for winning party at the district level

As a robustness check we also look at whether the alignment benefit might accrue to the mandals that voted in a district-level representative to the district government, rather than the ones having an aligned mandal president. To do so, we look at the mandal-level candidate data for the district-level election. Based on the number of votes in the district election at the mandal level we code one winner from each mandal and the distribution of the winning parties is shown in Table 8. The two most successful parties are again are TDP and INC, and not surprisingly, the distribution of support for the different parties is similar to the distribution of mandal-level presidents shown in Table 5. We use this information to investigate whether there is an effect of having voted in a mandal representative in the district government that is aligned with the president in the district government.

The baseline specification for the analysis of the winning party at the mandal level district elections in the most recent election is shown in the following equation:

$$Y_{it} = \beta_1 \cdot Party_{it} + \alpha_i + g_t + \varepsilon_{it}, \quad (5)$$

Where  $Party_{it}$  is the party of the winning candidate at the mandal level. In Table 9 we see basically the same results as before, i.e. it does not seem to matter. Also controlling for the winning party

Table 8: Distribution of winning parties of mandal-level representatives in the district government over the two elections

| Winning party | Year |      |
|---------------|------|------|
|               | 2001 | 2006 |
| BJP           | 14   | 3    |
| BSP           | 3    | 0    |
| CPI           | 8    | 40   |
| CPM           | 15   | 2    |
| INC           | 446  | 654  |
| IND           | 13   | 11   |
| TDP           | 492  | 359  |
| TRS           | 66   | 26   |
| Total         | 1057 | 1095 |

in the local level district elections for the effects of winning parties does not seem to make any difference as seen in columns 4 to 6.<sup>27</sup>

Table 9: Voted for the district winner

|                                                | (1)<br>Average     | (2)<br>ln Average     | (3)<br>Inequality  | (4)<br>Average     | (5)<br>ln Average   | (6)<br>Inequality  |
|------------------------------------------------|--------------------|-----------------------|--------------------|--------------------|---------------------|--------------------|
| Tehsil voted for winning party in the district | -0.041<br>(0.068)  | -0.000012<br>(0.0080) | 0.030<br>(0.034)   | -0.039<br>(0.069)  | 0.00037<br>(0.0081) | 0.025<br>(0.034)   |
| BJP                                            |                    |                       |                    | -0.071<br>(0.25)   | 0.00050<br>(0.037)  | 0.017<br>(0.15)    |
| TDP                                            |                    |                       |                    | 0.21***<br>(0.077) | 0.0082<br>(0.0082)  | 0.031<br>(0.045)   |
| Other parties                                  |                    |                       |                    | 0.022<br>(0.13)    | -0.012<br>(0.017)   | -0.071<br>(0.077)  |
| <i>Constant</i>                                | 9.83***<br>(0.079) | 2.11***<br>(0.0067)   | 4.30***<br>(0.041) | 9.75***<br>(0.079) | 2.11***<br>(0.0074) | 4.29***<br>(0.040) |
| Observations                                   | 8464               | 8447                  | 8464               | 8412               | 8395                | 8412               |
| R-squared                                      | 0.74               | 0.71                  | 0.54               | 0.74               | 0.71                | 0.54               |

*Notes:* Robust standard errors clustered at the mandal level in parentheses. All regressions include mandal fixed effects and year fixed effects.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

## 6 Conclusion

In this paper, we have explored the link between the salience of party identity on economic outcomes in local-level elections. Our theoretical model shows that such effects are muted when

<sup>27</sup>In Appendix Table 4 we show similar results for voting in the district election at the Mandal level for the effects of the winner in the AC election.

parties predominantly care about winning votes, even when ideology is important for voters and parties alike. Our model also suggests that similar forces prevent alignment gains – across levels of government – from materializing.

We investigate this question using election data for mandals in Andhra Pradesh for the elections in 2001 and 2006. We consistently find that the effect of party identity on economic outcomes as proxied by nighttime lights is not statistically significant across various specifications. Also, alignment does not seem to matter for economic outcomes. Mandals which are aligned with the district level government enjoy no special economic bonuses. Taking stock, we conclude that ideology, although no doubt important, fails to make a mark on economic transfers in this context. These findings contribute to the ongoing discussions about when and how resources are distributed at different levels of government in India. However, they do not rule out the manifestation of ideological differences in spheres other than that concerning economic performance or in other contexts.

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## A Appendix Tables

Table 1: Alignment between party of the mandal-level president and the party of the Member of Legislative Assembly in power in the same area

|                     | (1)                | (2)                 | (3)                | (4)                | (5)                 | (6)                |
|---------------------|--------------------|---------------------|--------------------|--------------------|---------------------|--------------------|
|                     | Average            | ln Average          | Inequality         | Average            | ln Average          | Inequality         |
| Parties are aligned | -0.11**<br>(0.048) | -0.0077<br>(0.0069) | -0.0018<br>(0.027) | -0.068<br>(0.042)  | -0.0063<br>(0.0077) | 0.0051<br>(0.023)  |
| BJP                 |                    |                     |                    | -0.073<br>(0.24)   | -0.00074<br>(0.037) | 0.012<br>(0.15)    |
| TDP                 |                    |                     |                    | 0.19***<br>(0.073) | 0.0062<br>(0.0092)  | 0.030<br>(0.043)   |
| Other parties       |                    |                     |                    | 0.0099<br>(0.13)   | -0.013<br>(0.017)   | -0.069<br>(0.077)  |
| <i>Constant</i>     | 9.92***<br>(0.074) | 2.12***<br>(0.0056) | 4.32***<br>(0.038) | 9.83***<br>(0.069) | 2.12***<br>(0.0075) | 4.31***<br>(0.035) |
| Observations        | 8548               | 8531                | 8548               | 8548               | 8531                | 8548               |
| R-squared           | 0.74               | 0.71                | 0.54               | 0.74               | 0.71                | 0.54               |

*Notes:* Robust standard errors clustered at the mandal level in parentheses. All regressions include mandal fixed effects and year fixed effects.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 2: Pre-election strategic spending

|                                        | (1)                | (2)                 | (3)                |
|----------------------------------------|--------------------|---------------------|--------------------|
|                                        | Average            | ln Average          | Inequality         |
| BJP in power                           | -0.31<br>(0.19)    | -0.029<br>(0.019)   | -0.14<br>(0.15)    |
| TDP in power                           | 0.080<br>(0.065)   | 0.017<br>(0.012)    | 0.035<br>(0.039)   |
| Other parties in power                 | -0.14<br>(0.092)   | -0.035*<br>(0.019)  | -0.10*<br>(0.054)  |
| <i>Level in INC Tehsils (constant)</i> | 9.85***<br>(0.068) | 2.11***<br>(0.0044) | 4.31***<br>(0.034) |
| Observations                           | 8556               | 8539                | 8556               |
| R-squared                              | 0.74               | 0.71                | 0.54               |

*Notes:* Robust standard errors clustered at the mandal level in parentheses. All regressions include mandal fixed effects and year fixed effects.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 3: Trend in light over the years

|                        | (1)                 | (2)                  | (3)                 |
|------------------------|---------------------|----------------------|---------------------|
|                        | Average             | ln Average           | Inequality          |
| 2003                   | -0.17***<br>(0.022) | -0.16***<br>(0.013)  | 0.22***<br>(0.018)  |
| 2004                   | -0.80***<br>(0.021) | -0.21***<br>(0.0067) | -0.46***<br>(0.016) |
| 2005                   | -0.63***<br>(0.022) | -0.18***<br>(0.0077) | -0.32***<br>(0.019) |
| 2007                   | -0.31***<br>(0.022) | -0.10***<br>(0.0078) | -0.30***<br>(0.021) |
| 2008                   | 1.77***<br>(0.044)  | 0.29***<br>(0.0084)  | 0.38***<br>(0.029)  |
| 2009                   | 1.70***<br>(0.048)  | 0.29***<br>(0.0071)  | 0.61***<br>(0.030)  |
| 2010                   | 5.16***<br>(0.091)  | 0.73***<br>(0.0063)  | 1.60***<br>(0.050)  |
| <i>Constant (2002)</i> | 5.23***<br>(0.025)  | 1.41***<br>(0.0050)  | 2.77***<br>(0.017)  |
| Observations           | 8888                | 8871                 | 8888                |
| R-squared              | 0.73                | 0.71                 | 0.46                |

*Notes:* Robust standard errors clustered at the mandal level in parentheses.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 4: Voted for AC winner

|                                      | (1)                | (2)                  | (3)                | (4)                | (5)                 | (6)                |
|--------------------------------------|--------------------|----------------------|--------------------|--------------------|---------------------|--------------------|
|                                      | Average            | ln Average           | Inequality         | Average            | ln Average          | Inequality         |
| Tehsil voted for winning party in AC | -0.073<br>(0.047)  | -0.013**<br>(0.0065) | 0.0027<br>(0.028)  | -0.051<br>(0.045)  | -0.013*<br>(0.0067) | 0.010<br>(0.027)   |
| BJP                                  |                    |                      |                    | -0.056<br>(0.25)   | 0.0011<br>(0.037)   | 0.010<br>(0.15)    |
| TDP                                  |                    |                      |                    | 0.20***<br>(0.075) | 0.0058<br>(0.0085)  | 0.031<br>(0.044)   |
| Other parties                        |                    |                      |                    | 0.021<br>(0.13)    | -0.012<br>(0.017)   | -0.070<br>(0.077)  |
| <i>Constant</i>                      | 9.91***<br>(0.075) | 2.12***<br>(0.0058)  | 4.32***<br>(0.038) | 9.82***<br>(0.072) | 2.12***<br>(0.0070) | 4.31***<br>(0.036) |
| Observations                         | 8600               | 8583                 | 8600               | 8548               | 8531                | 8548               |
| R-squared                            | 0.74               | 0.71                 | 0.54               | 0.74               | 0.71                | 0.54               |

*Notes:* Robust standard errors clustered at the mandal level in parentheses. All regressions include mandal fixed effects and year fixed effects.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$