The Politics of Pork: Building Schools and Rewarding Voters in Tamil Nadu

Milan Vaishnav and Neelanjan Sircar*

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Abstract

For the past two decades, the framework of core and swing voters has been the analytical workhorse for the comparative literature on distributive politics. In this paper, we argue for a minimal definition of core and swing that only depends on margin of victory within the constituency. Such a definition allows us evaluate distributional patterns of pork as a function of electoral pressures. We demonstrate these insights using a unique dataset on the patterns of public school construction in the southern Indian state of Tamil Nadu from 1977-2007. Using multilevel modeling (MLM) statistical techniques with time-series data, we find that there is a spike in school building in the first two years of a new state government consistent with a pattern of "vote rewarding." Furthermore, while there is a general pattern of rewarding core voters, MLM techniques allow us to identify heterogeneous effects across elections. We find that ruling party state legislators target schools in "swing" constituencies when there are a disproportionately large number of close races in the state. Thus, while ruling party politicians might prefer to reward their most ardent supporters, they are constrained by electoral realities.

*Milan Vaishnav (mv2191@columbia.edu) and Neelanjan Sircar (ns2303@columbia.edu), Department of Political Science, Columbia University, New York, NY 10027. We would like to thank Jeremiah Trinidad for his assistance with the GIS mapping and Sandip Sukhtankar for providing us with the assembly constituency maps. We would also like to thank Sebastian Karcher, Maria Victoria Murillo, Phil Oldenburg, Virginia Oliveros, Matt Winters, and seminar participants at Columbia University for comments. All errors are our own.

1 Introduction

For the past twenty years, the debate over whether parties reward core or swing voters has shaped the comparative politics literature on distributive politics. Political parties wield enormous influence in settings in which clientelism, patronage, pork and other forms of particularlism thrive. The core-swing framework was developed to try and get a handle on what strategies parties use when it comes to the task of wielding particularism in an effort to woo electoral support. This body of work has provided two distinct explanations for how politicians direct rewards to politically salient constituencies. Some argue that politicians will prioritize redistribution to their "core" base of supporters rather than fickle swing voters (Cox and McCubbins, 1986). In contrast, other scholars find that resources will be targeted towards "swing" or "pivotal" voters (Lindbeck and Weibull (1987); Dixit and Londregan (1996)).

The goal of this paper is to explain variations in core and swing outcomes over time, and like most other papers on the subject, we work in a two party context. We use a minimal definition where we define core and swing districts in terms of the margin of victory for the ruling coalition over the opposition, which is consistent with much of the empirical literature on the subject. Furthermore, we believe that those theorists that aim to investigate "thicker" definitions of swing and core (e.g. distance from party cutpoints, efficiency in distribution networks, or stable pools of votes) must address the confounding effects of our simpler electoral logic. We also believe that our analysis over time helps fill a gap in the literature. In particular, it may be incorrect to assume a single "true" pattern of targeting, as parties may target core or swing voters based upon electoral realities. By analyzing this pattern over time in one place, we are able to hone in on the effect of electoral competitiveness on core-swing targeting.

In our analysis, we refer to those areas that vote for the ruling party with large margins in the most recent election as "core" constituencies and those where the vote differential is quite small as "swing" constituencies. In order to explicate our theory, we will make three assumptions. First, we assume that the ruling party benefits from being in office and cares about future electoral prospects and prefers to win as comfortably as possible. Second, we assume that voters want to hold the ruling party accountable, and will vote against the party in the future period(s) for poor performance. A third assumption is that voters do not have the ability to coordinate their behavior either across or within districts.[1] Our paper focuses on the distribution of locally non-excludable goods, which include most public works such as roads, hospitals, and schools. Whereas a direct payout can be targeted towards a voter, a locally non-exludable good (often referred to as a club good) can only be targeted towards an area which will consist of voters that did and did not vote for the ruling party. Under these circumstances, we hypothesize that the ruling party, when possible, aims to reward the greatest number of party supporters by targeting core districts. However, in times of close electoral competition, we hypothesize that the party must target swing districts in order to win the election.

In order to understand our framework, consider two ideal-types of voters, the swing constituency supporter and the core constituency supporter, over multiple electoral cycles. The ruling party always prefers to reward its own supporters over those of the opposition and thus awards schools to constituencies with the highest margin of victory. This incentivizes voters to cast ballots even in constituencies where the election is not competitive, especially in party strongholds. In an election where the swing districts are not pivotal, the ruling party can freely target its core district supporters by awarding schools to core districts. However, in an election where swing districts are pivotal, core supporters cannot credibly demand goods because they will receive nothing if the opposing party wins. Thus, the ruling party targets swing supporters to maximize the probability of winning the election. Under this logic both types of voters have an incentive to vote sincerely.[2] Voters can force parties to deliver on their promises through a standard

[1] This is a standard feature of many voting models and fairly reasonable in this developing world context.

[2] The logic for sincere voting is identical to logic generally used in the probabilistic voting literature. In a non-competitive election, a swing constituency supporter cannot affect her probability of receiving a school in the current period or in the future by strategically voting for the opposing party. Similarly, in a competitive election, a core constituency supporter cannot affect her probability of receiving a school by strategically voting for the opposition (since voters within constituency cannot coordinate voting).

accountability mechanism, where voters threaten not vote for the party in the future if it does not deliver (i.e. voters play a trigger strategy).

To empirically demonstrate our insights, we analyze patterns of public school construction in the southern Indian state of Tamil Nadu as a function of the margin of victory within assembly constituencies (ACs). As we will show below, Tamil Nadu has very high rates of party alternation and a political business cycle where schools are built within two years of a new government. We are able to take advantage of both the timing of targeting and the alternation to build confidence in the hypothesized mechanism. In particular, alternation allows us dismiss concerns of reverse causality since it is unlikely that school building from one party would have a positive effect on the margin of victory for the opposing party. Since new governments tend to build schools within two years of taking office as opposed to before elections, school building seems to be a response to the previous election rather than a tool to affect future electoral outcomes. Furthermore, we examine the influence that powerful state legislators, or Members of the Legislative Assembly (MLAs), as well as the leadership of the ruling party have on the placement of new schools. Access to public education is a valued commodity in India, especially in Tamil Nadu–which is known for a socio-cultural emphasis on human capital accumulation. Politicians also prize public education because the construction of new schools is a valuable opportunity to engage in "pork barreling." We compile a unique dataset that combines information on public education with electoral data to study patterns of school construction from 1977-2007. Because administrative and political boundaries are not a perfect match, we use GIS mapping to link legislative constituencies to administrative sub-district units.

To estimate our model, we marry multilevel modeling (MLM) statistical techniques with time series cross-section (TSCS) data. Multilevel modeling allows us to vary the slopes on our coefficients of interest so that we are not forced to assume one "true" relationship between our variables of interest and the outcome variable. Because our coefficients are allowed to vary over time and space, we are able to easily identify heterogeneous effects in our data. Overall, we find that there is no one "true" pattern of targeting consistent over time and space. While there is a general pattern of rewarding core constituencies, this effect varies by election. We find that ruling party MLAs target schools to more "swing" constituencies when there are a disproportionately large number of close races in the state. Thus, while ruling party politicians in Tamil Nadu might prefer to reward their most ardent supporters, they are constrained by electoral realities.

Our findings provide strong support for three new insights into the study of pork. First, we find strong support for the effects of the electoral context on core-swing outcomes. Second, political competition has multiple dimensions. We show that even if the overall balance of seats is lopsided, electoral dynamics within constituencies can shape party preferences. Finally, our findings support explicitly modeling the hierarchical nature of electoral data, for not doing so–as is evident from our data–could lead to inaccurate inferences.

2 Theory

In most countries at most times, political parties play an influential role in allocating some portion of goods, private and public, in a way that maximizes their future electoral prospects. This influence may be explicit or implicit, but it is a truism that the use of political criteria for targeting scarce goods is a feature of most political systems in which elections play a pivotal role. The debate in comparative politics is usually not over whether such targeting exists, but the manner in which targeting is calibrated.

In the comparative literature on distributive politics, there have been two, opposing models put forward to explain the nature of such targeting. Both models begin with the premise that there are two parties

To see why the assumption of no coordination is necessary, suppose there is a competitive election. Members of a core constituency could coordinate their votes so that 50% vote for one party and 50% vote for the other party. In a non-competitive election, voters could coordinate to vote for the winning party.

competing in an election and each promises to deliver certain goods to various groups in exchange for votes. In these studies, there is an affinity between the party and a base of supporters; these are "core" voters. On the opposite end of the spectrum, there are "opposition" voters who are firmly in the camp of the opponent. It is assumed that this faction's support is out of reach for the other party, and thus, it is not worth attempting to wrest their votes away from their preferred party. The third relevant group, which sits in between these two extremes, are the "swing" voters. Swing voters are up for grabs and will vote for the party they believe will benefit them the most.

While the two models share the same broad set of underlying assumptions, they diverge in their theoretical predictions of targeting distributive goods. One set of studies predicts that politicians will prioritize redistribution to their core base of supporters (Cox and McCubbins, 1986). Proponents of this view believe that parties will reward their most ardent supporters–those who share its ideological inclinations and/or those who believe it will be a credible and effective agent in distributing goods. These models suggest some faithful base of core supporters, where parties can allocate to their core more efficiently through local networks. Ansolabehere and Snyder (2003) discuss theories that are more consistent with our electoral logic. In particular, parties may allocate to areas with greatest support simply because they prefer to target their own supporters or because they attempt to mobilize voters in areas of strongest support.

Another group of studies argues that resources will be targeted towards "swing" or "pivotal" districts (Lindbeck and Weibull (1987); Dixit and Londregan (1996)). Proponents of the "swing" voter bias argue that parties need not waste precious resources on rewarding core supporters who (it is assumed) will vote for them anyway due to an underlying ideological motivation. Rather, parties will narrow their sights on those "swing" voters who can make or break an election, although Dixit and Londregan (1996) argue that this effect might be mitigated somewhat by the so-called "leaky bucket."[3] On the other hand, the weakness of the "swing" thesis is that a party that consistently favors swing over core voters faces the prospect of alienating the party faithful.

The empirical evidence regarding "core-swing" is inconclusive. Some studies find support for the "swing" hypothesis (Stein and Bickers (1994); Dahlberg and Johansson (2002); Denemark (2000); Stokes (2005)), while others report findings supportive of the "core" model (Ansolabehere and Snyder (2003); Chen (2008)).[4]

Our theory analyzes the actions of the ruling party over multiple elections (i.e. the party the plays a repeated game). The party wants to maximize vote share and the probability of winning future elections, so it always attempts to incentivize voters by awarding schools to districts with the largest margin of victory, thereby adding value for a marginal vote for the party (consistent with the turnout hypothesis above). Furthermore, parties have a preference for rewarding as many supporters as possible. In an election where the swing districts are not pivotal, the ruling party can freely target its core district supporters by awarding schools to core districts. However, in an election where swing districts are pivotal, we are back to the logic of the Dixit-Londregan model. Core supporters cannot credibly demand goods because they will receive nothing if the opposing party wins; thus, the ruling party targets swing supporters to maximize the probability of winning. Since the ruling party targets benefits ex post in our context, we might believe it has an incentive to shirk its responsibility. However, supporters can hold the ruling party accountable after the first election by threatening to not vote for the party in future elections. Since the ruling party cares about the probability of winning future elections, it complies with targeting responsibilities.

[3]The "leaky bucket" phenomenon refers to the idea that parties may have less control over delivery mechanisms in swing areas, so, holding all else even, they can more efficiently target voters in core areas as opposed to swing areas.

[4]A number of related studies find support for a modified version of the core voter hypothesis. See Golden and Picci (2008), and Miguel and Zaidi (2003).

2.1 Developing the Theory

We conceive of the ruling party as presiding over a fixed budget which can be distributed locally either through public or private goods. Both types of goods can be discretional, but they have fundamentally different characteristics. Private goods are handouts, food subsidies, or other narrowly targeted benefits. As Diaz-Cayeros, Estevez and Magaloni (2009) argue, private goods are excludable and reversible. Public goods–like schools, roads, or health clinics–are neither excludable nor reversible. If the government builds a public school, it represents a relatively fixed investment that both supporters and opponents can benefit from. In this paper, we treat "public goods" as synonymous with "pork."[5]

First, parties have an incentive to deliver pork after, not before, elections. Without effective monitoring, it is not clear why parties would ever choose give public (club) goods prior to an election. Defection is a serious concern because if voters can secure the good ahead of time, they are free to vote their preferences in the voting booth due to the secret ballot. Stokes (2005) argues that parties can circumvent the issue of the secret ballot if they can sufficiently penetrate voters' social networks. She provides evidence of this from the Peronist party in Argentina. In her model, parties favor swing voters in the distribution of particularistic benefits. Nichter (2008) argues, contra Stokes, that parties may engage in "turnout buying" rather than "vote buying." This provides an alternative solution to the problem of monitoring and the secret ballot. Re-analyzing Stokes' data from Argentina, Nichter finds that the Peronist party invested in passive or unmobilized "core" constituencies rather than swing voters with the goal of increasing voter turnout. Both Stokes and Nichter focus on private handouts rather than club goods or pork projects. As we argue, and following Diaz-Cayeros, Estevez and Magaloni (2009), public infrastructure is qualitatively different from private goods. Some intrinsic characteristics (i.e. lack of reversibility or excludability) of club goods render them blunt instruments for attracting or mobilizing voters, implying that we are likely to see new investments made post-election.

As a result, the awarding of pork before the election may not significantly sway the electorate. Now consider a scenario in which the party promises to deliver a good if voters support that party in the election. Why might a party not shirk its responsibility? A ruling party's failure to deliver on its pork barrel promises might decrease future support for the party due to a loss of credibility. The insight for this logic comes from the logic of repeated games. While the party may prefer to shirk, the voters can enforce service delivery from the party by playing a trigger strategy, punishing the ruling party (perhaps for a long time) for failing to deliver . Many regions of India, including, as we will discuss, Tamil Nadu, are known to have strong anti-incumbency biases (see, for instance, Linden (2004)). Whereas a failure to deliver will likely turn away future voters, sticking to its promises at least gives the party a fighting chance. Thus, while the conventional wisdom in a volatile political setting might be for parties to pursue a strategy of defection, in this context we describe defection may not be optimal. This provides some intuition for the statement by Kapur and Mukhopadhyay (2007) that while patronage might seem moot in a country like India with anti-incumbency bias (i.e. why focus on pork if you are going to lose anyway?), it could be argued that jockeying for pork is still an equilibrium outcome in a context of increasing competition.

Second, public works (one of the most common manifestations of pork) cannot be built overnight. Even when the ruling party controls the distribution of pork, there is a process of approvals, site determination, contracting and construction that takes time. Thus, it may not be feasible for politicians to influence construction prior to an election because of the investments that are required. They may speed up school construction already in the works or inaugurate new sites, but the completion of new construction is more difficult. Rather, it makes some intuitive sense that we would see an increase in construction following elections. This also coincides with the fact that most new social programs are announced shortly after elections when a new government seeks to convey the sense that it is "delivering" for its citizens. In a context of anti-incumbency, what lingering effect do outgoing governments (elected out of office) have on

[5]Of course, there are conditions under which schools or clinics can be excludable. For this reason, it is perhaps best to classify them as "club goods." Public works can also be reversible if one thinks of investments that are created in time t but not maintained, staffed or serviced in time t+1.

overall targeting patterns if school construction is started–but not finished–under their aegis? We believe very little; new governments have very little incentive to follow through on the promises of the previous government and prefer to execute their own schemes, and it seems unlikely that pre-electoral promises would actually increase support for the opposition party! This gives us confidence that the post-election construction of schools is largely initiated by the new government.

The third and final implication is that the targeting calculus of parties is contingent on overall levels of political competition in the state. Here, it is important to distinguish between two dimensions of competition. While the overall distribution of seats in the assembly might indicate a landslide, parties must also take into account the level of competition within constituencies across the state. In equilibrium, the ruling party is likely to prefer directing pork to those areas which supported it in overwhelming numbers. When there is a high degree of competition and elections are close, MLAs are likely to make even more promises in marginal constituencies that could swing either way. This follows from the standard logic of political competition: in swing constituencies where the margin of victory is slim, politicians must make desperate promises to sweeten the pot. Wilkinson (2006), for instance, argues that competition and volatility have an unambiguous effect on the number of "pork" promises that are made during election season. Swing constituencies are fickle and pork represents a low-cost (yet high-risk) investment in potential voters who may swing against you–and with your opposition–in the next election. In this regard, public goods simultaneously represent a commitment problem as well as a unique opportunity to reach a wider pool of voters than targeted transfers. Furthermore, private transfers also imply a working baseline of networks, information, and relationships that are less likely to exist in swing areas.

When the bulk of victories in favor of the ruling party come from decisive constituencies, parties respond by rewarding their core voters. But when there is a large fraction of closely won constituencies, parties must be careful not to alienate these swing areas by depriving them of rewards. The idea is that if enough (for example, 50 percent) of all constituencies are electorally competitive, parties are compelled to be responsive to swing voters. However, if the party has secured is a comfortable victory in more than half of the constituencies, parties have the latitude to focus on rewarding the largest number of party voters possible (given other constraints). This also encourages voters to come out and support the winning party, as marginal increases in support for the incoming party mean greater opportunities for pork. The mechanism can be cleanly described as follows. There are two types of voters for the ruling party, supporters in swing constituencies and supporters in core constituencies. After the election, if more 50% of the constituencies are seen to be core constituencies, then swing constituencies were not pivotal the outcome of the elections and pork is delivered to core constituencies. Supporters in core constituencies can hold the ruling party accountable by requiring delivery of pork, or voting against the party in future elections (notice that no coordination mechanism across voters is necessary here). It follows that supporters in swing constituencies will not receive pork, with or without threat of not voting for the party in the future, so swing constituency supporters just vote sincerely. If on the other hand, most of the constituencies are seen to be swing constituencies, then the ruling party must target at least some pork towards swing constituency supporters. Furthermore, as in the Dixit-Londregan model, parties must focus much more attention to the swing constituencies to guard against the competitive pressures coming from the opposing party, leading to a greater swing effect. Although this paper is an empirical investigation, we believe this logic can be readily modeled formally.

2.2 The ruling party rules

Access to pork barrel resources rests with the ruling party and it is crucial to understand the nexus between MLAs and the party leadership and its role in the delivery of pork. That is, an individual legislator's ability to deliver on his promises of pork pivot on his party's success in coming to power (or joining the coalition in power). Party leaders are subject to countless demands on the part of legislators (not to mention national-level legislators and other political bigwigs) to provide jobs to cronies, transfer troublesome bureaucrats, or provide funds for infrastructure projects in their constituencies. While state

legislators themselves might have resources and channels through which to achieve some of these aims, we believe that much of this power is a function of ties to the party leadership in the state capital. Thus, we view parties as strategic actors who are cognizant of the larger political landscape in the state when making distributive decisions.

We assume throughout that India is what Chandra (2004) calls a "patronage democracy." Because patronage is the currency of Indian politics, state-level politicians face incentives to accumulate projects in their constituencies since projects can be exchanged for votes. As Wilkinson (2006) writes, "politicians, well aware of the direct link between delivering goods and getting votes, make sure that they control as many infrastructure and social programs as possible." MLAs are consumed not by their representative or legislative functions, but by their role as reliable intermediary. The subject of this paper is community public works projects, specifically public primary schools. A government can build schools at any time during its tenure, yet the literature on patronage politics (in India and elsewhere) offers evidence that many new public works projects are contingent on voter behavior. According to the standard narrative, MLAs typically campaign on promises of bringing development to their constituency in exchange for being voted into office. For instance, the study by Puri (1978) of the Rajasthan assembly shows that assurances regarding new local development works were among the most popular pledges made by candidates prior to the election. When asked "what the voters expected them to do," most MLAs indicated that voters desired new public works projects. Wilkinson (2006) also describes the incentives for MLAs to make promises of new infrastructure during the campaign (or to even authorize initial construction) with the implicit understanding that they will deliver on such promises only if voters uphold their half of the bargain. [6] As Bailey (1963, p. 25) writes:

> "[Their] MLA is not the representative of a party with a policy which commends itself to them, not even a representative who will watch over their interests when policies are being framed, but rather a man who will intervene in the implementation of policy, and in the ordinary day-to-day administration. He is there to divert the benefits in the direction of his constituents."

When it comes to large infrastructure initiatives, the role of the ruling party–particularly party leaders in the state capital–is central to understanding the distribution of pork. Most education and other large public goods initiatives emerge from centrally sponsored schemes and projects (and are often bolstered by state-level matching funds or complementary programs) where the states have broad discretionary authority. For example, this is the framework for India's most recent flagship primary education program, Sarva Shiksha Abhiyan (SSA). The implementation of these plans is done at the state level with state-level line departments playing a key role in decision-making. The heads of these agencies are typically members of the state legislative assembly who administer cabinet portfolios. This reality underscores the importance of co-partisanship and party hierarchy in understanding the allocation of pork. MLAs affiliated with the ruling party (coalition) have significant advantages in accessing and manipulating state resources for both public and private goods.[7] The value of co-partisanship, combined with party hierarchy, has also been shown to be influential in other contexts studied by political scientists, such as the allocation of intergovernmental grants in the United States (see Ansolabehere and Snyder (2003)).

One might argue that the picture presented here overlooks the importance of decentralization and local government. We believe that state-local government interaction is important, not because of the strength of panchayats but due to cycles of dependency. As Singh et al. (2003) document in their study of local development in the state of Madhya Pradesh, because elected panchayat (local government) members do

[6] Both voters and MLAs themselves view the role of a state legislator as an intervener or fixer in the process of policy administration and implementation. There are numerous historical case studies of India's state assemblies which support this conception. These include: Chopra (1996); Forrester (1969); Jha (1977); and Puri (1978), among others.

[7] Numerous anecdotes from the literature can be cited in support of this claim. For example, Jayalakshmi et al. (N.d., p. 76) discuss health sector reform in Andhra Pradesh when the state was ruled by the Telugu Desam Party (TDP). Describing a local project, the authors write: "The area is a TDP stronghold, and because the TDP MLA from this area was denied a Cabinet post, he was in compensation given powers over a number of services in the area âĂŞ including the decision about where to locate the PHC [Primary Health Centre], which was placed in his home constituency, where a friend, an ex-sarpanch [village headman], donated land for the construction of the PHC.

not have significant resources or autonomy, their election frequently pivots on whether they can promise close ties to higher ups along the political hierarchy in the state. The interdependence between tiers of government means that the politicization of public goods not only brings direct rewards to MLAs but also has numerous positive externalities: namely, the consolidation of patronage networks and cycles of dependence. Indeed, Yadav (2008) argues that the principal function of the panchayat raj institutions is to supply a cadre of lower-level functionaries (or "brokers") to political parties operating at the state and national levels.

2.3 The object: school construction in India

In this paper we examine pork barrel dynamics by studying patterns of school construction. We think a focus on schools makes sense for several reasons.

First, the Indian system of public education is underdeveloped. Universal access to public primary education has not yet been achieved, and so public schools represent a scarce resource. The historical expansion of services has been uneven, with strong evidence that lower castes, minorities, and areas with feudal histories have been underserved (Betancourt and Gleason (2000); Banerjee and Iyer (2005); Banerjee and Somanathan (2007)). And it is widely accepted that the influence of politics in public education is pervasive. Politics influences the hiring of teachers (Chin, 2005); the governance of education (Kingdon and Muzammil 2000); and the location of investments (Wilkinson, 2007).

Thus, access to, and the placement of, public schools is an issue that retains popular salience. This has been particularly true in Tamil Nadu, where social movements have historically coalesced around the idea of improving human capital for the general populace. Singh (2007) has argued that generations of Tamils have rallied around a common subnationalist "Tamil" identity to promote human development and progressive social policies.

Second, the central and state governments of India are devoting record sums to expanding the system of primary and secondary education. Banerji and Mukherjee (2008) report that since 2001-02 alone, the Indian government's flagship primary education program has financed the construction of nearly 160,000 new primary and upper-primary public schools across India. With increasing budgetary outlays comes expanded opportunity for political interference.

Third, public education is a responsibility of India's states where regional politicians retain discretionary authority. According to India's constitutional framework, states exercise primary responsibility for a range of core governmental functions including: law and order, public health, education, agriculture, irrigation, some forms of taxation, and land rights (Rao and Singh, 2005, p. 364). Furthermore, India's system of fiscal federalism is highly vertically unbalanced. While states incur almost 90% of social service expenditures, the central government finances roughly 55% of the states' overall spending (McCarten, 2003, pp. 250-251). Once federal monies are transferred to the states, regional authorities have considerable discretion in deciding where and how to make use of the monies.

One reason pork projects are so attractive to politicians is that they are highly visible; clearly, investments in community infrastructure such as school building possess this central benefit of visibility vis-à-vis local constituents (Mani and Mukand, 2007). With visibility comes an opportunity for credit claimingâ with the corresponding news coverage, groundbreaking, opening ceremonies, and local prestige. As Bailey (1963) recognized, where building a school is involved, two groups stand to benefit: local citizens and political cronies. The desire for an MLA to use infrastructure contracts to enrich his friends, local contractors, and suppliers coincides with his interest to influence the location of projects.[8]

[8] As Wilkinson (2006, p. 5) argues, the corruption in infrastructure projects often has political roots. "Capital infrastructure projects which can generate kickbacks are one of the main means through which incumbent politicians and parties can raise money and pay off party supporters."

3 The politics of Tamil Nadu

Tamil Nadu is a state of over 70 million people located on the southernmost peninsula of the Indian subcontinent, occupying a land area of roughly 130,000 square kilometers.[9] It is densely populated (at roughly 480 people per square kilometer, as opposed to the all-India average of 325) and nearly 44 percent of the state population lives in urban areas. Although it may seem odd to base an analysis around a single Indian state, there are several reasons it makes sense to treat our analysis on par with country-level studies. First, taken by itself, Tamil Nadu would be one of the twenty most populous countries in the world. Second, the borders of Indian states are based upon linguistic integrity. As such, Tamilians have a unique history and culture to themselves. Furthermore, the linguistic basis for statehood implies that the vast majority of Tamilians cannot communicate with the rest of India in their mother tongue, which is different than the component states of the US or even the majority of countries in Latin America. Third, as we will discuss, political parties are a function of state-specific concerns, so the two major parties are uniquely Tamilian parties. In fact a number of Indian states display competitive state-specific parties. This is quite different than the US where the same two parties are competitive in each state, or even Europe, where politics is often played on a similar left-right economic dimension.

Tamil Nadu is a unique case. On the one hand, it represents the epitome of India's modernizing trend. Tamil Nadu is the most urbanized state in India; its economic and human development surpass the national average; it represents a growing hotbed of technological and industrial activity; and, due to its unique history and demographics, it has not fallen prey to the ethnic and caste divisions that have served to stunt development in its northern Indian counterparts (Jaffrelot, 2003).[10]

This is not to suggest that divisive politics is nowhere to be found in the post-Independence era. To the contrary, as Harriss (2002) argues, one of the cardinal facts about the politics of Tamil Nadu is that the once-dominant Congress Party lost power in the state in 1967 and subsequently never regained it. The immediate successor to Congress was the DMK (Dravida Munnetra Kazhagam), a party borne from the regional Tamil social justice movement, led by C.N. Annadurai. Annadurai enjoyed a cult-like devotion among his followers, but his death in 1969 helped to precipitate a power struggle within the party. In 1972, breakaway leader (and former film star) M.G. Ramachandran (MGR) formed his own party, the Anna Dravida Munnetra Kazhagam (ADMK) on "the basis of his fan-club network" (Widlund, 2000, p. 77).

There are four reasons why Tamil Nadu make an interesting empirical case for our study: 1) regular bipolar competition; 2) persistent electoral volatility; 3) ideologically devoid politics; and 4) partisan populism.

3.1 Bipolar competition

For over three decades Tamil politics has revolved around fierce bipolar competition between two coalitions led by opposing the regional Dravidian partiesâ the DMK and ADMK (later renamed AIADMK). Since 1967, one of the two fronts has governed the state and monopolized access to patronage. The DMK front prevailed in the elections of 1967, 1971, 1989, 1996, and 2006; and the AIADMK alliance won in 1977, 1980, 1984, 1991, and 2001. After its initial defeat in 1967, the Congress Party played the role of important coalition partner in the 1970s and 1980s. Since the 1990s, its relevance has seriously declined–having been replaced by numerous, smaller parties (Wyatt, 2002).[11] For the purpose of this analysis, this oscillation be-

[9] According to the CIA World Factbook, its land mass is roughly equal to that of Nicaragua or Greece.

[10] The extent of religious and caste conflict in Tamil Nadu is a hotly contested issue. See Subramanian (2002) and Harriss (2002) for two views. Although even Harriss (2002) acknowledges that, "During the heyday of the Dravidian parties, political allegiances in Tamil Nadu were not strictly defined by social divisions. Though each party identified itself with a broad social category the populist styles of the DMK and the AIADMK meant that they were also catch-all parties."

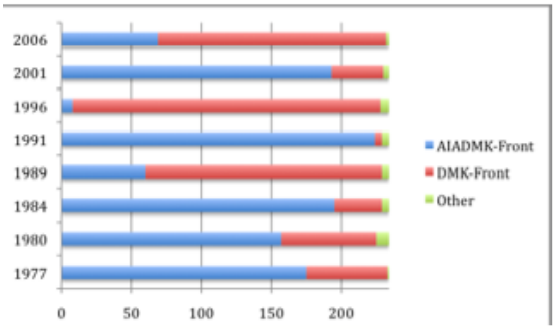
[11] Ananth (2006, pp. 1232-1233) argues that there have been four stages of post-Independence politics in Tamil Nadu. From Independence in 1947 to 1967, Congress was the dominant power. The second stage began with DMK's watershed upset victory in 1967, persisting until the onset of the Emergency in 1975. This was followed by the "MGR stage" from 1977-1987 and the consolidation

tween the two Dravidian fronts provides us with sufficient alteration in power to test for targeting effects across both parties and a range of governments, as well as isolate the effects of margin of victory on the construction of schools.

3.2 Electoral volatility and uncertainty

The two-front competition in Tamil Nadu has been marked by schizophrenic volatility. Figure 1 displays the results of every state election since 1977, by alliance affiliation (DMK vs. AIADMK). The dramatic swings from one party to another are staggering; when one front wins, it wins in a landslide. The pendulum-like dynamic of Tamil Nadu's politics allows us to identify firm breaks in the control of the state apparatus, clearly delineating who controls access to state resources.

Figure 1: Distribution of Seats by Political Party



3.3 Cult of personality and absence of ideology

Another main feature of the two main parties is the dominance of charismatic leaders, which has led to a triumph of pragmatism over ideology. Since their inception each party has been directed by a omnipresent larger than life cult figure: for decades the DMK has been fronted by octogenarian (and former screenwriter) M. Karunanidhi while AIADMK has been led by chief rival and former film star (and MGR protégé) Jayalalitha. The fact that many of Tamil Nadu's past and present political leaders emerged from South Indian cinema plays no small role in perpetuating "cult"-like dynamics (see Dickey 1993 for a review). "Personality cult" dynamics have helped to chip away at ideological divides in state politics, allowing us to discount differences in attitudes toward education and its use as pork barrel.

The presence of such charismatic figures atop the party hierarchies has also contributed to a centralization of power. Widlund (2000, p. 122) argues that both Karunanidhi and Jayalalitha are intimately involved in all crucial aspects of party decision-making, from selecting candidates to choosing ministers and deciding which MLA demands are fulfilled. When in power, ruling party MLAs draw their power from their relative proximity to ministers. She writes that "the perceived necessity to get in the leader's good books was...a product of her [Jayalalitha's] powers with regard to electoral tickets and party posts".

Although there has been a proliferation of smaller parties in recent years, the survival of any minor party depends on an affiliation with one or the other of the two main parties. Which party seems scarcely to matter; parties switch alliances almost every election. As Prasad (2004) writes, "elections [in Tamil Nadu]

of a two-and-a-half party system (AIADMK versus DMK, with Congress as an important alliance partner). The final stage, which began in 1998 and continues to the present, is marked by an increasing fragmentation of party politics, the rise of smaller caste-based parties, and the enervation of the two main Dravidan parties.

have become the arena to settle scores and win individual loyalty. Leaders have been willing to admit that ideology and principles take a back seat and there is an 'open door' policy relating to alliances." Figure 2 lists some of the most prominent coalition partners for each alliance since 1977. As one can see, there is very little consistency over time. As one author puts it, "[Jayalalitha's] favorite maxim–that in politics there are no permanent enemies or permanent friends, only permanent interests–is the accepted maxim for all" (Ibid.).

Figure 2: Alliances in Tamil Nadu 1977-2007

	1977	*1980*	*1984*	*1989*	*1991*	*1996*	*2001*	*2006*
CPI	INC	AIADMK	DMK	AIADMK	DMK	DMK	AIADMK	DMK
CPM	AIADMK	AIADMK	DMK	DMK	DMK	-	AIADMK	DMK
INC	INC	DMK	AIADMK	AIADMK	AIADMK	AIADMK	AIADMK	DMK
JNP/BJP	DMK	AIADMK	DMK	DMK	DMK	-	DMK	AIADMK
PMK					-	AIADMK	AIADMK	DMK
TMC(M)						DMK	AIADMK	

3.4 Partisan populism

Tamil Nadu's electoral dynamics have contributed to a perpetuation of competitive populism. Partisan politics colors all aspects of a MLA's duties and the two dueling fronts have made no secret of viewing development resources through an electoral-political lens. Resting primarily on the informal mechanisms described above, the ruling party has wide latitude to tap state coffers to allocate pork on political grounds. The ethnographic study of the Dravidian parties in Widlund (2000, p. 268) demonstrates how integral politics is to allocating state benefits: "Nobody would admit to being systematically biased in any respect, especially not in favoring people from his or her own party. The general understanding is, however, that most public representatives are biased precisely in this respect." The centrality (some observers of Tamil politics have called it an obsession) of partisan labels is useful insofar as it supports our contention that partisan politics is a critical determinant of targeting.[12]

4 Data, model specifications, and empirical results

4.1 Data

We utilize two datasets–one on schools and the other on electoral politics–in this paper, integrating them using GIS techniques. For education, we rely on a unique dataset compiled by the District Information System for Education initiative of the National University of Educational Planning and Administration. This initiative collects comprehensive school-level data on facilities, school grants, infrastructural quality, enrollment, and education outcomes–in an effort to assess (through a "school report card") India's 1.25 million primary and upper primary schools across all districts. Two unique features of this data stand out. One is that the data contain information on the year of school construction, which allows us to examine patterns of school building over time and space. Secondly, each school is coded by the block (sub-district), district, and state of its location.

Courtesy of the Election Commission of India, we compile assembly constituency-level electoral data for Tamil Nadu over the period 1977-2007. We focus on this period because boundaries of assembly

[12] A recent editorial published in the lead up to the 2009 national elections issued a damning indictment of partisan politics in Tamil Nadu: "The political discourse during campaigning has centred not so much on the performance of the ruling/oppositional parties as on the ability of the two main parties (and others) to use their money power and patronage networks...Even issues of development...are debated through personalised vitriolic attacks" (*Shifting Allegiances*, 2009).

constituencies (ACs) are held constant during these thirty years, allowing us to track trends over time across consistent units. Our election data contain information on candidates, turnout, votes polled, party identification, sex, and the caste reservation of constituencies.

In India, the primary administrative unit of analysis within states is the district (analogous to counties in the United States). Unfortunately, political constituencies do not map perfectly to districts. Thus, there is no easy way to merge administrative data on public goods with electoral data. Scholars have previously dealt with this mismatch in two ways, both less than ideal. Some scholars focus on national parliamentary constituencies (PCs), which can be roughly mapped to districts (Banerjee and Somanathan, 2007). While focusing on is computationally convenient, it is not self-evident that Members of Parliament (MPs) are the right actors to analyze if one is interested in local-level dynamics. The second course pursued is to exploit the fact that ACs are neatly nested within PCs, and thus can be linked to districts. Cole (2009) and Ravishankar (2007) follow this path. The problem is that the median district consists of 9 ACs, so one has to take crude averages across constituencies in order to map political variables to district-level administrative data.

This paper improves on extant approaches by using GIS software to map political boundaries to administrative ones. Yet rather than focusing at the district-level, we look one layer below at the sub-district or block-level.[13] Blocks are smaller units of aggregation and thus easier to compare with assembly constituenciesâĂŤproviding for more accurate inferences. Furthermore, our data on schools can be aggregated easily up to the block. While not perfect, there is a significant degree of nesting between block and AC boundaries in Tamil Nadu. We rely on electronic block-level maps created by the Tamil Nadu unit of the National Informatics Centre (http://www.tnmaps.tn.nic.in) and use ArcGIS to overlay them with AC maps.[14]

There are 385 administrative blocks and 234 assembly constituencies. We were successfully able to implement the mapping routine for 210 constituencies. Many of the large urban centers of Tamil Nadu have relatively small constituencies for which we require more detailed city-level maps. Thus we omit the urban centers of Chennai, Coimbatore, Madurai, and Tiruchirapalli (Trichy). The result is a constituency-level panel dataset with information on elections and school building from 1977-2007.

4.2 Framing the Empirical Question

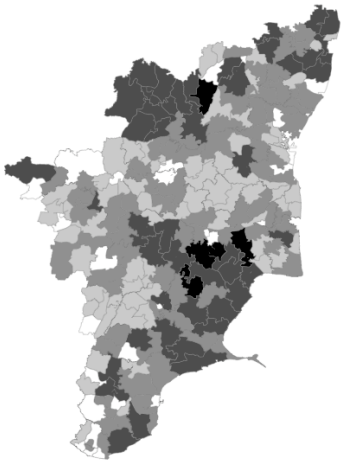
We may divide electoral competition along two dimensions. In the first dimension, we may think about the percentage of constituencies won by a particular coalition, which is the dimension discussed in section 4.2. However, we may also frame electoral competition in terms of the level of competitiveness at the constituency level. For instance, in a particular election the AIADMK may win every constituency, but they may win each seat with a small margin of victory (henceforth, MoV). In this case, the election is not competitive along the first dimension but is competitive along the second dimension. We are convinced that the second dimension, competition at the constituency level, is crucial for understanding the core-swing behavior of political parties in Tamil Nadu. Below, we have plotted MoVs for the winning coalition in each election, starting from 1977. As a crude measure, we have defined a swing constituency (the dark bars in the histograms below) as any constituency where the MoV is less than 10%.

Figure 4 exhibits a large degree of variation across constituency-level competitiveness, with a high of 66% swing constituencies for the government starting in 2006, and a low of just 3% swing constituencies for

[13]While there are a multitude of sub-district administrative entities, I utilize data on entities known as "blocks." Each district is comprised of a number of blocks, which are the sub-district structures used to manage development schemes. They differ from "taluks," another larger sub-district entity, which primarily deal with revenue issues. The boundaries of the two sub-district entities bear no systematic relation.

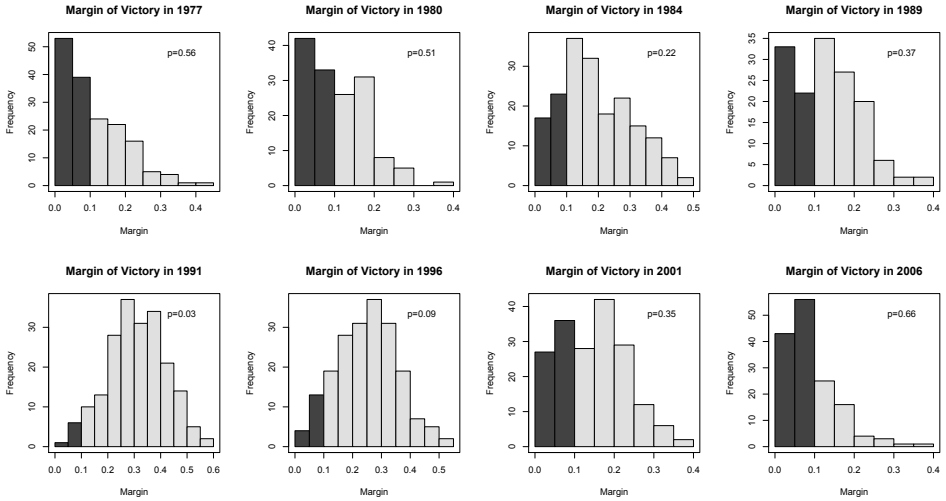
[14]We gratefully acknowledge Sandip Sukhtankar of Harvard for making these maps available. Although the Election Commission provides GIS maps of constituencies, they are not made using any known system of geo-coordinates. For more information, see: http://www.people.fas.harvard.edu/ sukhtank/data.html.

Figure 3: Distribution of Schools in Tamil Nadu



The data is broken into quintiles with a low of 30 schools and a high of 638 schools. The darker colors indicate a greater number of schools.

Figure 4: Core-Swing Constituencies By Government



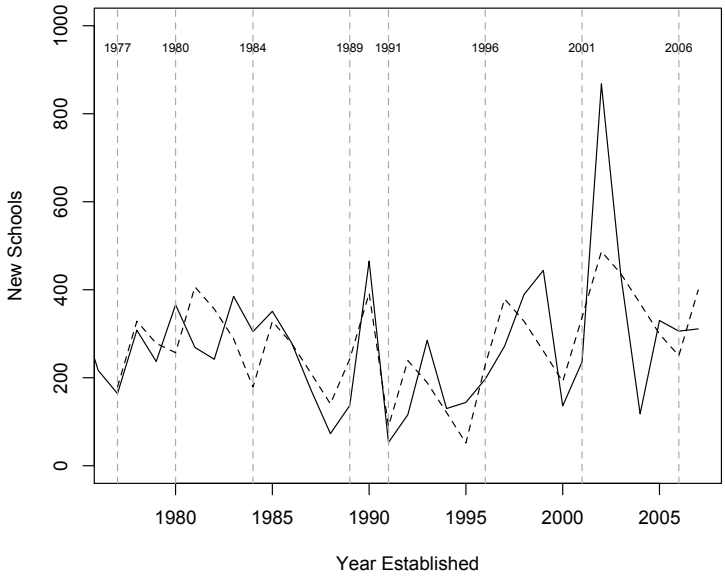
The histograms are restricted to constituencies where the future ruling coalition was victorious. The darker bars represent frequencies of constituencies with a MoV of less than 10%, which we identify as swing constituencies. The gray bars are, thus, the core constituencies. The values in the upper right corner of each histogram are the percentage of swing constituencies among those won by the future ruling coalition.

the government taking power in 1991. On the other hand, there is not much variation along the dimension of seat share. Each ruling coalition in our study period won at least 70% of the seats in the Assembly.

As discussed above, there are two natural ways we can think of the connections between the delivery of public goods and partisan bias: clientelism and pork. If school building is tied to clientelistic behavior, we should see a spike in school construction just prior to elections, which would be consistent with the idea of *buying* votes. On the other hand, if schools are built as pork, then we should observe school construction in the early years of government, which would be consistent with the idea of *rewarding* voters.

Below, we have plotted year of school construction from 1977 onward.

Figure 5: Political Business Cycle in Tamil Nadu

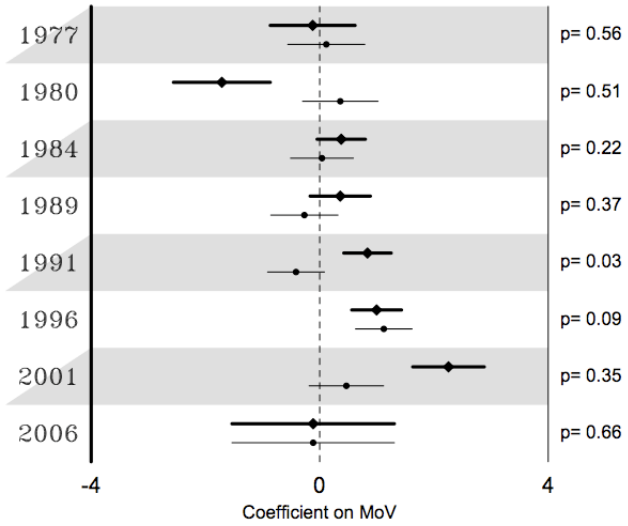


The solid line represents the actual values for schools established. The dotted line represents an estimated model which takes the number of schools built during each government and adds a "seasonal" effect corresponding to the year of government (election year, 2nd, 3rd, 4th, or 5th). The fitted model has an adjusted R^2 of 84%.

Figure 5 shows that the vast majority of spikes occur after the election year (indeed, the seasonal effects for the first two years of a government were positive), which suggests the role of school construction as pork. In fact, in our data, 95.4% of all schools built during our study period were built in the first two years of government (15 of 31 years in our study). Parties in Tamil Nadu are unlikely to engage in pre-election vote-buying because such a strategy is unlikely to affect electoral outcomes in a system with massive anti-incumbency bias. Thus, we are likely to see fewer schools built in the later years of a government as compared to the earlier years. In fact, a cursory analysis of our data (results not shown here) reveals that school building has no impact on future voting behavior of an assembly constituency, suggesting a minimal role for vote-buying. Figure 6 shows how constituency-level competition (measured as the margin of victory on a scale from 0 to 1) affects school construction across different governments, comparing the first two years of government with the last two years of government.

The values for p in Figure 6 correspond to the percentage of swing constituencies among those won by the ruling coalition (i.e. the values from Figure 4). The estimates above come from a fairly crude model, which runs a separate overdispersed Poisson model for each government, changing the dependent variable from the number of schools in the first two years of government (thick line) and the last two year of government (thin line). However, the figure above is largely consistent with the major finding of this paper. In years when p is above 50%, we see on average more of a swing effect, and when it is below 50% we see more of a core effect, when the dependent variable is the first two years of the government. The results in the crude model are obscured by a few factors. Since we are partitioning the data by government and have a constituency-level predictor, we are not able to control for constituency-level fixed effects, and each estimate is based upon a cross-section of 210 observations. The more complicated model discussed in the

Figure 6: Effect of Margin of Victory Across Governments



The thick line represents estimates (+/- 1 standard deviation) where the dependent variable is the first two years of government, and thinner line is for the last 2 years of a government. The dataset ends in 2007, so the first and last two years coincide for the government starting in 2006. The estimated model is an overdispersed Poisson model, with each model containing whether the constituency voted for the ruling coalition (RC), the number of schools built before 1977 (early), and margin of victory (MoV) and y_i, the number schools in the appropriate period. Thus, the model is $y_i = Poisson(\beta_0 + \beta_1 RC + \beta_2 MoV + \beta_3 early, \omega)$ where ω is an overdispersion parameter, estimated as the sum of squared standardized residuals divided by the degrees of freedom. β_2 is reported in the table above.

next subsection addresses these issues.

4.3 Model Selection

Our dataset has 210 constituencies over 8 time periods. This sort of data, generally referred to as time series cross-section (TSCS) data, has been the focus of intense debate in the methodological literature. In order to properly estimate models with TSCS data, we must always be aware of constituency-level effects, contemporaneous time effects, and persistence (dynamics) in the data. One can control for constituency-level and contemporaneous time effects by using fixed effects (FE), or dummy variable, regression. However, there are several drawbacks to FE models. In addition to eating up degrees of freedom, the FE approach does not allow for the inclusion of constituency-level or time-level variables. For instance, our final model includes a control for the number of schools built before 1977 (a constituency-level variable), which could not be included under a FE approach. One possible solution to this problem is to use random errors in modeling the data, where constituency-level and contemporaneous effects are assumed to be normally distributed with some common mean and variance. Although we can now enter the constituency-level variables and the estimates are more efficient, the model relies on the strong assumption that constituency-level and contemporaneous time effects are uncorrelated with the rest of predictors in the regression for unbiased estimates (FE, on the other hand, allows for this sort of correlation). This has been a major concern of the econometric literature, and many use a Hausman test to determine whether "random effects" or "fixed effects" are more appropriate for the model. Using the estimates from the varying-intercept model we run later, we have Hausman test statistic of .69, so we fail to reject the null hypothesis that random effects are both consistent and more efficient, which will be necessary for our modeling specification.

In order to analyze our TSCS data, we use a multilevel modeling (MLM) regression framework.[15] In an MLM framework, we view TSCS data as a non-nested hierarchical structure. That is, constituency-time observations are nested in the constituency and time levels (higher level), but neither constituency nor time are nested within each other. The higher level errors (constituency and time) still enter into the model as random errors. However, MLM allows us to explicitly model intercept and slope coefficients as a function of predictors (fixed) and higher level errors (random). There are several benefits to this modeling approach. We are able to vary slope coefficients of lower-level predictors by higher level group, and we can explicitly account for correlation between these slopes and the random error in the higher level group. Unfortunately, the term "random error" is often lumped together with the old feasible generalized least squares (FGLS) procedure used to calculate such models (e.g. Swamy (1971) or Hsiao (2003)), which have poor finite sample properties (Beck and Katz, 2007). We use likelihood methods to estimate the parameters of the model, which have superior finite sample properties. Indeed, accounting for the uncertainty as a function of finite sample properties is crucial to the modeling approach employed in this paper.

MLM balances between "pooled" and "unpooled" estimates based one the sample size in each cluster (e.g. constituency x or time y), what Gelman and Hill (2007) call "partial pooling."[16] As the sample size grows in each cluster, random coefficients converge to the unpooled estimates, which are precisely the fixed effects. Thus, FE can be seen as a special case of the MLM framework. On the other hand, as the sample size in each cluster goes to zero, the random coefficients converge to a single constant, the constant term from the regression if each observation is treated as independent (i.e. there are no controls for clustering).[17] In essence, fixed effects only allow for interpretations restricted to the observations with in each cluster,[18] whereas the random effects allow for estimates with greater predictive validity. Although the social sciences have not used MLM methods for TSCS very often, Shor et al. (2007) shows superior model performance[19] in Monte Carlo tests against OLS and FE models, even when using panel corrected standard errors and robust FE standard errors (Arellano, 1987).

4.4 Specification of Models

Throughout the analysis, we employ an overdispersed Poisson model containing predictors for voting for the future ruling coalition (RC), the margin of victory (MoV), the interaction between the two (RC$\times$MoV), as well as a constituency level predictor for the number of schools built before 1977 (early). In order to model persistence in the data, we always include a lag term in the regression.[20]

[15] For a wonderful introduction to models of this type, please see Gelman and Hill (2007).

[16] The overall goal of multilevel modeling is to account for variance in an outcome variable that is measured at the lowest level of analysis by considering information from all levels. Steenbergen and Jones (2002) posit three benefits to multilevel analysis. First, multilevel data allows researchers to combine multiple levels of analysis in a single comprehensive model. Second, multilevel analysis allows researchers to explore causal heterogeneity: is the effect of lower-level predictors conditioned by higher-level variables? Third, multilevel analysis can provide a test of the generalizability of one's findings. Do the findings obtained in one geographic location apply to other contexts?

[17] In order to understand the logic of the approach, consider a model where we want to determine the height of a student based on being in one of twenty schools (with large populations and of equal size). Now, assume that the average height in school 1 is 65 inches, and in school 2 it is 68 inches. Assume that we go to each school and sample two people, and the average height over the 40 observations is 66 inches. In school 1 we could easily pick two taller people around 72 inches, and in school 2 we could easily pick shorter people around 60 inches. The fixed effects model would give us these estimates for average height in schools 1 and 2 with a large standard error. On the other hand, the MLM estimates take the uncertainty under consideration when giving estimates. In this case, the MLM estimates for average height in the schools would be close to 66 inches (the population mean), a much better estimate.

[18] The common interpretation of coefficients under FE is that of a "within" estimator, where the coefficient on all predictors are taken to be the predicted effect on the dependent variable within the cluster. However, when sample sizes within clusters are small, we run into problems because we tend to get very extreme estimates for all estimates varying by cluster

[19] The paper uses both root mean square error (RMSE) and optimism as measures. In their paper, the model takes a standard OLS model with cluster-level effects and contemporaneous time shocks.

[20] We choose to run a model with lags and schools built before 1977 to control for constituency-level need. This is all the more important since there is no annual demographic information available at the constituency level. We also experimented with models controlling for those constituencies that explicitly supported DMK or AIADMK (as opposed to coalition partners), as well as those

We are interested measuring in the effect of margin of victory on subsequent school construction. A natural concern with this sort of data is that of endogeneity or reverse causality. For instance, we might believe that margin of victory is a function of schools previously built, consistent with the vote-buying logic. However, our discussion above showed that there is no evidence of vote-buying, largely because of so much alternation. In order to believe the effect of reverse causality we would have to believe that building schools had a positive impact on the margin of victory for the *opposing* party. Given this setup, we believe the models we fit give fairly good estimates of the effect of margin of victory on school construction.

We run two models, a varying-intercept model (VIM), where only the intercepts vary by time period and constituency, and a more complicated intercept-varying and slope-varying model, where we vary the slopes on voting for the ruling coalition (RC), the effect of the margin of victory (MoV), and their interaction by time period.[21] Model 1 (VIM) is written formally below:

$$y_{it} \sim \text{Poisson}\left(\alpha_{it} + \delta y_{i,t-1} + \beta_1 \text{RC} + \beta_2 \text{MoV} + \beta_3 (\text{RC}\times\text{MoV}),\ \omega\right)$$
$$\alpha_{it} = \alpha + \gamma_1 \text{early} + \varepsilon_i + \eta_t; \quad \varepsilon_i \sim (0, \sigma_\varepsilon)\,; \quad \eta_t \sim \left(0, \sigma_\eta\right)$$

Once again, ω is an overdispersion parameter, as described above. The notation y_{it} corresponds to constituency i at time t. In the model above, time-constituency level (RC, MoV, and RC$\times$MoV) variables enter in as fixed predictors in the lower level regression. The random coefficient is modeled as a function of the pooled estimate of the constant, α, a fixed predictor (early), and random errors at the constituency level (ε_i) and the time level (η_t).[22] In the VIM, we have a unique coefficient estimate for RC, MoV, and their interaction. The implication is that the clustering by time or constituency shouldn't significantly affect the coefficients of these variables on the predicted number of schools. Put another way, this implies that the effect of these predictors on the dependent variable is identical within and across clusters.

We are, however, specifically interested in whether clustering by time affects the coefficient estimates, and testing whether there are substantial differences in the effect of both voting for the ruling coalition and the margin of victory over time. Model 2 (the varying-intercept, varying-slope model) is written formally below:

$$y_{it} \sim \text{NegBin}\left(\alpha_{it} + \delta y_{i,t-1} + \beta_{1,t} \text{RC} + \beta_{2,t} \text{MoV} + \beta_{3,t} (\text{RC}\times\text{MoV}),\ \omega\right)$$
$$\alpha_{it} = \alpha + \gamma_1 \text{early} + \varepsilon_i + \eta_t;$$
$$\varepsilon_i \sim (0, \sigma_\varepsilon)\,; \quad \begin{pmatrix} \eta_t \\ \beta_{1,t} \\ \beta_{2,t} \\ \beta_{3,t} \end{pmatrix} \sim N\left(\begin{pmatrix} \mu_\eta \\ \mu_{\beta_{1,t}} \\ \mu_{\beta_{2,t}} \\ \mu_{\beta_{3,t}} \end{pmatrix}, V\right)$$

Model 2 estimates a varying intercept α_{it} as before, but now it adds slope-varying coefficients.[23] For instance, the term $\beta_{1,t}$ is composed of a pooled estimate β_1 and a random error at the time level. It is important to note that random errors at time level (η_t, $\beta_{1,t}$, $\beta_{2,t}$, $\beta_{3,t}$) are all taken to be in a multivariate

controlling for turnout and eligible voters. None of these predictors seem to matter much for the basic results, but the coefficients become more difficult to interpret. For instance, we want to estimate different effects for years that AIADMK and DMK were in the ruling coalition, as well as for people who voted for the ruling coalition in those years but not AIADMK or DMK.

[21] All models are calculated using the `jags` and called with the package `R2jags` in R, with an overdispersed Poisson specification

[22] Note that due to the non-nested structure of the data, we are able to estimate unique coefficients for constituency-year observations since we have allowed constituency-level and contemporaneous effects to enter into random coefficient equation additively.

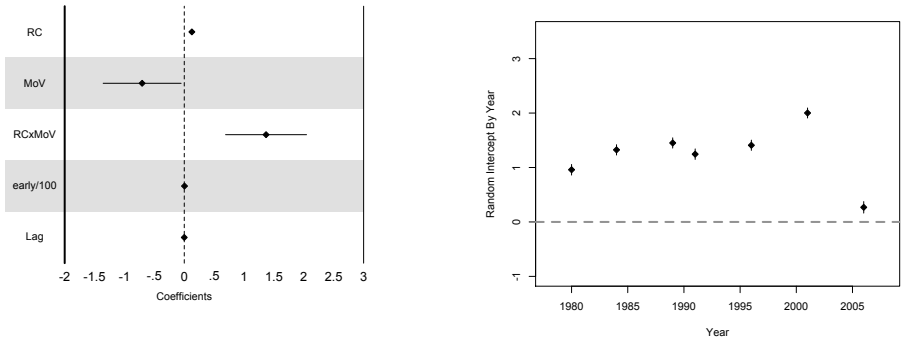
[23] We note that we chose not to model the percentage of swing constituencies as a time level variable. There are two reasons. First of all, our only argument is that there is a threshold of competitiveness above which parties invest in swing districts. In the model, this would just look like dummies on the years 1980 and 2006, which doesn't really add any substantive knowledge to our model. The second, and more important, reason is that we do not want electoral competitiveness entering into the model as a fixed effect, since we are making no claim about the magnitude of the coefficients on electoral competitiveness.

normal with mean 0 and variance-covariance matrix V (i.e. the model allows for correlation between coefficients at both the time and lower levels).

4.5 Results

We begin with the results of Model 1, the VIM. Figure 7 shows the estimated coefficients and random intercepts of the model (with respect to time).

Figure 7: Results from Model 1



(a) Fixed Effects for Model 1 (b) Random Intercepts for Model 1

The horizontal bars in (a) and the vertical bars in (b) represent a band of +/- 1 standard deviation.

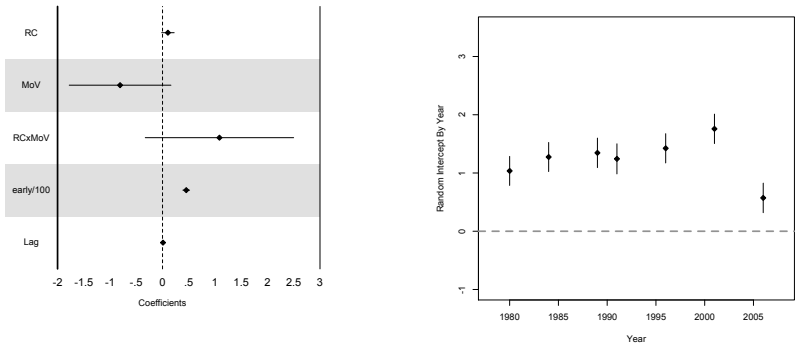
The model in Figure 7 suggests a core effect in Tamil Nadu. The sum of the coefficients for RC, MoV, and RC×MoV is positive and significant (with a mean of 0.88 and standard deviation of 0.18).[24] As we mentioned earlier, the logic of our argument assumes that the voters receiving schools actually supported the ruling coalition. For those purposes, we are interested in the sum of the coefficients for MoV and RC×MoV, which, when tested, is also positive and significant (with a mean of 0.74 and a standard deviation of 0.17). This suggests that in "normal" times there is a preference for parties to reward their core constituents. In order to estimate core-swing behavior over time, we turn to model 2, for which we show the results in Figure 8:

In comparing models 1 and 2, we notice that the fixed effects estimates are about the same, but the standard errors on the fixed effects are much larger in model 2. We also notice that model 1 has slightly more extreme estimates than model 2 for random intercepts. This is due to the fact that some of the variation is being sucked up by the varying slopes. Figure 9 plots the varying slope estimates for $MoV + RC \times MoV$ over time.

The procedure for calculating varying slope estimates is somewhat complicated. We drew 1000 simulations of all of the fixed effects with the parameter estimates as the mean with respect to the variance-covariance matrix for the fixed effects. Then, we did a similar procedure for the time level. Since the intercept, and the coefficients on RC, MoV, and RC×MoV follow a multivariate normal, we used the variance-covariance matrix at the time level and the variance-covariance matrix of the fixed effects to derive a variance-covariance matrix that corresponds to a particular time period. We then sampled our parameter estimates *for each time period* 1000 times according to the estimated random effects (as the mean) and the derived variance-covariance matrix. In the final step, we sum the appropriate fixed effects and

[24] In order to test net value of these three coefficients, we took 1000 draws from a multivariate normal distribution with the estimated coefficients as the mean with respect to the variance-covariance matrix. We then pulled out and summed our coefficients of interest to get the values.

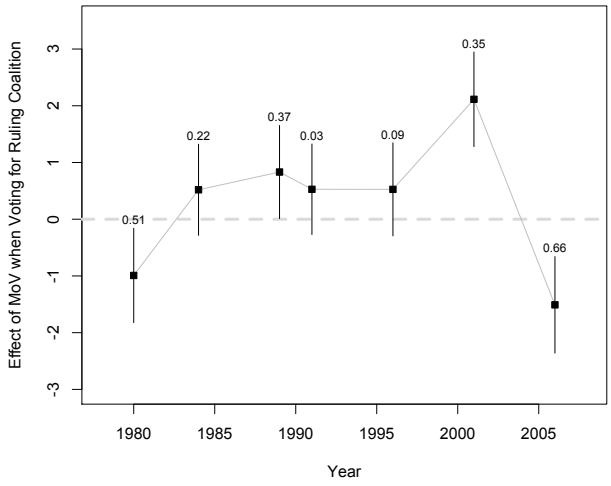
Figure 8: Results from Model 2



(a) Fixed Effects for Model 2 (b) Random Intercepts for Model 2

The horizontal bars in (a) and the vertical bars in (b) represent a band of +/- 1 standard deviation. The residual deviance of the model is 2757, whereas the null deviance is 6472.

Figure 9: Varying Slope Estimates of Margin of Victory Across Governments



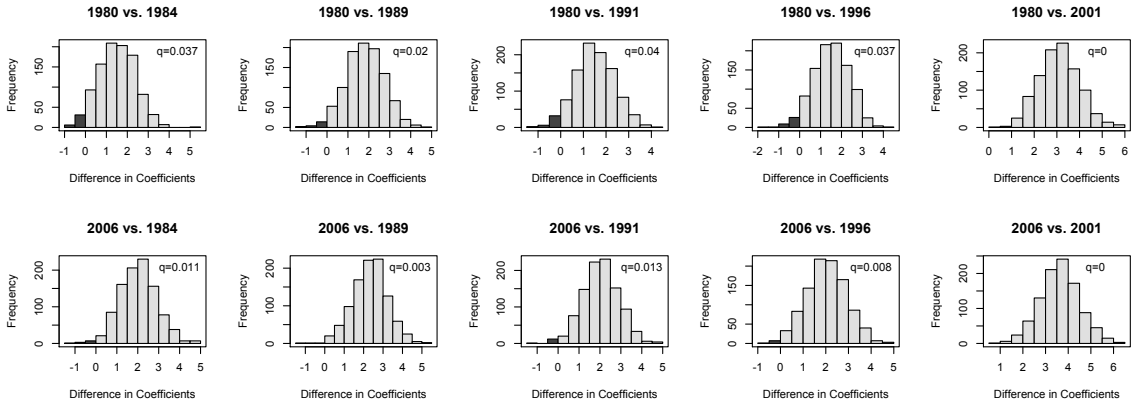
The above estimates are derived by simulation from 1000 draws with +/- 1 standard deviation band. The coefficients represent the sum of the coefficients on MoV and RC×MoV. Thus, this represents differences in the margin of victory effect among constituencies that voted for the ruling coalition. The small numbers represent the percentage of swing districts among those won by the ruling party, as in Figure 4.

random effects (those associated with MoV and RC×MoV) to get 1000 estimates of the coefficient. We use these 1000 estimates to calculate and expected value (the mean of the estimates) and a standard deviation.

There is significant variation in the effect of MoV on the number of schools constructed based on schools constructed during the first two years of a government period. We see what looks like a swing effect (MoV has a negative impact on the number of schools constructed) in 1980 and 2006. However, all other years we see a slight core effect and a fairly significant one in 2001. We are interested in testing *the difference* between the coefficients shown in Figure 9. In other words, we are interested in testing the effect of

electoral competitiveness on the estimates of MoV, not whether the MoV estimate is significantly different from zero. Figure 10 compares coefficients on MoV in 1980 and 2006 with other years in our sample. It

Figure 10: Comparing Government By Government Swing-Core Effects



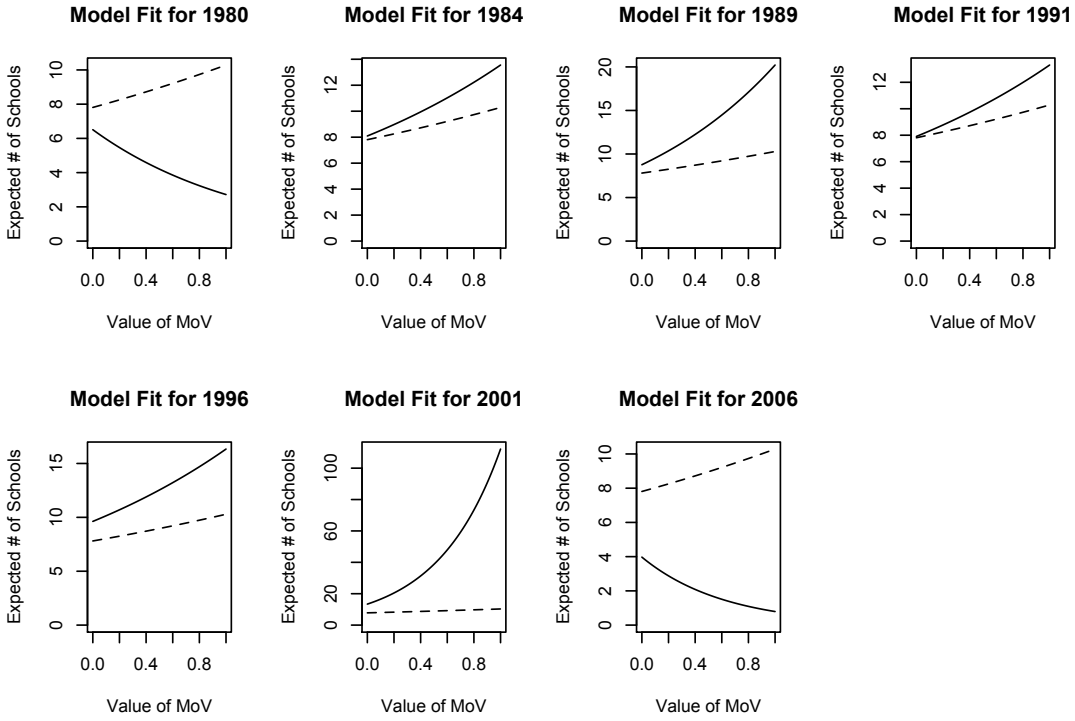
The top row looks at the MoV estimates from 1980 among those where the constituency voted for the ruling coalition against similar estimates from the years where we observe more of a core effect (1984-2001). The bottom row makes the same comparison for 2006. The histograms are over 1000 simulations. The value "q" represents the percentage of the time the coefficient estimate from a core year is smaller than that of the swing year (either 1980 or 2006). This is an empirical equivalent to a one-tailed t-test.

suggests that we have greater than 95% certainty that the swing effect among constituencies that voted for the ruling coalition in 1980 and 2006 was larger than in the other years. The histograms look at the difference between the estimated coefficient on MoV when the constituency voted for the ruling coalition. The histogram looks at 1000 simulations and is the empirical equivalent of a one-tailed t-test. We may believe, however, that our statistic of a reaching some threshold of swing constituencies matched up with the years of 1980 and 2006 by random chance. We can test this by using permutation tests (a common non-parametric technique). The probability that our statistic lines up with the above-mentioned years, assuming that any number of years may be labeled as "swing" years, is $\frac{1}{128} = 0.8\%$. The probability our statistic lines up with the above-mentioned years, assuming that two years are chosen at random to be "swing" years, is $\frac{1}{21} = 4.8\%$. We believe that, taken together, the evidence suggests that 1) there is a stronger swing effect in 1980 and 2006, years with disproportionately many swing constituencies, and 2) this result is unlikely to have occurred by random chance.

We conclude the data section by plotting our estimated effect on school construction and assessing model fit. We notice that there is quite a bit of fluctuation in predictions over time. The dotted curves in Figure 11 are the estimated models from the pooled estimates. The solid curves correspond to the partially pooled slope estimates from Model 2. Figure 11 shows that there are stark differences in predicted number of schools based on MoV over time, justifying the varying slopes approach.

Although there is some noise, we see that the models do a decent job of fitting the data, especially considering that we had so few predictors. In order to see whether model 2 is an improvement over model 1, we plot both of them in Figure 12. When the series is purple, it means there is mixing between the two models, and there is little benefit to running the more complicated model. We see, however, that there is not full mixing in 1980, 2001, and 2006, which were precisely the years with the largest core-swing effects. While the changes may look small on the graph, it is important to note that in many cases the difference in the model represents a 10-25% difference in the expected number of schools. Since so many constituencies receive less than 5 schools, this difference does not seem as big on the graphs in Figure 12. We conclude that there is a benefit to running model 2 because it fits the data better, especially in 1980, 2001, and 2006.

Figure 11: The Fitted Model By Government



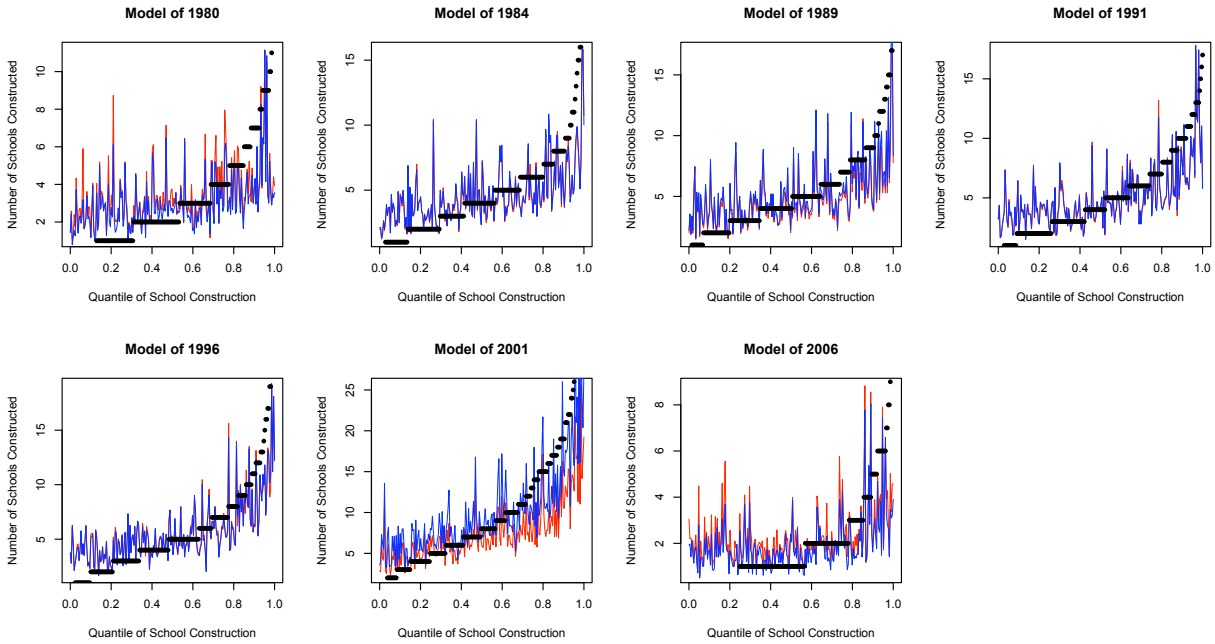
The dotted line corresponds to the completely pooled estimates in the model, and solid line corresponds to the partially pooled slope varying estimates for MoV when the constituency votes for the ruling coalition. In the graphs, the lag and the value of early are taken to be at the grand mean.

5 Conclusion

This paper proposes and tests hypotheses relating to the role of ruling party MLAs in Tamil Nadu and their preferences regarding pork barrel distribution. Drawing on the largely qualitative literature on patronage politics in India, we integrate theories of distributive politics and political business cycles to create empirically testable hypotheses on the targeting of pork. Using a unique dataset on school construction, we find that ruling MLAs in Tamil Nadu have an overarching preference to target club goods to those constituencies which strongly supported it in the most recent election. High levels of electoral volatility in Tamil Nadu render buying votes prior to elections a sub-optimal strategy due to the ease of voter defection and incomplete monitoring. Rather we find that ruling MLAs immediately reward compliant voters post-election with pork in the form of new schools.

While there is an immediate post-election spike in school construction, targeting strategies are more nuanced. A multi-level modeling regression framework allows us to disaggregate targeting strategies across time and space. We find that there are deviations from the "core" targeting strategy in those years with exceptionally high levels of electoral competition within constituencies. When more than half the ruling coalition's victories come in closely-fought ("swing") constituencies, we find that the ruling party alters its post-election targeting strategy to reward pivotal swing areas. We interpret this as the constraining effect of electoral competition: while there may be a bias of rewarding their most ardent supporters, politicians must abide by electoral realities. In swing constituencies where the margin of victory is slim, politicians must make desperate promises to sweeten the pot. In the elections of 1980 and 2006, there were a disproportionate number of such constituencies; hence, benefits flowed to those areas disproportionately.

Figure 12: Checking Model Fit



The red series corresponds to the fitted estimates of Model 1, and the blue series corresponds to the fitted estimates of Model 2 (purple indicates mixing of the two). Note that these estimates correspond to the *expected values* of school construction by constituency. The black points denote the actual number of schools built.

In conclusion, we believe that this research can contribute to our understanding of tactical redistribution in three ways. The first lesson is theoretical. We take the role of electoral volatility and political competition seriously. Each election presents a unique set of incentives to politicians with respect to pork barreling. The nature of the interaction between volatility and competition compels the ruling party to pursue differential targeting strategies. Of course, volatility is a constant in Tamil Nadu but the nature of competition varies considerably. Under these conditions, we do not expect (nor do we find) uniform targeting strategies across constituencies and over time. In the future, we plan to pursue this research in other Indian states with different volatility profiles.

The second and third contributions are methodological. Rather than relying on crude measures of spending, we use micro-level data on school construction. This provides a more accurate picture of actual pork barrel effort. The real innovation though is using GIS mapping to estimate the effect of pork barreling at the level of the assembly constituency. This requires us to take block-level data on schools and overlay this with assembly constituency boundaries. Previous work on distributive politics in India takes shortcuts in measurementâĂŤprimarily by relying on district-level analysisâĂŤthat could bias estimates. Finally, we make a call to integrate multi-level modeling (MLM) with time-series, cross-sectional (TSCS) data. MLM balances between "pooled" and "unpooled" estimates based one the sample size in each cluster (e.g. constituency x or time y), what Gelman and Hill (2007) dub "partial pooling." Thus, we can relax the assumption that there is one "true" relationship between our dependent variable on predictors of interest. Rather, we can vary both intercepts and slopes to obtain disaggregated estimates across time and space. This modeling strategy allows us to take a nuanced view of the vagaries of tactical redistribution as electoral conditions change.

References

Ananth, V. Krishna. 2006. "Assembly Elections: Changing Dynamics in Tamil Nadu." *Economic and Political Weekly* April 1:1232–1233.

Ansolabehere, Stephen and James M. Snyder. 2003. "Party Control of State government and the Distribution of Public Expenditures." Typescript. Departments of Political Science and Economics, Massachusetts Institute of Technology.

Arellano, Manuel. 1987. "Computing Robust Standard Errors for Within-group Estimators." *Oxford Bulletin of Economics and Statistics* 49(4):431–434.

Bailey, F. G. 1963. *Politics and Social Change: Orissa in 1959*. Berkeley, CA: University of California Press.

Banerjee, Abhijit and Lakshmi Iyer. 2005. "History, Institutions, and Economic Performance: The Legacy of Colonial Land Tenure Systems in India." *American Economic Review* 95(4):1190–1213.

Banerjee, Abhijit and Rohini Somanathan. 2007. "The Political Economy of Public Goods: Some Evidence from India." *Journal of Development Economics* 82(2):287–314.

Banerji, Rukmini and Anit N. Mukherjee. 2008. "Achieving Universal Elementary Education in India: Future Strategies for Ensuring Access, Quality and Finance." *Margin: The Journal of Applied Economic Research* 2(2):213–228.

Beck, Nathaniel and Jonathan N. Katz. 2007. "Random Coefficient Models for Time-Series Cross-Section Data: Monte Carlo Experiments." *Political Analysis* 15(2):182–195.

Betancourt, Roger and Suzanne Gleason. 2000. "The Allocation of Publicly-Provided Goods to Rural Households in India: On Some Consequences of Caste, Religion, and Democracy." *World Development* 28(12):2169–2182.

Chandra, Kanchan. 2004. *Why Ethnic Parties Succeed: Patronage and Ethnic Headcounts in India*. Cambridge University Press.

Chen, Jowei. 2008. "When Do Government Benefits Influence Voters' Behavior? The Effect of FEMA Disaster Awards on US Presidential Votes." Typescript. Department of Political Science, Stanford University.

Chin, Aimee. 2005. "'Can Redistributing Teachers Across Schools Raise Educational Attainment? Evidence from Operation Blackboard in India." *Journal of Development Economics* 78(2):384–405.

Chopra, Vir K. 1996. *Marginal Players in Marginal Assemblies*. New Delhi: Orient Longman.

Cole, Shawn A. 2009. "Fixing Market Failures or Fixing Elections? Elections, Banks, and Agricultural Lending in India." *American Economic Journal: Applied Economics* 1(1).

Cox, Gary and Mathew McCubbins. 1986. "Electoral Politics as a Redistributive Game." *The Journal of Politics* 48(2):370–389.

Dahlberg, Matz and Eva Johansson. 2002. "On the Vote-Purchasing Behavior of Incumbent Governments." *American Political Science Review* 96(1):27–40.

Denemark, David. 2000. "Partisan Pork Barrel in Parliamentary Systems: Australian Constiuency-Level Grants." *Journal of Politics* 62(3):896–915.

Diaz-Cayeros, Alberto, Federico Estevez and Beatriz Magaloni. 2009. "Vote-Buying, Poverty and Democracy: The Politics of Social Programs in Mexico, 1989-2006." Unpublished Manuscript.

Dixit, Avinash and John Londregan. 1996. "The Determinants of Success of Special Interests in Redistributive Politics." *The Journal of Politics* 58(4):1132–1155.

Forrester, Duncan B. 1969. "State Legislators in Madras." *Journal of Commonwealth Political Studies* pp. 36–57.

Gelman, Andrew and Jennifer Hill. 2007. *Data Analysis Using Regression and Multilevel/Hierarchical Models*. New York: Cambridge University Press.

Golden, Miriam and Lucio Picci. 2008. "Pork-Barrel Politics in Postwar Italy, 1953-94." *American Journal of Political Science* 52(2):268–289.

Harriss, John. 2002. "Whatever Happened to Cultural Nationalism in Tamil Nadu? A Reading of Current Events and the Recent Literature on Tamil Politics." *Commonwealth and Comparative Politics* 40(3):97–117.

Hsiao, Cheng. 2003. *Analysis of Panel Data*. 2nd ed. New York: Cambridge University Press.

Jaffrelot, Christophe. 2003. *India's Silent Revolution: The Rise of the Lower Castes in North India*. New York: Columbia University Press.

Jayalakshmi, K, Tasnim Khorakiwala, Gopinath Reddy, Ratna Reddy, Vikas Singh, Anne Marie Goetz and Robert Jenkins. N.d. "State Responsiveness to Poverty: A Comparative Study of Development Interventions in the Indian States of Andhra Pradesh and Madhya Pradesh." Overseas Development Institute, United Kingdom.

Jha, Dayadhar. 1977. *State Legislature in India: Legislature in the Indian Political System*. New Delhi: Abhinav.

Kapur, Devesh and Partha Mukhopadhyay. 2007. "Sisyphean State? Why Poverty Programs in India Fail and Yet Persist." Paper presented at the 2007 Annual Meeting of the American Political Science Association.

Lindbeck, Assar and Joerg Weibull. 1987. "Balanced Budget Redistribution and the Outcome of Political Competition." *Public Choice* 52(3):273–297.

Linden, Leigh. 2004. "Are Incumbents Really Advantaged? The Preference for Non-Incumbents in India." Job Market Paper.

Mani, Anandi and Sharun W. Mukand. 2007. "Democracy, Visibility and Public Good Provision." *Journal of Development Economics* 83(2):506–529.

McCarten, William. 2003. The Challenge of Fiscal Discipline in the Indian States. In *Fiscal Decentralization and the Challenge of Hard Budget Constraints*, ed. Jonathan Rodden, Gunnar Eskeland and Jennie Litvack. Cambridge, MA: The MIT Press.

Miguel, Edward and Farhan Zaidi. 2003. "Do Politicians Reward Their Supporters? Regression Discontinuity Evidence from Ghana." Typescript. Department of Economics, University of California-Berkeley.

Nichter, Simeon. 2008. "Vote Buying or Turnout Buying? Machine Politics and the Secret Ballot." *American Political Science Review* 102(1):19–31.

Prasad, G. Koteswara. 2004. "Tamil Nadu : A Tactical Alliance and a Sweep for the DPA." *Economic and Political Weekly* .

Puri, Shashi Lata. 1978. *Legislative Elite in an Indian State: A Case Study of Rajasthan*. New Delhi: Abhinav.

Rao, M. Govinda and Nirvikar Singh. 2005. *The Political Economy of Fiscal Federalism in India*. New Delhi: Oxford University Press.

Ravishankar, Nirmala. 2007. "Voting for Change: Turnout and Vote Choice in Indian Elections." PhD disseration. Harvard University.

Shifting Allegiances: The Arithmetic of the Vote Share is All That Matters in the Making of Political Alliances in Tamil Nadu. 2009. *Economic and Political Weekly* 154(14).

Shor, Boris, Joseph Bafumi, Luke Keele and David Park. 2007. "A Bayesian Multilevel Modeling Approach to Time-Series Cross-Sectional Data." *Political Analysis* 15(2):165–181.

Singh, Prerna. 2007. "Subnationalism and Social Development: A Comparative Analysis of Indian States." PhD disseration. Princeton University.

Singh, Vikas, Bhupendra Gehlot, Daniel Start and Craig Johnson. 2003. "Out of Reach: Local Politics and the Distribution of Development Funds in Madhya Pradesh." Working Paper. Overseas Development Institute.

Steenbergen, Marco R. and Bradford S. Jones. 2002. "Modeling Multilevel Data Structures." *American Journal of Political Science* 46(1):218–237.

Stein, Robert M. and Kenneth N. Bickers. 1994. "Congressional Elections and the Pork Barrel." *Journal of Politics* 56(2):377–399.

Stokes, Susan. 2005. "Perverse Accountability: A Formal Model of Machine Politics with Evidence from Argentina." *American Political Science Review* 99(3):315–325.

Subramanian, Narendra. 2002. "Identity Politics and Social Pluralism: Political Sociology and Political Change in Tamil Nadu." *Commonwealth and Comparative Politics* 40(3):125–139.

Swamy, P. 1971. *Statistical Inference in Random Coefficient Regression Models*. Berlin: Springer-Verlag.

Widlund, Ingrid. 2000. "Paths to Power and Patterns of Influence: The Dravidian Parties in South Indian Politics." Uppsala, Sweden: Uppsala University.

Wilkinson, Steven I. 2006. "The Politics of Infrastructural Spending in India." Typescript. University of Chicago.

Wilkinson, Steven I. 2007. Explaining Changing Patterns of Party-Voter Linkages in India. In *Patrons, Clients, and Policies: Patterns of Democratic Accountability and Political Competition*, ed. Herbert Kitschelt and Steven I. Wilkinson. New York: Cambridge University Press.

Wyatt, A. K. J. 2002. "New Alignments in South Indian Politics: The 2001 Assembly Elections in Tamil Nadu." *Asian Survey* 42(5):733–753.

Yadav, Yogendra. 2008. "Ten Theses on State Politics in India." *Seminar* 591.