

Bureaucrats and Politicians:

How Does Electoral Competition Affect Bureaucratic Performance? *

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Abstract

This paper examines two competing mechanisms by which electoral competition affects bureaucrats' performance: re-election concerns and dynamic incentives. Incumbent politicians in competitive constituencies have higher re-election concerns. This gives them a greater *incentive* to monitor their bureaucrats, resulting in faster project execution. On the other hand, politicians in low competition constituencies have a high probability of being re-elected and therefore typically have longer tenures. This gives them the *ability* to provide better incentives to bureaucrats using long term contracts. To isolate these mechanisms, I construct a unique dataset from India by matching details of bureaucrats' work histories with individual local public good projects under the Member of Parliament Local Area Development scheme. The main results show that bureaucrats approve projects faster when the incumbent politician's probability of winning is higher. Moreover, bureaucrats perform better when they are up for promotion and when they know that the politician is likely to be in office at the time of promotion. These findings suggest that access to dynamic incentives is the dominant mechanism through which political competition affects bureaucrats' performance.

JEL Classification: D72, D73, H11, H41, H54, H70

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1 Introduction

Political competition is said to yield benefits to the citizens just as competition in economic markets yields benefits to consumers.¹ There is a large theoretical literature and an increasing number of empirical studies which show that lack of political competition may lead to adverse policy outcomes compared to competitive constituencies.² The underlying mechanism that drives these results is that due to re-election concerns, the voters gain influence in disciplining the politicians only when political competition is high. While these studies mostly examine policy choices made by politicians, the implementation of these policies by bureaucrats also matters for governance.³

In the above context, the question this paper addresses is: *how does political competition affect the bureaucrats' performance?* If re-election concerns are also an important determinant of project implementation, then we should find that bureaucrats perform worse in less competitive constituencies.⁴ Contrary to this prediction, using data from India, this study finds that bureaucrats perform better when the incumbent politician's probability of winning is higher.

In this paper, we introduce another important mechanism that rationalizes these results. This is related to the *ability* of the politicians to provide incentives to the bureaucrats. In low competition constituencies, the incumbents typically have a high probability of returning to office in the next term (assuming no term limits). This provides them with an additional way of incentivizing bureaucrats that their counterparts in competitive constituencies do not have: promising future rewards. The use of dynamic incentives enables the incumbents in low competition areas to implement higher effort levels and hence we get a negative relationship between electoral competition and bureaucrat's performance.

¹See Bardhan and Yang (2004) and Bardhan and Mookherjee (2010) for a discussion on this.

²Besley et. al (2010) show that lack of political competition may lead to policies that hinder economic growth. Nath (2014a) shows that in absence of political competition, local elites exert disproportionate influence on the allocation of spending on local public goods. Brown and Hunter (1999); Lake and Baum (2001) and Hecock (2006) show that competition increases the level of spending.

³The bureaucrats we have in mind are career civil servants who enter the bureaucracy through a meritorious entrance exam. Since they are non-elected government officials, the only way political competition can affect their performance is through the influence exerted by politicians.

⁴The effect of re-election concerns on bureaucrats' performance has been studied by Rogers (2014). Using data from Nigeria he shows that politicians in high competition constituencies are more likely to delegate public good projects to autonomous bureaucrats rather than governmental agencies. The autonomous agencies, on an average, perform better and hence he finds a positive relationship between competition and bureaucratic performance.

Our measure of bureaucratic performance is the time taken to approve local public goods projects. The details of projects are obtained from Members of Parliament Local Area Development (MPLAD) scheme. Each member of parliament (MP) gets a fixed sum of money to spend on infrastructure projects within his constituency. The politician has full control over the type of project, the cost and the location. These projects, however, have to be approved by the bureaucrats in the administrative district where they are to be constructed. We use work histories of bureaucrats to match them with individual projects under the MPLAD scheme. This allows direct identification of the bureaucrats who approved the projects and how long they took to approve them.

To identify the causal effect of political competition on bureaucratic performance, we take advantage of a previously unexplored information shock that resulted in an effective term limit for some incumbents. The shock we exploit is the announcement of changes in reservation status of some of the constituencies as result of re-districting of all electoral boundaries in India.⁵ When these boundaries were redefined, the population shares of minority groups changed as well, resulting in changes in the reservation status accordingly.⁶ The announcement of the changes was made in December 2007 and they were to be enforced in the 2009 elections. The incumbents who were affected by this change knew that their probability of winning in 2009 was zero. The politicians in the control group were not affected by the news and therefore their probability of winning does not change. We compare the bureaucratic performance in the two groups before and after this shock. The differences-in-difference (DID) strategy gives us a causal effect of change in political competition on the bureaucratic performance.

Our results show that as the probability of winning goes to zero due to the information shock, the average sanctioning time increases by 13%. Now, probability of winning going to zero means that the incumbent's re-electoral motives become weaker. Moreover, since the bureaucrats know that the politician is not going to get re-elected, any promise of future rewards made by the politicians are not credible. Since both the reelection concerns and access to dynamic contracts shut down with the exogenous shock, this result by itself does not help us isolate the two channels.

In order to identify which of the mechanisms drives the effect of electoral competition on bureaucratic performance, we compare the sanctioning times of bureaucrats in constituencies

⁵Reservation of a constituency for a minority group means that only those candidates who belong to the minority group can contest elections.

⁶The electoral boundaries did not change throughout the period of the study (1999-2009). The announcement was made in the middle of the 2004-2009 legislative term. The new boundaries came into force in the 2009 elections, at the end of the period.

that are a party stronghold with those that are not. The variable stronghold is a dummy which takes value 1 if the same party won all four elections prior to the period of study. This is our measure of competition - incumbents in strongholds have a high probability of winning again and hence face very little electoral pressure. The results of this empirical model tell us what happens when we move from probability of winning close to half (non-strongholds) towards probability of winning close to one (strongholds).

Our results show that in constituencies with party strongholds, projects are sanctioned 11% faster. This means that bureaucrats perform better in constituencies where probability of winning for politicians is higher. Taken together with the results from the natural experiment, our findings are consistent with the dynamic contracts mechanism: the politicians in low competition constituencies have longer tenures and therefore have access to dynamic contracts that provide better incentives to bureaucrats. This in turn improves bureaucratic performance. However, if probability of winning goes to zero, the promise of future rewards are no longer credible and hence bureaucrats take longer to approve projects.

One of the empirical concerns we need to address is that of selection: politicians in strongholds may be able to get better performing bureaucrats and that may drive the results rather than incentives/ability of politicians to monitor the bureaucrats. In order to control for selection, we take advantage of the fact that the administrative and electoral boundaries do not perfectly overlap in India. A single administrative district may have two or three electoral constituencies that overlap with it. Since the bureaucrat sits in an administrative district and the politician is the elected representative of the electoral constituencies, we have situations where one bureaucrat may deal with two or even three politicians. Comparing the performance of a single bureaucrat with multiple politicians helps us deal with the selection problem.

It may be argued that better performance of bureaucrats in strongholds may have nothing to do with incentives, but instead be due to rent-seeking motives. Politicians and bureaucrats may collude to push certain types of projects faster in order to gain rents. In order to alleviate these concerns, we provide two pieces of evidence. Firstly, we show that there is no systematic bias in types of projects that are sanctioned faster. All types of projects - roads, water, health, and irrigation - have significantly less delays in strongholds. Secondly, we explicitly look at the tenures of the bureaucrats to construct measures of how far they are from promotions. We find that bureaucrats perform better in the year that they are up for promotion. Moreover, they perform worse when they know that the politician is not likely to be in office at the time of promotion. These results suggest that bureaucrats are indeed responding to incentives.

The main contributions of this paper can be summarized as follows: firstly, we examine

a hitherto unexplored mechanism that connects electoral competition to bureaucratic performance: access to dynamic contracts. Secondly, we develop an empirical methodology to identify the causal effect of electoral competition on bureaucratic performance and to isolate the mechanism that drives the relationship. Finally, we construct a rich and disaggregated dataset that allows us to [a] directly observe the behavior of bureaucrats and [b] control for selection and unobserved abilities that typically pose a threat to identification of causal mechanisms.

The rest of the paper is organized as follows. Section 2 provides details of the institutional background: the bureaucrats and the politicians as well as the way in which they interact in our setting. In section 3, we outline how the alternative mechanisms work through the lens of a canonical efficiency wage model that is adapted to match our setting. We provide details of the data and our empirical identification strategy in sections 4 and 5 respectively. While section 6 provides empirical results, section 7 concludes.

2 Institutional Background

2.1 The Bureaucrats

The bureaucrats I study in this paper belong to the Indian Administrative Service (IAS). These IAS officers are federal government employees recruited through a nationwide competitive examination conducted by the independent Union Public Service Commission. A few IAS officers within each state may be recruited through the State Civil Services. The latter ones are posted only within the state and typically do not hold positions in the ministries or departments in New Delhi. ⁷

Once the direct recruits are chosen, they all undergo training together. Thereafter, they are assigned to one of the states in a quasi-random manner and this assigned state is known as their Cadre. They train under their assigned superiors for about four to five years in different districts. They are subsequently assigned to a district as the head administrator. This post is known as collector or district magistrate ⁸. In terms of their career path, the bureaucrats can serve as collectors roughly between years 5-16 of their careers. In their 9th year, they are promoted to the junior administrative grade. There is no screening: everyone is promoted. ⁹ This is basically a salary hike. It is in the 13th and the 16th years that the promotions are

⁷The officers that enter the IAS through the UPSC exam are referred to as ‘Direct Recruits’ and the ones that come from the State Civil Services are called ‘Promotees’.

⁸The Promotees typically become IAS officers pretty late in their careers.

⁹See http://persmin.gov.in/DOPT/EmployeesCorner/Acts_Rules/IASPromotionGuideLines.pdf

based on screening of the bureaucrats.

As collectors, the bureaucrats are responsible for law and order, collection of land revenue and various taxes, land acquisition and land assessment, crisis administration, and serve as the development officer. The main role of the collector relevant for this study is that he is Ex-officio Chairman of District Rural Development Authority Agency which carries out the various developmental activities. Any development project that has to be executed in the district must be approved by the collector.

The IAS officers are civil servants and, as per the directives of the Constitution of India, they cannot be hired or fired by the politicians. The bureaucrats are assigned to various posts in each state by the corresponding Department of Personnel and Training. The executive order of each assignment is signed by the top bureaucrat of each state known as the Chief Secretary. There is some evidence, however, that politicians may influence the assignments of the bureaucrats. Iyer and Mani (2012) show that when the leader of the party in power in a state changes, the probability of reassignments of bureaucrats goes up. Hence, politicians may use the threat of reassigning the bureaucrats to different posts as a control mechanism. Moreover, the politicians can potentially influence bureaucrats' job assignments once they are up for the promotions described above. Later, this paper explores how political competition affects the ability of the politicians to use these promotions as an incentive mechanism.

2.2 The Politicians

India has a federal parliamentary system of democracy. The parliament is the supreme legislative body. There are two houses in the parliament - the lower house is called the Lok Sabha (House of the People) and members of this house are directly elected by the citizens. The upper house is called the Rajya Sabha (Council of States) and the members of this house are elected by the state legislative assemblies.

This analysis will focus on the members of parliament (MPs) in the Lok Sabha. There are 543 Lok Sabha constituencies. In accordance with the Constitution, elections are held every five years where candidates are selected through universal suffrage. India has a plurality system where the candidate with the highest vote share wins (also called "first-past-the-post"). There is a multi-party system and candidates are allowed to contest independently as well. There are no term limits for politicians in India.

2.3 The MPLAD Scheme

The local public goods projects that this paper studies are the ones provided under the MPLAD (Member of Parliament Local Area Development) Scheme in India. Under this scheme, each MP is given a fixed budget of Rs. 20 million (0.5 million USD) per year to spend anywhere within his constituency. The money can only be spent on asset building projects. This means that politicians cannot hire employees, give grants and loans, or purchase inventory or stock with this money. Moreover, the guidelines say that acquisition of land, building assets for individual benefits and building religious structures is not permissible. In short, most of the permissible works are construction-based and are for infrastructure development within the constituency.

One of the particularly relevant features of these projects is that they are highly visible. According to the guidelines, the MP who funded the project must visit the work site and unveil a plaque detailing the project when it is complete. The MP's name is written on the plaque along with how much money was spent and how long it took for the project to be completed. The fact that the public knows these details gives the politicians an incentive to ensure that projects are completed in a timely manner. Since the projects are executed by the bureaucrats, this provides us a very nice set up to see whether political competition affects the performance of bureaucrats in executing these highly visible projects.

2.4 The Bureaucrat-Politician Interaction

MPLAD is a unique scheme where we observe the decision of each politician separately and can also observe the performance of bureaucrats. When the money from the fund is allocated to the politicians, they send a recommendation letter to the collector. This recommendation letter details the following: [1] the type of projects the politician wants (roads, drinking water, education, etc) [2] the cost of each project and [3] the location of each project. The total cost of various projects recommended by the MP has to be within the fixed budget of Rs. 20 million. Hence, the politician has complete control of what to choose, where to build, and how much to spend on each project.

Once the bureaucrat receives the recommendations for the project, the project goes through a sanctioning process. The collector chooses the implementing agency and sends the proposal to its chief engineer. The engineers inspect the site, prepare a technical and feasibility report, and send this report back to the bureaucrat. The collector reviews the structural and financial report and then approves the project if everything is sound. The time between receiving the recommendation and approving the project will be henceforth referred to as the time taken

to sanction the project.

The collector has the full authority over the sanctioning of the project and the politician has no say in it ¹⁰. Over the period of this study, the official guidelines suggest that the number of days taken to sanction should not exceed 45 days. Once project is sanctioned, the engineers and lower level bureaucrats execute the project with the collector having full control over the implementation process.

The bottomline is that the members of parliament depend completely on the bureaucrat to carry out the projects that will ultimately bear the politician's name. This provides incentives to the politician to monitor the bureaucrat as his image is at stake.

2.5 Administrative and Electoral Boundaries

Electoral boundaries in India are intended to create constituencies such that each politician represents the same number of citizens in the parliament. The Delimitation Commission of India is responsible for drawing the boundaries based on population figures from the census. Before our study period, the Delimitation Committee was set up in 1952, 1963, and 1973. In a 1976 constitutional amendment, the government suspended delimitation until after the 2001 census so that states' family planning programs would not affect their political representation in the Lok Sabha. The report of the 2001 census came in 2003 and the new boundaries were applicable only in 2009. Hence, during the entire period of this study, 1999-2009, the electoral boundaries remained the same.

Figure 1 depicts the electoral boundaries. As we can see, the size of the constituencies are not uniform; some are large and some are small. The smaller constituencies are in areas where the density of population is higher. This is especially true for Uttar Pradesh in the north and West Bengal in the west.

In contrast to electoral boundaries, the administrative boundaries are drawn based on land area. This is done so that each district collector is responsible for land revenue, law and order and development works for the same area of land. Unlike electoral boundaries, district

¹⁰The collector has full control of the technical feasibility checks. In some of the districts we visited, we found that collectors required the chief engineers of all the implementing agencies to provide a weekly report of the works in progress. In other districts, this practice was not enforced. If the bureaucrat does not monitor the engineers, the reports are not sent to the collector on time. Bureaucratic delays therefore come from two sources: [a] bureaucrat not monitoring the feasibility checks and [b] upon receiving the report, bureaucrats taking a long time to reviewing and approving it.

boundaries do not change over time. There are cases where district boundaries are redrawn and this happens when the states split into two. In 1998, three of the largest states in India split and due to this districts also split into smaller sizes. However, this happened before our period of study and does not affect our analysis.

Since the electoral boundaries and administrative boundaries are drawn according to different dimensions, these boundaries do not perfectly coincide. One electoral constituency may overlap between two administrative districts and vice versa. Figure 2 shows these overlaps across India. If we zoom in, the overlaps of boundaries are clearer, as shown in figure 3. The highlighted portion illustrates a possible district-constituency overlap situation where one bureaucrat works with three politicians at any given point in time. We exploit this feature to control for selection and unobserved ability of bureaucrats. We provide more details of this once when we discuss the empirical identification strategy. We also exploit the fact one politician may deal with multiple bureaucrats at a point in time. This is analyzed in section 6.6.

3 Theoretical Framework

As described earlier, there are two ways in which electoral competition can affect the politician's incentives to induce better bureaucratic performance. In order to study how these mechanisms work, we adapt a canonical efficiency wage model with endogenous monitoring to make two modifications: [a] let the wages be fixed exogenously and [b] consider a two period dynamic contract with one-sided commitment where the principle commits to promises of future payoffs. The model is useful for two main reasons: [1] it furthers our understanding of how the potential mechanisms work and [2] the comparative statics derived in the model provide us with testable predictions which we can use to identify which mechanism is at work in the data.

3.1 The Environment

Consider a politician ('he') who has a public good project in each period t that has to be executed by a bureaucrat ('she'). The bureaucrat has to exert an effort to implement the project. Let $e_t \in [0, 1]$ denote the effort level chosen by the bureaucrat in period t . The output takes values $\pi_t \in \{0, 1\}$. Putting in higher effort increases the probability of successfully implementing the project such that $Prob(\pi_t = 1) = e_t$. Putting in effort is costly and to obtain an interior solution, the cost is assumed to be convex: $c'(e) > 0$ and $c''(e) > 0$. For simplicity, we assume that $c(e_t) = e_t^2$.

There are two features of the institutional setup that limit politician's ability to directly control the bureaucrat. Firstly, the wages of the bureaucrats are fixed and determined exogenously. Politicians cannot affect these wages. Secondly, politicians cannot hire or fire the bureaucrats.¹¹ In lieu of these direct methods of control, politicians have indirect ways in which they can control the bureaucrat. The politicians can give a letter of recognition in each period if the bureaucrat puts in effort. Let's assume that this gives a utility r to the bureaucrats. Secondly, and more importantly, the politicians can influence the re-assignment of bureaucrats to other administrative districts (Iyer and Mani (2012)). If bureaucrats perform well, politicians can reward them by providing them more lucrative assignments in the future.

Let us now see how these two instrument of control are used by politicians to provide incentives to the bureaucrat for putting in higher effort. At $t = 0$, the politician announces that the bureaucrats will be monitored with probability $q_t \in [0, 1]$ in period $t \in [1, 2]$. If the bureaucrat is monitored and is caught shirking, she does not get a letter of recognition in the current period. Moreover, the politician can further punish her in the future by assigning her to an undesirable post (hence giving a low continuation value V'). The principal would like to make $V' \rightarrow -\infty$ since this threat would be enough to induce the bureaucrat to work and it would mean that he will not have to monitor the bureaucrat. However, such a threat is not credible and hence we assume that $V' \geq 0$. Also, monitoring is costly. Let cost of monitoring bureaucrat be $C(q_t) = q_t^2$ such that $C_q > 0$, $C_{qq} > 0$.

The second way to incentivize the bureaucrat is to promise a higher future payoff in the form of more lucrative assignments. This is captured via the future continuation value V which the bureaucrat discounts at rate $\beta(\phi) \in [0, 1]$ where ϕ is the extent of electoral competition in the constituency politician represents. The discount rate depends on the level of competition because if the electoral constituency is competitive, then the probability of winning in the next election is low. In such an event, promises of future rewards are less credible and the discount rate is close to zero. Hence, $\beta'(\phi) < 0$. Effect of electoral competition on optimal effort through beta will henceforth be referred to as "access to dynamic contracts" mechanism.

The politician offers a contract (q_1, q_2, e_1, e_2) to the bureaucrat and the latter chooses e' to maximize his own payoffs. The bureaucrat's expected payoff in period zero is therefore given by:

¹¹This setting is not unique to India. It exists in many other countries, especially the commonwealth countries where there exists some form of civil service.

$$U^B = \sum_{t=1}^2 \beta^{t-1} \left[w + (1 - q_t)r + q_t \mathbb{1}\{e'_t = e_t\}r - e_t'^2 \right]$$

Let $R(e, \phi)$ denote the present value of gross payoffs the politician gets when the project is implemented. If the project is not implemented, he gets a zero payoff. Note that the payoff function is concave in effort: $R_e(e, \phi) > 0$ and $R_{ee}(e, \phi) < 0$. This ensures a unique solution. The electoral motives are captured in this gross payoff function: when $R_{e\phi}(e, \phi) > 0$, it means that the marginal increase payoff when the project is implemented increases as the extent of competition increases. This is exactly what the reelection concern motive would suggest. To get a closed form solution, we assume $R(e, \phi) = R(\phi)\sqrt{e}$.

The politician's expected payoffs are: $U^P = \sum_{t=1}^2 \beta^{t-1} \left[R\sqrt{e_t} - q_t^2 \right]$.

3.2 The Maximization Problem

The politician's problem can be written recursively as:

Period 1:

$$\max_{e_1, q_1, V, V'} \quad R(\phi)\sqrt{e_1} - q_1^2 + \beta(\phi)\mathbb{Q}(V) \quad (1)$$

subject to:

$$\text{IC}_1: \quad w + r + \beta(\phi)V - e_1^2 \geq w + (1 - q_1) \left[r + \beta(\phi)V \right] + q_1\beta(\phi)V' \quad (2)$$

$$\text{PC}_1: \quad w + r + \beta(\phi)V - e_1^2 \geq 0 \quad (3)$$

$$\text{NN:} \quad V \geq 0; \quad V' \geq 0 \quad (4)$$

Period 2:

$$\mathbb{Q}(V) = \max_{e_2, q_2} \quad R(\phi)\sqrt{e_2} - q_2^2 \quad (5)$$

subject to:

$$\text{IC}_2: \quad w + r - e_2^2 \geq w + (1 - q_2)r \quad (6)$$

$$PC_2: \quad w + r - e_2^2 \geq V \quad (7)$$

IC_t represents the incentive compatibility constraint in period t and says that the payoff the bureaucrat gets from putting in effort $e'_t = e_t$ is at least as much as the payoff from shirking and putting in zero effort. The participation constraint (PC_t) ensures that, in each period, the payoff from putting in effort is at least as much as what the bureaucrat gets when he does not work on executing the politician's project.

In the first best scenario, the effort is observable. There is zero monitoring in both periods and the effort level chosen by the politician is a solution to the above problem without the IC constraints and without q . In this scenario, the participation constraint binds at optimum in each period. Consider the second period: if PC_2 is not binding at optimum, then the effort level can be increased without violating the constraint. This creates a contradiction because it increases the politician's payoffs. Hence, the participation constraint binds in period two and we get $e_2^{FB} = \sqrt{w + r - V^{FB}}$. Consider now the first period. If the participation constraint is not binding, the politician can now do two things. He can increase e_1 and increase his payoffs in period 1, or reduce V and increase his payoffs in period 2. Hence, at optimum, the participation constraint of period one should also bind. Solving the first period problem gives us: $e_1^{FB} = \sqrt{w + r + \beta V^{FB}}$.

How do the effort levels compare to the case where the politician offers a static contract each period? In the static contract case, the politician implements the same level of effort: $e_2^s = \sqrt{w + r} = e_1^s$. Note that $e_1^{FB} > e_1^s$ and $e_2^{FB} < e_2^s$. This shows that by having access to dynamic contracts, the politician can use the promise of a higher future payoff in order to improve performance in the first period. By keeping his promise in the second period, he gives the bureaucrat a higher payoff by reducing the effort level the bureaucrat is asked to implement.

Let us now turn to the second-best problem defined by equations (1)-(6). Similar to the first best scenario, $e_1^* > e_2^*$. Even in the presence of moral hazard, the politician can front-load the incentives to induce the bureaucrat to work harder in the first period of the contract. To curb deviations from the contracted effort level, the politician engages in costly monitoring. The solution to the second-best problem is collected in the following proposition:

Proposition 1: *The unique optimal contract solving the second-best problem is characterized by:*

$$e_2^* = \sqrt{(w + r - V)} \quad (8)$$

$$q_2^* = \frac{w + r - v}{r} \quad (9)$$

$$e_1^* = \alpha R^{\frac{2}{7}} [r + \beta V^*]^{\frac{4}{7}} \quad (10)$$

$$q_1^* = \alpha R^{\frac{4}{7}} [r + \beta V^*]^{\frac{1}{7}} \quad (11)$$

$$V^* \text{ solves: } 2\alpha R^{\frac{8}{7}} [r + \beta V]^{\frac{9}{7}} - \frac{1}{r} - \frac{3}{16} R (w + r - V)^{\frac{-7}{4}} = 0 \quad (12)$$

$$V'^* = 0 \quad (13)$$

where $\alpha = 8^{\frac{-2}{7}}$.

Proof: See Appendix. ■

3.3 Comparative Statics: Effect of Electoral Competition

We now examine how the optimal level of effort implemented by the politician changes as level of competition changes.

Case I: Pure re-election concerns, inability to use dynamic incentives

In this case, the politician can only use static contracts each period. This means $\beta(\phi) = 0$ and $e_1^* = \alpha R(\phi)^{\frac{2}{7}} r^{\frac{4}{7}}$. As the level of competition increases, the marginal return to politicians from extra effort put into the project by the bureaucrat increases. This is because in competitive districts, the value of increase from a small vote share is much higher than in stronghold constituencies. Thus, re-election concerns suggest $R_\phi > 0$. Differentiating the optimal effort level with respect to ϕ gives us:

$$\frac{de_1^*}{d\phi} = \frac{2}{7} \alpha R^{\frac{-5}{7}} r^{\frac{4}{7}} R_\phi > 0 \quad (14)$$

This suggests as the level of competition increases, re-election concerns put pressure on the politician to induce a higher effort level from the bureaucrat. Now, starting from the optimal level of effort, what happens if the probability of winning goes to zero? Since the probability of winning being zero means lack of re-election concerns similar to that of low ϕ , 14 tells us that the optimal effort level should fall.

Case II: Ability to use dynamic incentives, no re-election concerns

This case corresponds to $R(\phi) = R$. Now, whether the politician is able to use the promise of future payoffs to induce effort depends on $\beta(\phi)$. With high electoral competition, $\beta(\phi) \approx 0$ such that these politicians can only provide static contracts in each period. This reduces the first period effort level to $e_1^{comptt} = \alpha R^{\frac{2}{7}} r^{\frac{4}{7}}$. Dividing this expression with the expression for the effort level that can be implemented by the recursive contract by politicians in strongholds, we get:

$$\frac{e_1^{comptt}}{e_1^{stronghold}} = \frac{r^{\frac{4}{7}}}{(r + \beta V)^{\frac{4}{7}}} < 1 \quad \Rightarrow \quad e_1^{comptt} < e_1^{stronghold}$$

This shows that as level of competition rises, politician’s ability to use the long-term contracts falls since the probability of them getting re-elected is low. This affects the optimal effort level that can be implemented. Now, what happens if the probability of winning falls to zero? In this case, both re-election concerns and dynamic incentives are shut down ($\beta(0) = 0$ and $R(0) \Rightarrow e_1^* \rightarrow 0$). Thus, starting from any effort level, exogenous decrease in winning probability should reduce optimal effort level.

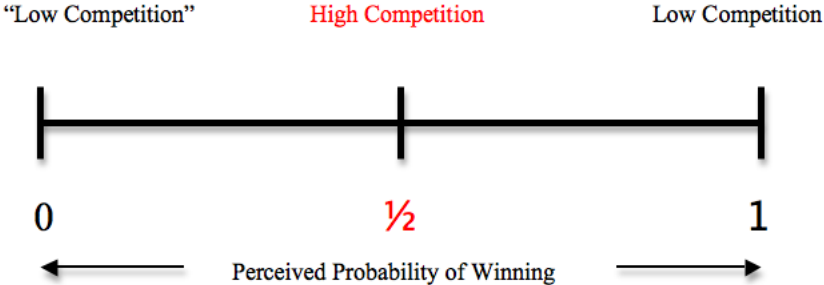
We can summarize the theoretical predictions in the following table:

Table 1: Predictions for the Potential Mechanisms

Mechanism	$\frac{\delta e}{\delta \phi}$	Δe as Prob(win) $\rightarrow 0$
1 Re-election Concerns	(+)	(-)
2 Access to Dynamic Contracts	(-)	(-)

Now, how do we interpret the two columns of table 1? The first thing to note is that extent of electoral competition is non-monotonic in the probability of winning as shown in the figure below. When the probability of winning is close to zero, the politician does not face any re-election concerns. Moreover, he does not have access to dynamic contracts. On

the other hand, when the probability of winning is close to one, the politicians can credibly make future promises to bureaucrats. However, the re-election concerns are weak at this end of the spectrum as well. Now, when the probability of winning is close to half, the pressure of electoral competition is the highest.¹²



The predictions in table 1 look at what the mechanisms have to say about change in optimal level of effort when we move away from probability of winning at half. Predictions in column (1) tell us how the level of effort changes when the probability of winning increases towards one. In column (2) however, we are looking at what the mechanisms have to say when we move away from half towards probability of winning being zero. Carrying out both the exercises can help us identify which of the mechanisms is dominant.

4 Data

4.1 Data Sources

The main source of data on local public goods comes from the MPLAD database. We have data for each project that was recommended and sanctioned across all 392 constituencies in 12 major states in India over the period 1999-2009. These cover 72% of all constituencies in India and two Lok Sabha election terms: 1999-2004 and 2004-2009.¹³ The details of the projects available to us include the type of the project (whether its a road project, drinking water project etc.); the cost incurred; the location; the day on which the project was recommended and the day on which it was sanctioned by the collector. For a subset of projects,

¹²Strictly speaking, the probability of winning is half if there is a contest between two candidates. In India, there is a multi party system. However, in many cases there are two strong players and several smaller ones. Even if there are three strong players, for the incumbent, what matters is how far he is from the next best candidate.

¹³These 12 major states are: Uttar Pradesh, Madhya Pradesh, Andhra Pradesh, West Bengal, Maharashtra, Gujarat, Kerala, Rajasthan, Tamil Nadu, Haryana, Chhattisgarh and Assam.

we also know the time lag between the day the project was sanctioned and the day on which the project actually got completed. We also know which implementing agency executed the project.

In the MPLAD data, even though we know which village the project was recommended in, we do not know the identity of the administrative district the village belongs to. We only know which constituency it belongs to. Knowing the identity of the districts is important for us to know which bureaucrat interacted with which politician. In order to find out which district the project was implemented in, we match village and block names from the MPLAD database to the village names in Census data. Our first iteration used a string matching algorithm and in cases where we did not find unique matches, we manually matched the village names.

Once we matched the village names across MPLAD data and Census data, it provided us with both district and constituency names for each village. In order to test whether the matching algorithm gave us correct matching, we use shape file data for villages from Census of India and shape files for constituency boundaries obtained from the Election Commission of India. Shape files contain the information on the boundaries of districts, constituencies, and villages. The observations appear as points on polygons. Points are the GPS coordinates and the polygons they form are the boundaries of the geographical unit under study. The following steps are followed in mapping projects from MPLAD data to districts: for each village, we find the centroid using the ArcGIS. We then take the centroid and figure out which polygon it belongs to in the district shape files and which polygon it belongs to in the electoral constituency shape files. This provides us with district-constituency pairs for each project. Using geospatial overlaps, we also obtain the extent to which the administrative and electoral boundaries overlap.

Once we obtain the district name for each project in the MPLAD database, we then identify which bureaucrat served as the collector in that particular district in that particular month and year. This allows us to see the identity of the bureaucrat who approved each project.

The information on bureaucrats is obtained from the Department of Personnel and Training (DoPT) in India. The DoPT keeps the records of all IAS officers in the form of Executive Record sheets. There is one ER sheet per bureaucrat. This provides us with information about their name, their cadre, their educational background as well as all assignments since the day they joined the civil services. We digitized these ERs in the form of a database and used it to figure out which bureaucrat was assigned as collector to which district over the

1999-2009 period. In any given district, over a ten year period, on average, we can expect five to six bureaucrats to serve as collectors. So, knowing just the district is not enough. We need to know exactly which bureaucrat served in any given month. Only then can we know which bureaucrat sanctioned which project. This piece of information is essential for our identification strategy.

The election data is obtained from the Election Commission of India. We obtain data for all parliamentary elections from 1989-2009. The main variable of interest is the extent of political competition. We look at various measures of competition. The first one is victory margin which uses information on vote shares of the winner and runner up. The second measure is whether a constituency is a party stronghold or not. This measure looks at identity of the party that won previous consecutive elections.

This data also provides us with the names of the winning candidates and their party affiliation. We can map the names across different electoral terms to see whether these politicians are rookies or have been serving for a long time. This allows us to control for politician's experiences. We also use the party information to see if the MPs are from the same party as the party in power at the center. This proxies for political connection of the politicians.

4.2 Measuring Bureaucrat's Performance

The objective of this paper is to examine how bureaucrats' performance is affected by electoral competition. For this exercise, we need to define a task assigned to bureaucrats and compare how they perform this task. In this paper we propose a new way of measuring bureaucratic performance: time taken to approve development projects. This is equal to the number of days between the date on which the politician recommended the project and the date on which the bureaucrat gave his stamp of approval. The main advantage of this measure is that this task is purely under the control of the bureaucrat: any delays in approval can be directly attributed to him.

Alternative measures used in the literature are time taken to complete projects (i.e. time taken for construction to complete) and completion rates (i.e. proportion of projects that got completed)¹⁴. While these measures are a good indicator of overall governance, we cannot use these to identify which bureaucrat is at fault if delays occur. Completing a project involves several individuals and in infrastructure projects, unobserved factors like the weather can be important reasons for delays. Since the execution process is more complex and has many

¹⁴See Roggers (2014)

more unobservables compared to the sanctioning time, we prefer to use the later measure. If approvals take a long time, then we know that it is because the bureaucrat is not putting the effort to get things done. Being able to directly observe the actions of the bureaucrat gives us an advantage over other measures.

Given that our measure is directly related to the decisions of a single individual, it is comforting to know that it is positively correlated to completion times. For a very small subset of projects in our database, we have information on the date at which the project construction began and the date at which the project construction ended. We use this additional information to construct a measure of delay in completion - this is the time between the date of sanctioning by the bureaucrat and the date at which the project construction was completed. Note that this measure of delay does not include time taken to sanction - it only looks at how long a project took to complete *after* it was sanctioned.

Table 3 explores the relationship between time taken to sanction projects and time taken to complete projects. As we can see, there is a significant positive correlation between commencement and sanctioning time. This suggests that if bureaucrats perform better according to our measure, then the projects get started faster. In column 2, we see that if bureaucrat gets project sanctioned within 10 days, then the the delay in commencement of projects reduces by more than 3 months. This is a very large magnitude. Moreover, if projects take more than 90 days to sanction, the then the project construction is delayed by about 7 months. Hence, the speed of sanctioning and speed of project construction move in the same direction¹⁵.

5 Empirical Identification Strategy

Consider the following model:

$$y = \mu_0 + \mu_1 * Competition + \epsilon \tag{15}$$

where y denotes the time taken to sanction a project. We are interested in establishing the causal effect of competition on time taken to sanction the project. Identifying the parameter μ_1 requires two things: [1] there should be no reverse causality and [2] there should not be any other unobservables that affects our measure of competition.

¹⁵Although time taken to sanction projects is a more direct way of measuring bureaucratic performance, it would be nice to replicate the tables with an additional measure. However, we have very little data on time taken to complete the projects, hence cannot carry out such an analysis.

In the literature, lagged victory margins are often used as measures of competition. This measure assumes that past victory margins are a good predictor of the future victory margins. Moreover, any deviations between the past and future victory margins are assumed to be random and independent to the outcome variable of interest. Now, in our setup, this assumption is violated if we believe that the bureaucrat's performance between the two elections can affect the future victory margin. Moreover, Ravishankar (2009) shows that there is a strong anti-incumbency effect in Indian elections. Hence, past victory margins may not fully capture the re-election concerns faced by the incumbent.

5.1 Obtaining Exogenous Variation in Probability of Winning

In order to obtain the causal effect of electoral competition on bureaucrats' performance, we need to have a truly exogenous source of variation in political competition. To get such a variation, we take advantage of an information shock that occurred in the middle of the 2004-2009 legislative term. This shock exogenously changed some incumbents' perceived probability of winning in the next elections to zero while not affecting other incumbents. Henceforth, we refer to the constituencies that are affected by the shock as the treated group while those that are not affected by this shock are the control group. We can then compare the sanctioning times of the treated and control groups before and after this shock. Since this event essentially causes an exogenous change in the electoral competition, the differences-in-difference strategy will give us a causal effect of change in political competition on the performance of the bureaucrat.

The information shock we take advantage of is an outcome of the redistricting process that took place in India from 2002-2007. The Government of India froze the changing of electoral boundaries in 1976 and the freeze was supposed to be lifted after the 2001 census was carried out. A delimitation commission was set up in 2002 with the objective of redrawing the electoral boundaries such that the population shares across constituencies are equalized. The total number of constituencies were to remain unchanged. In addition to the equalization of population, the commission re-demarcated the SC/ST constituencies. The SC/ST constituencies are 'reserved' in the sense that only candidates who belong to the Scheduled Caste (SC) or Scheduled Tribe (ST) are allowed to contest. Those constituencies that are not reserved, allows any citizen to contest as a candidate.

Article 330 of the Constitution of India says that the number of constituencies (or 'seats') reserved in any state should be proportional to the number of total seats within a state. Which seat is reserved depends on the relative population of SC/ST across constituencies. So, when the constituency borders are being redrawn, the politicians cannot predict whether their own

constituency will be reserved or not because the reservation status depends on how boundaries of *other* constituencies were re-drawn. This fact is important for the identification strategy. This is because politicians may attempt to influence the re-districting process in order to benefit from it. If the influence in re-districting is a function of political competition, then the concern is that this event may not be truly exogenous. But, since there is no threshold rule but reservation is based on relative population shares, the announcement of the *reservation status* acts as an exogenous information shock to the incumbents, even if the redistricting may have been endogenous. ¹⁶

The report of the delimitation commission of 2002 came in December 2007. This information shock is in the middle of the term 2004-2009. Figure 4 depicts the timing of the announcement. It shows that conditions for using difference-in-difference (DID) strategy are ripe. We now need to do the following: [1] clearly define the treatment group and [2] show how this exogenous information shock changed the perceived probability of winning for the treated group.

A constituency can be of three types: [1] reserved for only candidates who belong to SC category, [2] reserved for ST category candidates and [3] GEN (General) category where any citizen can contest (including SC/ST candidates). Under 1972 delimitation, certain constituencies were reserved for SC or ST categories. The incumbents who took office in May 2004 were elected according to the reservation scheme as under 1972 directives. In 2007, the incumbents got to know the reservation status of their constituency for the 2009 election. All those constituencies where there was no change in the reservation status - are in the control group. The electoral districts where there were changes in the reservation status can be classified into two types of treatment groups: [1] REStoGEN - where the constituency was reserved under the 1972 delimitation but all types of candidates were allowed to contest under the 2002 delimitation. [2] GENtoRES - in this case the constituencies were open to all before and in 2007 it was announced that they will be reserved only for SC/ST candidates from 2009 elections.

For incumbents who don't belong to the SC/ST category in the GENtoRES constituencies (which is 87% of all candidates), the change in the reservation status means that they will not be allowed to contest again. Hence, their probability of winning in 2009 is deterministically zero. For the incumbents in REStoGEN, the probability of winning is not conceptually zero because they are, in principle, allowed to contest again. However, as we will show now, the

¹⁶A paper by Iyer and Reddy (2013) provides further support for our identification strategy. They study the redistricting process in India and find that "the redistricting process does not appear to have been influenced by incumbent politicians to a great extent."

perceived probability of winning for these incumbents would have been very close to zero.

In table 7, consider the group "Gen to Gen." There are 342 constituencies where all candidates could contest in 2004 as well as in 2009 elections. This group is a subset of the control group. Column (2) shows that out of all contestants in these constituencies, only 16% were SC/ST candidates. This means out of 4,477 candidates in these constituencies, only 716 were from reserved category. All these constituencies had at least one candidate who was from reserved category. Column (4) shows that out of these 342 constituencies, only 6 constituency had a winner who came from the reserved category. So, less than 2% of the constituencies open to all had a SC/ST leader.

What do these statistics tell us? Consider an incumbent in the REStoGEN treatment group. In the middle of the term, he gets to know that the constituency he represents will be open to competition from other general category candidates. These are career politicians that have a fair amount of idea about what the chances of an SC/ST candidates are in winning an election in GEN category constituency. The above calculations tell us that in 2004, the only 2% of the reserved candidates are successful in winning a seat - this is a fairly low number. Hence, the increase in competition from general candidates is likely to take the perceived probability of winning for incumbents in REStoGEN category is close to zero.

Moreover, there is another source of competition faced by these incumbents: intra-party competition. An incumbent of party A may be getting the party ticket to contest in the reserved category constituencies because he may be the best SC/ST candidate. But when the constituency gets de-reserved, this incumbent is up against the general category candidates to get the party ticket to contest in the first place. There are two facts that confirm this: [1] None of the incumbents in the REStoGEN treatment group got a ticket to contest again in 2009 and [2] ALL 2009 candidates in REStoGEN group belonged to the GEN category - none of the candidates were from SC/ST category!

Hence once the information shock came in 2007, it is reasonable to assume that due to increase in both intra-party competition and competition from other contestants, the SC/ST incumbents' perceived probability of winning in 2009 jumped very close to zero within the REStoGEN.

5.2 Isolating the Mechanisms

While the natural experiment described above helps us determine the causal effect of competition on bureaucratic performance, it does not tell us which mechanism drives the results. This is because when the probability of winning goes to zero, both re-election concerns as well as access to dynamic contracts shut down. In order to see what happens when probability of winning goes to one, we use an alternative measure of extent of electoral pressures: whether a constituency is a party stronghold or not. We define stronghold as a dummy variable that takes value one if the same party won over all four elections between 1989-1998. Table 5 shows that the probability of a stronghold party winning again in 1999 is 65% and winning in 2004 is about 70%. These probabilities are significantly higher compared to non-stronghold constituencies. Note that by construction, our measure of stronghold compares those constituencies where parties have survived the anti-incumbency effect in the past with ones that did not survive it. Hence, the incumbents of stronghold constituencies face less electoral pressures compared to the non-strongholds.

Now, how long bureaucrats take to sanction projects depends on their ability. If higher ability bureaucrats are assigned to strongholds, then the error term is correlated to the main regressor of interest. This gives rise to the following selection problem: if we observe a negative relationship between our competition measure and time taken to sanction, it could very well be driven by bureaucrat's ability. To solve this problem, we exploit two features of our data: [a] panel structure and [b] boundary overlaps. The latter refers to the fact that the administrative and electoral boundaries do not perfectly overlap in India. A single district may have two or three Lok Sabha constituencies that overlap with it. Since the collector is the head bureaucrat in a district and the politician is the elected representative of the electoral constituencies, we have situations where one bureaucrat may deal with two or even three politicians.

Figure 3 illustrates such a possibility of overlaps. In this example, the district overlaps with three constituencies: 1, 2, and 3. Each of these politicians face different levels of political competition in their constituencies. However, all three politicians have to depend on this bureaucrat for execution of projects within the district boundary depicted in black color. We can compare the average time taken by this bureaucrat for each of the three politicians. Since we keep the bureaucrat fixed, this controls for the unobserved ability. If we observe that the bureaucrat sanctions projects faster for the politician in the stronghold, then we can attribute the difference in performance to the difference in level of competition.

Our discussion so far provides us with two models that we can use to isolate the mechanism

that drives the relationship between political competition on bureaucratic performance:

$$y_{ibpc} = \beta_0 + \beta_1 * Party_Stronghold_c + \epsilon_{ibpc} \quad (16)$$

$$y_{ibpc} = \gamma_0 + \gamma_1 * (Prob(win) = 0)_c * Post + \gamma_2 * (Prob(win) = 0)_c + \gamma_3 * Post + \epsilon_{ibpc} \quad (17)$$

where, y_{ibpc} denotes the time taken to sanction project i by bureaucrat b when paired with politician p in constituency c . The variable *stronghold* means that the same party had won all four elections prior to 1999 elections.

Now, how do we interpret β_1 and γ_1 ? When the party of an incumbent has a stronghold over the constituency then it means that the probability he will win again is very high (close to 1). Hence, we can think of β_1 as the effect on approval speed as probability of winning goes to 1. On the other hand, our exogenous shock works as a term limit on the incumbents. Therefore, γ_1 looks at the effect on bureaucrat's performance as the probability of winning goes to zero.

As discussed under the theoretical framework, different mechanisms predict different signs on β_1 and γ_1 . The following table provides the predictions of the alternative channels:

Table 2: Predictions for the Potential Mechanisms

Mechanism	β	γ
1 Re-election Concerns	(+)	(+)
2 Access to Dynamic Contracts	(-)	(+)

Note that our measure of bureaucratic performance is time taken to sanction a project which can be thought of as negative of e in the model. Hence, in column 2 of table 2, the signs are flipped compared to table 1, column 2. Moreover, since *stronghold* is negatively correlated to ϕ (the extent of competition), the signs in column 1 are the same in both tables.

6 Empirical Results

We begin by providing the OLS estimates for the effect of electoral competition on time taken to sanction the projects when the measure of competition is victory margin in the previous election. Table 6 gives the results of this specification. Column 1 shows that as margin of victory increases by 1%, the time taken to sanction the projects reduces by about a day. Now, the 10th percentile victory margin distribution is at 1.8% while the 90th percentile is at 22.6%. Back of the envelope calculations suggest that moving from one end of the distribution to the other, a fall in electoral competition reduces the number of days to sanction by about 16 days¹⁷. Hence, bureaucrats perform better when electoral competition is low.

As we discussed before, past victory margin may not be a good predictor the extent of competition faced by the politician in the next election. Moreover, there are concerns about reverse causality when one uses this measure. We now present the results from the difference-in-difference specification. It provides us with the causal effect of change in politician’s probability of winning on bureaucrats’ performance.

6.1 Results from Difference-in-Differences Strategy

Consider the following model:

$$\begin{aligned} y_{ibpct} &= \gamma_0 + \gamma_1 * Treatment_c * Post + \gamma_2 * Treatment_c + \gamma_3 * Post & (18) \\ &+ \pi_p + \phi_b + \tau_t + \psi + \epsilon_{ibpct} \end{aligned}$$

where, y_{ibpct} denotes the time taken to sanction project i by bureaucrat b when paired with politician p in constituency c in year t . π_p , ϕ_b , τ_t and ψ are fixed effects as defined before. The variable ‘Treatment’ takes value one if the announcement of delimitation affected the particular constituency while ‘post’ is a dummy variable denoting the period after the delimitation (2008-2009).

Table 7 gives the results for specification 18. The difference-in-differences estimate γ_1 is positive and statistically significant at 10% l.o.s. It shows that as the probability of winning goes to zero, the average time taken to sanction a project increase by about 10 days. Given

¹⁷Assuming a linear relationship between victory margin and time taken to sanction.

that the mean of the dependent variable is 73 days, it means that sanctioning time increases by approximately 13%. In column 2, we use the cost of project as a measure of the size of project. The results remain unchanged.

6.2 Falsification Tests for DID Strategy

One key assumption of DID estimation is that the trends in outcomes of interest would be the same in both the groups in absence of the shock, and it is the new information that induced a deviation from the common trend. One way to check this is to compare the trends before the shock took place. This can be carried out formally by creating a fake shock prior to the actual shock and estimating model with the same treatment and control groups. If pre-trends in time taken to sanction are the same, then the difference-in-differences estimates with the ‘fake’ shock should be zero.

We create such a fake shock occurring in December of 2005, two years prior to the actual shock. The treated and control groups remain the same. Table 8 provides the results of this specification. As we can see, the magnitudes of the difference-in-differences estimator has gone down substantially. Moreover, the coefficient is insignificant. This is comforting and suggests that we can assume that pre-shock trends in times taken to sanction were same across the control and treated groups.

6.3 Isolating the Mechanisms

While the DID estimate provides us with the causal effect of politician’s probability of winning on bureaucrats’ performance, it does not by itself help identify the causal mechanism. As discussed before, this is because when the shock occurs, both re-election concerns as well as access to dynamic incentives shut down. In order to identify which mechanism is driving the results, we now estimate the following model:

$$y_{ibpct} = \beta_0 + \beta_1 * Stronghold_c + \pi_p + \phi_b + \tau_t + \psi + \epsilon_{ibpct} \quad (19)$$

where stronghold is a dummy variable that takes value one if the same party won over all four elections between 1989-1999. π_p and ϕ_b are politician and bureaucratic effects respectively. τ_t corresponds to year fixed effects and ψ denotes project type fixed effects.

Column (1) of Table 9 provides the estimates of equation 19. The average time taken to sanction a project is significantly lower by a magnitude of about nine days if a constituency is

a party stronghold compared to when its not. Comparing this to the mean of the dependent variable, we find that this constitutes about an 11% decrease in approval speed. In column 2, we add the size of the project which is meant to capture how big the project is. Column (3) controls for politicians experience and shows that more experienced the politician is, the faster the projects are sanctioned. This does not change the effect of being a stronghold on the speed of approval. Column (4) controls for whether the incumbent is from the same party as the leader of the state and (5) includes party fixed effects. The results remain the same: when competitive pressures are very low, the projects are sanctioned significantly faster.

What does this tell us about the potential mechanisms? From table 2 we see - that we can reject the hypothesis that pure re-election concerns drive the results. The results are consistent with dynamic incentive mechanism: when the probability of winning is high, the politicians can credibly use dynamic contracts to incentivize the bureaucrat. In competitive areas, on the other hand, promise of future rewards are less credible.

6.4 Promotions: Direct Evidence for Dynamic Incentives

Until now we have been talking about future rewards without saying what they actually are. In this section we explore the nature of incentives provided to the bureaucrats. Since the bureaucrats we look at are career civil servants, their wages are determined exogenously. The only way the politician can control the bureaucrat is by reassignment to other districts or a plum job at the time of promotion. We now show that it is the promise of favorably affecting the promotions that induces bureaucrats to perform better.

Using the career histories, we construct a promotion timeline for the bureaucrats. As we mentioned before, we look at bureaucrats when they are collectors because this is the period in which they are responsible for approving and executing the public goods. This corresponds to roughly years 5-16 of their careers. In their 9th year, they are promoted to the next level but there is no screening: everyone is promoted¹⁸. This is basically a hike in their salaries. It is in the 13th and the 16th years that the promotions have a bite. The politicians can potentially influence bureaucrats' job assignments once they are up for these promotion.

We construct a variable that measures how far the bureaucrats are away from the promotions. For this exercise, we only consider bureaucrats who are in years 10-16 years of their career since the 9th year promotion is "non-functional". The variable "three years to promotion" means they are either in the 10th year of their career or just crossed 13th year. Two

¹⁸See http://persmin.gov.in/DOPT/EmployeesCorner/Acts_Rules/IASPromotionGuideLines.pdf

years and one year from promotion are defined similarly.

Our first hypothesis is that when bureaucrats are up for promotion, the performance should improve. Table 10 looks at effect of distance from promotion screening on approval times. Column (1) shows that compared to three or more years, the time taken to sanction is about 14 days less when the bureaucrat is up for promotion within the year. This magnitude is 20% of the mean of dependent variable. This result remains robust to controlling for project characteristics.

To see how the promotions tie up with the dynamic incentives, we now perform an empirical test. Suppose we are in time $t = 0$ and elections are to be held in period $t = 2$. Let B_1 denote a bureaucrat who is up for promotion in $t = 1$, i.e. before the elections. Let B_2 denote a bureaucrat who is up for promotion in $t > 2$. How should B_1 and B_2 perform? The answer rests in whether we are in a stronghold (S) or a non-stronghold (N).

Let us first consider the B_1 bureaucrats. These bureaucrats are going to be up for promotion before the next elections. This means that both the stronghold as well as non-stronghold politicians will be in office at the time of promotion. If favorable promotions are what the bureaucrats care about, then we should not see any difference in the time taken to approve for B_1 bureaucrats across strongholds and non-strongholds.

Now, let us consider B_2 bureaucrats who would be up for promotion after the elections. The politicians in strongholds are likely to be re-elected and hence would be able to affect the reassignment of the bureaucrats. On the other hand, politicians in non-strongholds are less likely to be in office in the next term and hence have a lesser ability to influence their bureaucrat's promotions. We should therefore find that B_2 bureaucrats perform better for stronghold politicians.

Table 11 presents the results of this exercise. The base category consists of bureaucrats who are up for promotion within a year in non-strongholds. The first row in panel A shows that the time taken to approve for B_1 bureaucrats in strongholds is the same as time taken for B_1 bureaucrats in non-strongholds. If we compare the time taken for B_2 bureaucrats across these constituencies, we find that time taken to approve is about 14 days *less* in strongholds. This is 19% of the mean dependent variable. Panel B provides the p-value for this difference. These results provide direct evidence for dynamic incentives: there is no difference in performance when both stronghold and non-stronghold politicians are likely to in office at time of promotion screening (before next elections). However, there is a significant difference in performance when one type of politician is likely to be in office to influence promotions and

the other type of politician is not likely to be in office.

An important point to note is that in addition to providing direct evidence for dynamic incentives, these results also help eliminate other alternative explanations for why, on an average, the projects are approved faster in strongholds. For example, one might expect politicians in strongholds to be of higher ability. That could mean that these politician monitor the bureaucrat more than the non-stronghold politicians and therefore we see better performance in strongholds. However, potential difference in politician ability cannot explain the promotion results. The only explanation that is consistent with promotion results is that politician's ability to provide incentives to bureaucrat matters for their performance.

6.5 Party Stronghold vs Politician Stronghold

Till now we have defined stronghold as those constituencies where the same party had been in power for a decade before our time period of study. If we think about the dynamic incentives mechanism, what matters is the relationship between the politician and the bureaucrat, not the bureaucrat-party relationship. If the results are indeed driven by relationship between politician and bureaucrat, then, these results should remain the same when we define stronghold as politician stronghold rather than party stronghold.

In our sample, within the party stronghold constituencies, 68% of them had the same politician win all four terms. Table 12 shows the results of the earlier analysis with politician stronghold dummies. Column (1) shows that in a politician stronghold constituency, time taken to approve projects is about 14% less than the average. This magnitude is similar to one obtained in column (5) of table 9. Column (2) examines the promotion results using the politician stronghold dummy. As before, consider bureaucrats two years away from next election. B_1 are those bureaucrats who will be screened for promotion before the elections and B_2 are ones that will be screened after the elections. The results show that there is no statistical difference between the time taken to approve by B_1 bureaucrats between strongholds and non-strongholds. However, B_2 bureaucrats take 33 days less to approve projects for stronghold politicians compared to non-stronghold politicians. These results are similar to the ones obtained in table 11, but the effects are much stronger.

6.6 Diluted Incentives: Role of Number of Bureaucrats per Politician

As we mentioned before, the administrative boundaries do not perfectly overlap with the electoral boundaries. This creates a situation where at any given time, one politician can

be working with multiple bureaucrats. In our dataset, there are 386 constituencies and 694 district-constituency pairs. Out of the 386 constituencies, 136 overlap with two districts and 80 constituencies overlap with three or more districts. The rest have only one bureaucrat per politician.

We interact the stronghold dummy with number of bureaucrats per politician. The hypothesis is that the more the number of bureaucrats, the worse the performance should be. To see why this is so, let us go back to our main mechanism. The politicians use current and future rewards to incentivize bureaucrats to put in higher effort levels. We can think of the number of rewards as being fixed. This is a valid assumption in our institutional setup since the contracts are implicit in nature are based on relationship between the politician and bureaucrats. These relational contracts require repeated interactions between the politicians and bureaucrats. When there are multiple bureaucrats per politician, it becomes costlier for the politician to implement a high effort level from all bureaucrats. In such a case, since the rewards per bureaucrat reduces, the incentives of bureaucrat to perform get diluted. Hence, we should see that projects take longer to get approved as the number of bureaucrats increase.

We now estimate the following model:

$$y_{ibpct} = \theta_0 + \theta_1 * Stronghold_c + \sum_{j=2}^3 \theta_j * Stronghold_c * jBureaucrats_c + \epsilon_{ibpct} \quad (20)$$

where j refers to the number of bureaucrats. The hypothesis is that $\theta_1 < 0$ and $\theta_1 < \theta_2 < \theta_3$.

Table 13 presents the results of the above specification. As we can see, when there is one bureaucrat per politician, the projects are sanctioned 15 days faster in strongholds than non-strongholds. However, when we compare the performance of bureaucrats in strongholds with one bureaucrat per politician with strongholds with multiple bureaucrats, the performance is worse when there are multiple bureaucrats. This is especially true when there are three or more bureaucrats. Hence, we cannot reject the hypothesis that $\theta_1 < \theta_2 < \theta_3$.

6.7 Speed of Approvals and Project Types

Our results show that politicians in strongholds are able to get the bureaucrats to speed up the sanctioning of projects. A valid concern is that politicians in low competition areas may

be systematically choosing to implement their pet projects faster. In this section we show that there is no ‘project bias’.

Before we proceed to look at specific project types, we first address the question of what the optimal time taken to sanction a project should be. The recommendation of Ministry of Statistics and Programme Implementation is that the decision to approve the project must be completed within 45 days. This threshold is supposed to be an upper bound to how long sanctions can take and is applicable to all types of projects.

In order to get a better understanding of the implementation process, we visited 17 districts in India. In each district, we talked to the district magistrate, the director of the development authority and four engineers. Engineers were asked the exact steps that are involved in the sanctioning process and how many days it generally takes. Based on the interviews, we find that the sanctioning process entails the following steps:

Step 1: Politician sends project recommendation to bureaucrat.

Step 2: Bureaucrat chooses implementing agency and sends proposal to chief engineer.

Step 3: Chief engineer assigns a junior engineer to go and inspect the site.

Step 4: Junior engineer inspects and submits a feasibility report.

Step 5: Chief engineer prepares budget estimate and technical feasibility report and sends it back to bureaucrat.

Step 6: Bureaucrat reviews structural and financial feasibility and approves the projects.

The bureaucrat (district magistrate) monitors the entire process of sanctioning. She can ask for a status update on whether project sites have been visited, whether the feasibility report has been submitted, etc. If the engineers are delaying the process and the bureaucrat does not keep tabs on the procedures, then administrative sanctions get delayed as well. Once the initial engineering reports are submitted, how long the bureaucrat takes to review the proposal is entirely in her control.

According to the engineer’s responses, all the above steps can be followed within approximately 30 days.¹⁹ Hence, the median upper bound from the engineer’s responses is 15 days lower than the official guideline of 45 days. These benchmarks suggest that projects that are

¹⁹The median number of days for the entire sanctioning process as reported by the engineers is 30 days while the average is 38 days.

sanctioned above 45 days are delays.

We now examine how being a stronghold affects the probability that projects are delayed. Column (1) of Table 14 looks at the probability of a project being sanctioned within 30 days. As we can see, the probability is 7% higher for stronghold constituencies. Moreover, column (3) shows that probability that the projects take more than 45 days to sanction is 5% less in stronghold. There is no difference between strongholds and non-strongholds in the probability of a project being sanctioned between 30-45 days. All specifications control for project type. These results suggest that the distribution of time taken to sanction shifts to the left for strongholds: the probability of delays is significantly lower and the probability of sanctioning projects within 30 days is also significantly higher.

Table 15 looks at these probabilities across project types. Panel [A] shows that the probability of the projects being sanctioned within 30 days in strongholds is significantly higher for road, water, and irrigation as well as health projects. Also, from panel [C], we can see that these projects are less likely to take more than 45 days to be approved. These results show that all types of projects are approved faster in strongholds.

7 Concluding Remarks

In the existing empirical literature, politician-bureaucrat interactions have mostly been analyzed with respect to re-election concerns. This paper examines a hitherto unexplored mechanism that connects electoral competition to bureaucratic performance: access to dynamic contracts. Using a richly constructed data from India and developing a novel empirical methodology to isolate these mechanisms, we show that politicians in low competition constituencies can get bureaucrats to perform better by using long-term contracts. We also show that the future rewards used to incentivize bureaucrats take the form of promotions.

While this paper focused on the variations within bureaucrat performance, an equally important issue is the selection of bureaucrats itself: how does electoral competition affect allocation of bureaucrats across different politicians? Although, in India, the initial appointment of bureaucrats to various posts and districts is done by an independent organization headed by the top bureaucrats within a state, politicians can influence the career paths of individual bureaucrats. The results of this paper suggest that bureaucrats respond to politician's incentives when they are up for promotion. Moreover, Iyer and Mani (2012) show that when there is political turnover, the probability of bureaucratic turnover increases significantly. I study the bureaucrat selection issue in a parallel work-in-progress.

With respect to the role of electoral competition in public goods provision, this paper focused on the implementation problem. An equally important issue is how electoral pressures affect the *allocation* of public goods. In a related paper, Nath (2014a), I examine this allocation problem. Using household survey data from India, I first analyze how stated preferences vary across wealth classes. Then I use the dataset on MPLAD local public goods to show that in absence of re-election concerns, politicians are most likely to spend on projects that are desired by the rich.

These results contribute not only to our understanding of how politician-bureaucrat interactions affect policy implementation, but also to the role of political competition. On one hand, it is argued that in autocracies, the politicians are able to get things done because of centralized power, while in democracies - there are too many political constraints which slows thing down. On the other hand, it is argued that democracies are more redistributive. The results of this paper taken together with insights from Nath (2014a) highlight this tradeoff: *democratic pressures lead to higher redistribution but also more delays in service delivery.*

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Figure 1: Electoral Constituency Boundaries and Victory Margins for 1999 Elections

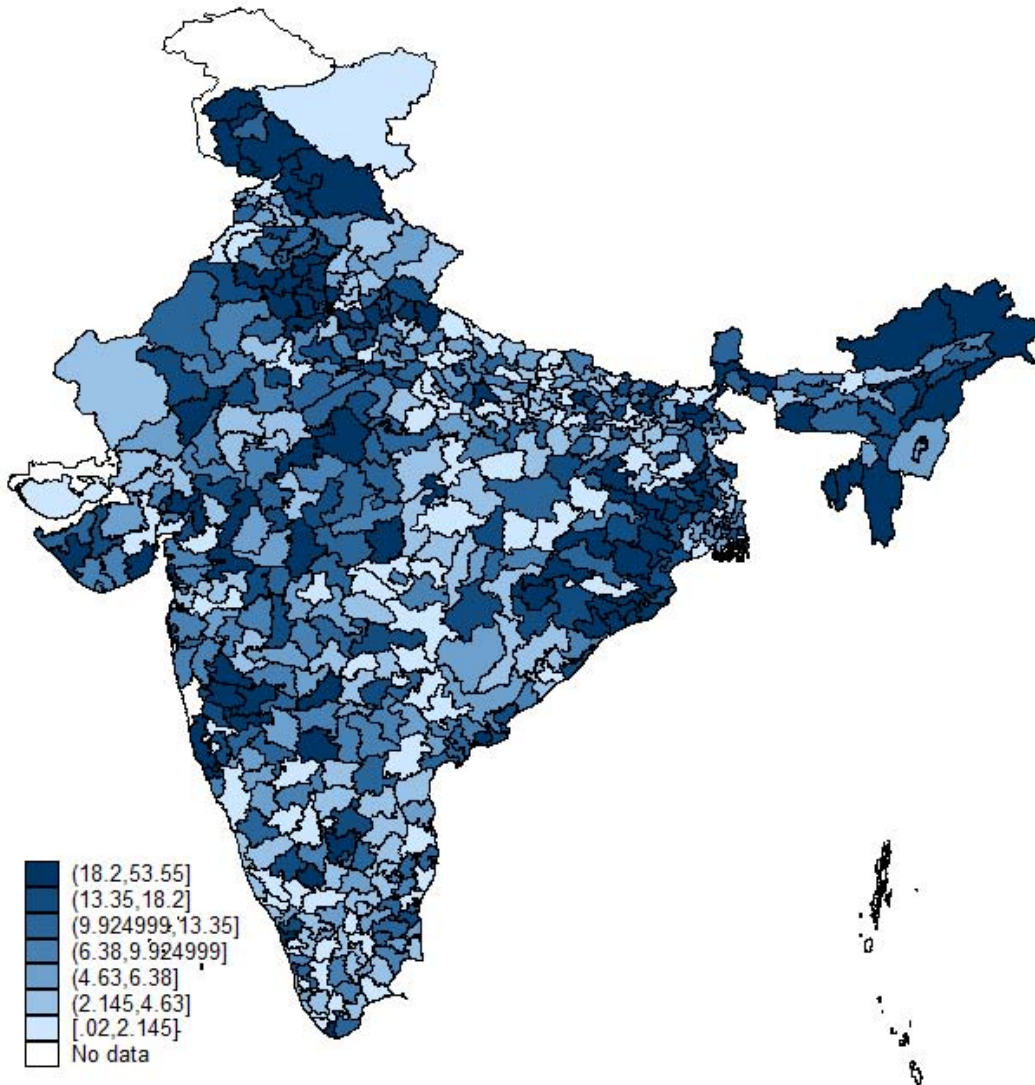


Figure 2: Overlap Between Electoral Constituencies and Administrative Districts

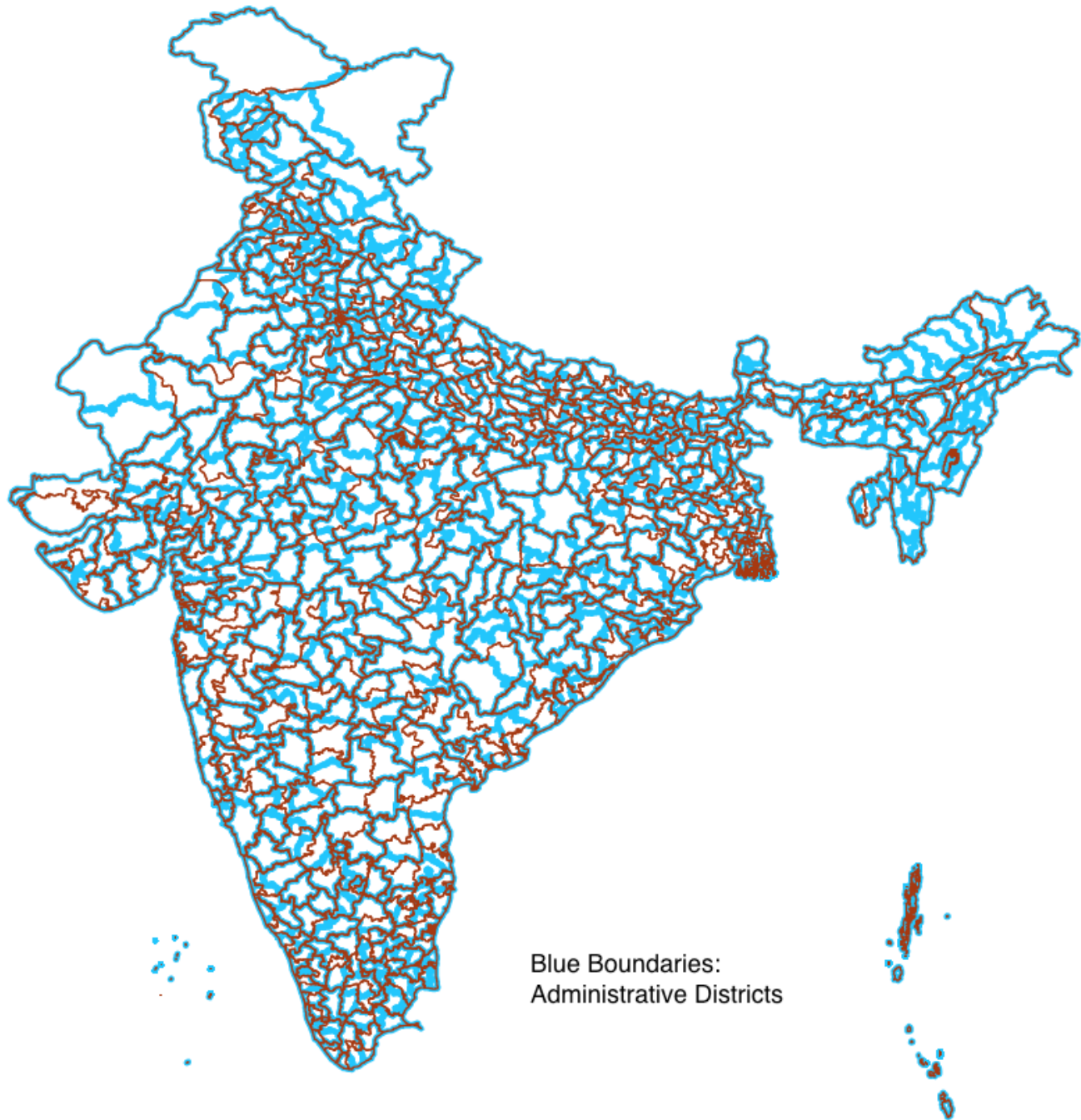


Figure 3: Overlap Between Boundaries: Zooming In

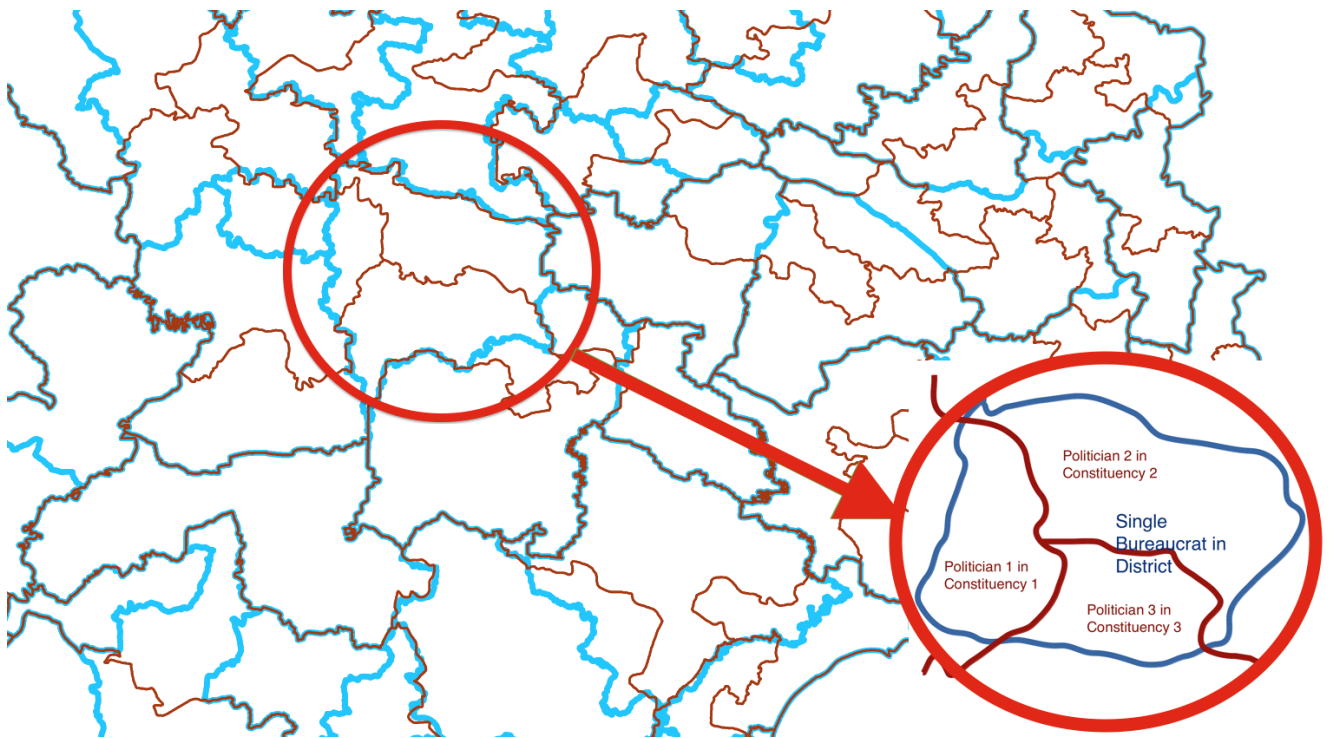


Table 3: Correlation Between Time Taken to Sanction and Delay in Project Implementation

	(1)	(2)	(3)
	Execution Time	Execution Time	Execution Time
Number of Days to Sanction	1.49*** (0.44)		
Sanctioned within 10 Days		-161.43* (87.13)	
Sanctioned greater than 90 days			220.86*** (42.09)
Cost Sanctioned for the project	9.77*** (3.09)	12.77** (6.21)	13.42** (5.57)
Constant	-448.98 (352.31)	374.70** (168.99)	398.13*** (22.03)
Observations	426	426	426
Adjusted R^2	0.777	0.749	0.753
Project Fixed Effects	YES	YES	YES
Constituency Fixed Effects	YES	YES	YES

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Robust standard errors in parentheses, clustered at Constituency level.

Figure 4: Outline of the Difference-in-Differences Strategy

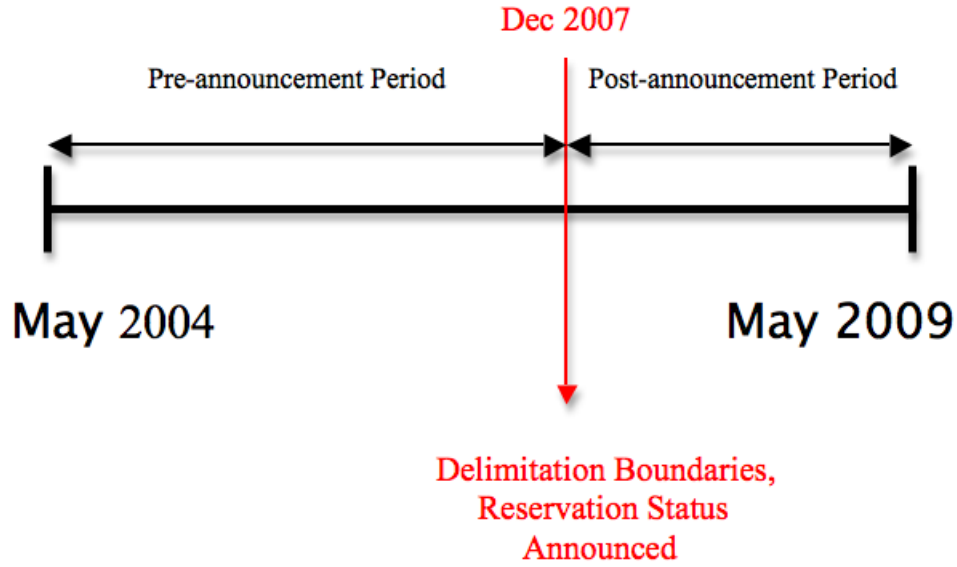


Table 4: Summary Statistics for Change in Perceived Probability of Winning

Group	Number of Constituencies (1)	Average Proportion of Candidates belonging to SC/ST Category		Number of Constituencies with SC/ST Winners	
		2004 (2)	2009 (3)	2004 (4)	2009 (5)
Res to Gen	37	100	17.6 (14.22)	37	0
Gen to Res	52	24.76 (27.04)	100 -	7	52
Gen to Gen/ Res to Res	444	31.17 (34.74)	29.5 (34.77)	80	78
Gen to Gen	342	16.45 (15.23)	14.04 (11.92)	6	3

Table 5: Stronghold- Predicting Probability of Same Party Winning Again

	(1)	(2)	(3)	(4)
	Won 1999	Won 2004	Won 1999	Won 2004
Stronghold	0.18*** (0.06)	0.29*** (0.06)	0.18* (0.10)	0.29** (0.10)
Constant	0.47*** (0.03)	0.39*** (0.03)	0.47*** (0.04)	0.39*** (0.05)
Observations	374	374	374	374
R^2	0.021	0.058	0.021	0.058

* p<0.10, ** p<0.05, *** p<0.01 Robust standard errors in parentheses, clustered at state level in (3) and (4).

Table 6: Effect of Competition on Time taken to Sanction

	(1)	(2)	(3)	(4)	(5)
Dependent Variable: Time Taken to Sanction Projects					
Victory Margin	-0.75** (0.30)	-0.74** (0.30)	-0.77** (0.30)	-0.75** (0.30)	-0.58* (0.35)
Cost of Project		0.64 (0.47)	0.68 (0.44)	0.72 (0.44)	0.11 (0.27)
Observations	220360	220358	220358	220358	220358
R^2	0.003	0.004	0.017	0.027	0.262
Mean Dependent Variable	78.63	78.63	78.63	78.63	78.63
Project Type Fixed Effects	NO	NO	YES	YES	YES
Year Fixed Effects	NO	NO	NO	YES	YES
Constituency Fixed Effects	NO	NO	NO	NO	YES

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Robust standard errors in parentheses, clustered at constituency-term level.

Dependent variable is time taken by the bureaucrat to complete projects in a district-constituency.

Table 7: Results of Difference-in-Differences Strategy

	Dependent Variable: Time Taken to Approve	
	(1)	(2)
Treated*Post	10.78** (4.24)	10.69** (4.15)
Post 2007	-32.27*** (6.43)	-21.24*** (3.64)
Cost of Project		0.80** (0.35)
Observations	30007	30006
R^2	0.353	0.354
Mean Dependent Variable	73.18	73.18
Bureaucrat Fixed Effects	YES	YES
Politician Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
Project Fixed Effects	YES	YES

* p<0.10, ** p<0.05, *** p<0.01

Robust standard errors in parentheses, clustered at state level.

Dependent variable is time taken by the bureaucrat to complete a project.

Table 8: DID Falsification Test - Fake Shock

	Dependent Variable: Time Taken to Approve	
	(1)	(2)
Treated*Post 2005	2.31 (14.71)	2.31 (14.71)
Post 2005	14.76** (6.12)	14.75** (6.12)
Cost of Project		0.14 (0.44)
Observations	37048	37047
R^2	0.342	0.342
Bureaucrat Fixed Effects	YES	YES
Politician Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
Project Fixed Effects	YES	YES

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Robust standard errors in parentheses, clustered at state level.

Dependent variable is time taken by the bureaucrat to complete a project.

Table 9: Effect of Competition on Time taken to Sanction

	Dependent Variable: Time Taken to Sanction Projects				
	(1)	(2)	(3)	(4)	(5)
Stronghold	-8.84*	-8.78*	-8.70*	-8.76*	-11.31**
	(4.82)	(4.81)	(4.54)	(4.87)	(5.11)
Cost of Project		-0.61**			
		(0.31)			
Politician Experience			-0.06		
			(0.48)		
Winner from CM Party				1.83	
				(4.85)	
Observations	165276	165274	165276	165276	165276
R^2	0.332	0.332	0.332	0.332	0.337
Mean Dependent Variable	76.98	76.98	76.98	76.98	76.98
Bureaucrat Fixed Effects	YES	YES	YES	YES	YES
Project Type Fixed Effects	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES
Party Fixed Effects	NO	NO	NO	NO	YES

* p<0.10, ** p<0.05, *** p<0.01 Robust standard errors in parentheses, clustered at constituency-term level.

Dependent variable is time taken by the bureaucrat to complete projects in a district-constituency.

Table 10: Promotion Timeline and Bureaucratic Performance

	(1)	(2)	(3)	(4)
One Year to Promotion	-13.42*** (4.71)	-13.41*** (4.72)	-13.45*** (4.73)	-14.46*** (4.81)
Cost of Project		-0.29 (0.35)		
Number of Projects			-0.02 (0.03)	
Total Uptake				0.00** (0.00)
Observations	32306	32306	32306	32306
R^2	0.648	0.648	0.648	0.649
Mean Dependent Variable	69.03	69.03	69.03	69.03
Year Fixed Effects	YES	YES	YES	YES
Project Type Fixed Effects	YES	YES	YES	YES
Party Fixed Effects	YES	YES	YES	YES
Bureaucrat Fixed Effects	YES	YES	YES	YES
Politician Fixed Effects	YES	YES	YES	YES

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Robust standard errors in parentheses, clustered at constituency-term level.

Dependent variable is time taken by the bureaucrat to complete projects in a district-constituency.

Table 11: Bureaucratic Performance Two Years Before Elections

PANEL A: Regression Results

	Dependent Variable: Time Taken to Approve		
	(1)	(2)	(3)
One Year* Stronghold	3.26 (9.99)	-0.45 (10.11)	3.12 (9.85)
Two + Years (B_2N)	14.30** (6.34)	14.01** (6.34)	14.23** (6.34)
Two + Years* Stronghold (B_2S)	-13.33 (8.97)	-16.60* (9.07)	-13.30 (9.00)
Politician - No. Years Served		0.73 (0.59)	
Winner from CM Party			2.33 (15.53)
Observations	38669	38669	38669
R^2	0.353	0.353	0.353
Mean Dependent Variable	70.17	70.17	70.17
Bureaucrat Fixed Effects	YES	YES	YES
Project Type Fixed Effects	YES	YES	YES
Year Fixed Effects	YES	YES	YES
Party Fixed Effects	YES	YES	YES

PANEL B: Testing for Differences in Levels: p-values

Test	p-value		
$H_0: B_2S = B_2N$	0.020	0.011	0.021

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses, clustered at constituency-term level.

[1] Dependent variable is time taken by the bureaucrat to complete projects in a district-constituency.

[2] Base Category is one year from promotion.

Table 12: Robustness: Politician Stronghold

	(1)	(2)
Politician Stronghold	-11.27** (5.39)	
One Year * Politician Stronghold		-7.04 (11.31)
Two + Years (B_2N)		12.08** (5.83)
Two + Years * Politician Stronghold (B_2S)		-21.60** (10.32)
Observations	164663	38669
R^2	0.333	0.353
Mean Dependent Variable	77.12	70.17
Bureaucrat Fixed Effects	YES	YES
Project Type Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
Party Fixed Effects	YES	YES

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Robust standard errors in parentheses, clustered at state level.

Dependent variable is time taken by the bureaucrat to complete a project.

Table 13: Effect of Competition on Time Taken to Sanction: Role of Number of Bureaucrats

PANEL [A]		
	(1)	(2)
One Bureaucrat per Politician	76.90** (31.58)	87.60*** (31.52)
Two Bureaucrats per Politician	74.01** (31.41)	78.36** (31.38)
Three Bureaucrats per Politician	104.95*** (31.85)	112.40*** (31.86)
Stronghold* One Bureaucrat		-31.34*** (7.45)
Stronghold* Two Bureaucrats		-9.10 (6.32)
Stronghold* Three Bureaucrats		-8.57 (13.10)
Observations	149081	149081
R^2	0.584	0.586
Mean Dependent Variable	77.53	77.53
Bureaucrat Fixed Effects	YES	YES
Project Type Fixed Effects	YES	YES
Year Fixed Effects	YES	YES
Party Fixed Effects	YES	YES
PANEL [B]		
Testing for Differences in Levels		
[i] Average Effects (Column 1)	Test	p-value
	One Bur=Two Bur	0.489
	Two Bur=Three Bur	0.000
[ii] Strongholds (Column 2)	Test	p-value
	One Bur=Two Bur	0.018
	Two Bur=Three Bur	0.971
[iii] Non-Strongholds (Column 2)	Test	p-value
	One Bur=Two Bur	0.082
	Two Bur=Three Bur	0.000

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Robust standard errors in parentheses, clustered at constituency-term level.

Dependent variable is time taken by the bureaucrat to complete projects in a district-constituency.

Table 14: Probability of Sanctioning Within X Days

	(1) <30 Days	(2) 30-45 Days	(3) >45 Days
Stronghold	0.07*** (0.03)	-0.01 (0.01)	-0.05* (0.03)
Observations	180748	180748	180748
R^2	0.367	0.249	0.370
Mean Dependent Variable	0.37	0.14	0.51
Bureaucrat Fixed Effects	YES	YES	YES
Project Type Fixed Effects	YES	YES	YES
Year Fixed Effects	YES	YES	YES

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Robust standard errors in parentheses, clustered at constituency-term level.

Dependent variable is a dummy variable that takes value 1 if the project was sanctioned within 'x' days.

Table 15: Probability of Sanctioning Within ‘X’ Days - Project-wise

[A] Probability of Sanctioning Within 30 Days					
	Road	Water	Health	Irrig	Comm. Cent
Stronghold	0.05** (0.03)	0.13*** (0.05)	0.08* (0.04)	0.27*** (0.07)	0.00 (0.03)
Observations	71529	24920	1690	2821	25093
R^2	0.403	0.475	0.597	0.525	0.459
Mean Dependent Variable	0.37	0.40	0.32	0.49	0.32
[B] Probability of Sanctioning Between 30-45 Days					
	Road	Water	Health	Irrig	Comm. Cent
Stronghold	0.02 (0.02)	-0.01 (0.02)	0.00 (0.03)	-0.05 (0.04)	-0.03 (0.02)
Observations	71529	24920	1690	2821	25093
R^2	0.280	0.371	0.471	0.321	0.281
Mean Dependent Variable	0.16	0.14	0.09	0.09	0.11
[C] Probability of Sanctioning in More than 45 Days					
	Road	Water	Health	Irrig	Comm. Cent
Stronghold	-0.06** (0.03)	-0.11*** (0.04)	-0.07 (0.05)	-0.19*** (0.07)	0.03 (0.03)
Observations	71529	24920	1690	2821	25093
R^2	0.394	0.470	0.627	0.514	0.471
Mean Dependent Variable	0.50	0.48	0.60	0.43	0.59
Bureaucrat Fixed Effects	YES	YES	YES	YES	YES
Project Type Fixed Effects	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ Robust standard errors in parentheses, clustered at constituency-term level.

Dependent variable is a dummy variable that takes value 1 if the project was sanctioned within ‘x’ days.

Model Appendix

Proof of Proposition 1. The following lemmata simplify the analysis of the second best problem defined by equations (1)-(6).

Lemma 1. IC_2 always binds at the optimum.

Proof. Suppose not. Then the politician can reduce q_2 by a small amount and increase his payoffs. A contradiction. ■

Lemma 2. Under the optimal contract, PC_2 binds.

Proof. Suppose that PC_2 does not bind under the optimal contract. The politician can increase V by a small amount without affecting the constraint. This will increase the level of effort politician can induce in the first period, therefore increasing the politicians's payoff. This contradicts the assumption. Hence, under the optimal contract, PC_2 binds. ■

Lemma 3. IC_1 binds at the optimum.

Proof. Suppose not. Then the politician can reduce q_1 by a small amount and increase his payoffs. V' does not affect the objective function but q does. So, the principal can make V' arbitrarily small and decrease q even further to increase his payoffs. ■

We now solve the second period problem. From lemma 2, $e_2 = \sqrt{(w + r - V)}$. From IC_2 , we get $q_2 = \frac{e_2}{r}$. Plugging the value of q_2 into e_2 , we get the following two expressions:

$$e_2^* = \sqrt{(w + r - V)}; \quad q_2^* = \frac{w + r - V}{r} \quad (21)$$

We now solve the first period problem. Firstly, note that V' is the continuation payoff the bureaucrat gets in period two if he is caught shirking in period one. The politician would want to make it as low as possible. $V' \rightarrow -\infty$ would be desirable but not credible. Since V' does not enter the objective function of the politician, it can be set to $V' = 0$ at optimum. Using this and lemma 3, the expression for q_1 becomes: $q_1 = \frac{e_1^2}{r + \beta(\phi)V}$. Plugging this into the objective function reduces the problem to:

$$\max_{e_1, V} \quad R(\phi)\sqrt{e_1} - \frac{e_1^4}{(r + \beta(\phi)V)^2} + \beta(\phi)\mathbb{Q}(V)$$

Using envelope theorem, we get the following expression for $\mathbb{Q}(V)$:

$$Q(V) = \frac{w + r - V}{r} - \frac{R}{4}(w + r - V)^{\frac{-3}{4}}$$

Plugging this into the first period maximization problem, the problem reduces to:

$$\max_{e_1, V} \quad R(\phi)\sqrt{e_1} - \frac{e_1^4}{(r + \beta(\phi)V)^2} + \beta(\phi) \left[\frac{w + r - V}{r} - \frac{R}{4}(w + r - V)^{\frac{-3}{4}} \right]$$

The first order condition with respect to e is given by:

$$FOC_e : \quad \frac{R(\phi)}{2\sqrt{e_1}} = \frac{4e_1^3}{(r + \beta(\phi)V)^2}$$

Solving for e_1 and plugging it into q_1 gives us the following expressions:

$$e_1^* = \alpha R(\phi)^{\frac{2}{3}}(r + \beta(\phi)V)^{\frac{4}{7}}; \quad q_1^* = \alpha R^{\frac{2}{3}}[r + \beta(\phi)V^*]^{\frac{1}{7}} \quad (22)$$

The first order condition with respect to V is given by:

$$2e_1^4(r + \beta(\phi)V)^{-1} - \frac{1}{r} - \frac{3}{16}R(w + r - V)^{\frac{-7}{4}} = 0$$

Plugging in the value of e_1 and gives us the following:

$$V^* \text{ solves: } \frac{2}{8^{\frac{-2}{7}}}R^{\frac{8}{7}}[r + \beta(\phi)V]^{\frac{9}{7}} - \frac{1}{r} - \frac{3}{16}R(w + r - V)^{\frac{-7}{4}} = 0 \quad (23)$$

equations 21 , 22 and 23 characterize the optimal contract. ■