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Why Get Technical? Corruption and the Politics of Public Service Reform in the Indian States

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Abstract

The emergence of new information and communication technologies in the 1990s offered governments opportunities to deliver public services more effectively to their citizens. Yet national and subnational authorities have employed such technologies in highly uneven ways. Drawing on a new data set of technology policy adoption by Indian states, the author argues that political calculations drive variation in the timing and scope of technology policies. Politicians weigh the expected electoral benefits from providing new goods to citizens against the expected electoral costs of reduced access to corrupt funds because of increased transparency. The author shows that the level of bureaucratic corruption in a state is the best predictor of both when states implement policies promoting computer-enabled services and the number of services made available. This finding contrasts with arguments that posit economic or developmental conditions, or alternative electoral and institutional characteristics, as the major drivers of technology investment.

Keywords

India, public services, information technology, corruption

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The emergence of new information and communication technologies in the 1990s offered governments new opportunities to improve the delivery of public services to their citizens. National and subnational governments could use low-cost digital technologies to supply citizens with identity and income documents, distribute welfare benefits, provide utilities, and extend a range of other valued services (see, e.g., Bhatnagar, 2002; Bussell, 2007; Heeks, 2003). Especially in developing countries, where accessing such services through traditional vehicles often carries significant costs for citizens, the digital age promised valuable improvements in the quality of citizen–government interactions.

Yet efforts to use new technologies to improve service delivery exhibit significant variation. In India, the focus of this article, some subnational states implemented policies to promote use of technology in delivering government services in the 1990s. Such states created "one-stop" computerized service centers in which citizens could apply for a range of different government services, thus greatly cutting down on the time and effort required to access services.

However, other states embraced the opportunity for reform only with a delay, if at all. By 2006, despite the substantial attention technology policies had received in both Indian and international policy circles, and despite the relatively meager monetary cost of initiating service centers, 4 of 20 major states had failed to implement any version of a computer-enabled service center policy.[1] Figure 1 shows the cumulative initiation of policies over the period under consideration.

In those states that did implement policies, variation in the timing of reforms is matched by measures of their extensiveness. As Figure 2 shows, the number of different government services that could be accessed in 2006 at any one-stop center ranged from fewer than 5 to more than 40 across the Indian states. The number of services made available has important implications for the ability of these centers to respond to citizens' diverse demands.

What explains such variation in the use of information technologies to improve public service delivery? I find that in the context of the Indian states, established hypotheses have limited explanatory power. As I show, neither state socioeconomic development nor economic capacity nor level of technology infrastructure can explain the variation in the adoption of technology-enabled service provision or the number of services made available by states. Standard electoral or institutional explanations, such as the number of parties, the proximity of elections, or the socioeconomic profile of the ruling government's support base, also do not provide significant leverage for understanding variation in these policy outcomes.

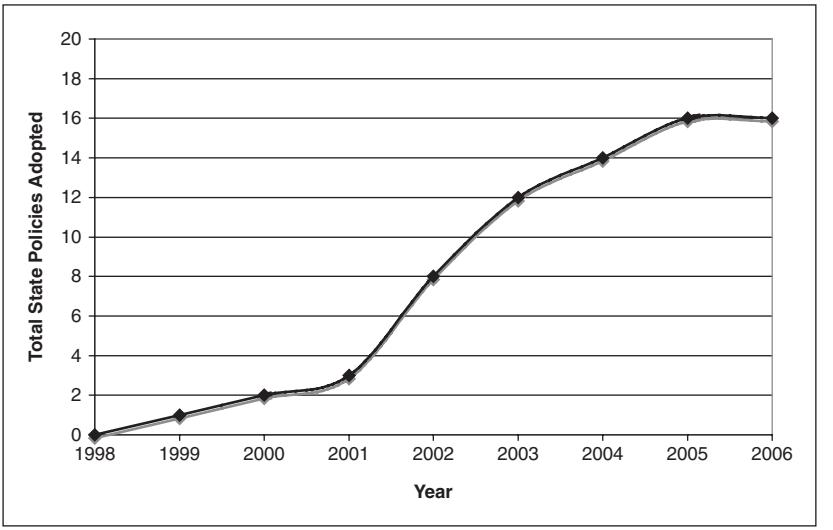

Figure 1. Cumulative Indian state policy adoption.

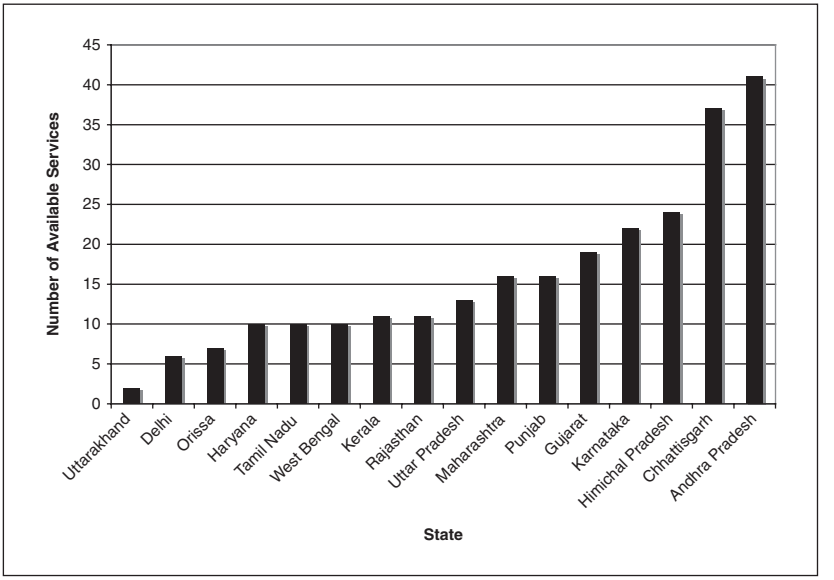

Figure 2. Maximum number of available services per center in the Indian states (2006).

Instead, it is necessary to examine the way in which new technologies disrupt established patterns of rent seeking by politicians. By upsetting established relations among politicians, bureaucrats, and citizens, and in particular by diminishing the capacity of politicians to extract rents—in the Indian context, the bribes necessary to finance reelection campaigns—new technologies can pose substantial costs to government stakeholders. Key state decision makers must weigh these costs of diminished access to rents against the electoral benefits of using new technologies to improve service delivery.[2]

I argue that variation in the size of these political costs provides the best explanation for the observed policy variation across the Indian states. Incumbent governments and particularly the key decision makers within them—including, as I discuss below, a state's chief minister, the information technology minister, and those ministers whose department's services may be placed online in service centers—can find ways to electorally benefit from the implementation of computerized service centers, whatever the partisan identity or electoral support base of the ruling party. However, the costs of implementing rent-reducing reforms, as proxied by a state-level measure of corruption in established modes of service delivery, vary markedly across the Indian states.

As I show in my empirical analysis, the size of these costs best explains when and how politicians will take advantage of, or resist, the opportunity to use new technologies to improve government service delivery. The level of corruption in basic service delivery is strongly associated with variation in the timing and scope of technology-enabled service reforms, controlling for a battery of other variables that could affect the introduction of computerized centers. I also use evidence from my fieldwork and other sources to show that just as key incumbents internalize the electoral benefits to the ruling governments of reforms, so do they evaluate the total costs in terms of foregone rents. Yet only a focus on the size of the costs provides significant leverage for understanding the marked variation in technology-enabled service reform across the Indian states.

In the next section I review the key characteristics of the technology policies under consideration and elaborate my argument for the observed variation in these policies. I subsequently present an event history model of policy timing and quantitative tests on the extensiveness of reforms.

Political Incentives for Technology-Enabled Service Reform

The policies I consider here are those to reform the delivery of public services through "technology-enabled service centers."[3] These centers, which

serve as a public outlet for computerized services, are seen as a potentially cost-effective way to improve service delivery (Badshah & Khan, 2003). By providing a "one-stop" environment for services from multiple government departments, service centers simplify access by effectively taking service delivery out of the hands of the originating department and placing it with service center operators, who process transactions for citizens.[4] Government may own these centers directly or outsource the ownership and management of centers to private individuals or organizations.

For my purposes, technology-enabled service centers have three main characteristics. First, they deliver government services by utilizing information technologies, and in particular computers and the Internet. Second, the centers are dedicated, physical locations to which citizens can go to access services. Third, services are provided from *multiple* government departments. Thus, the Indian Railways electronic ticketing system does not fit my criteria because tickets are delivered through the established physical infrastructure or online, but not through dedicated centers, and *only* Indian Railways tickets are available. However, technology-enabled service centers may offer railway tickets as one of multiple services. Therefore, these centers can change not only the technology of service delivery but also the people and processes by which services are delivered and the manner in which citizens interact with government.

In India, state governments provide an array of services such as identity cards, birth and death certificates, and driver's licenses; citizens also pay utility bills to the state and seek benefits of various welfare programs (or schemes, in Indian political parlance) from the state government. States are therefore well positioned to take advantage of new technologies by implementing service centers that streamline the service delivery process. In principle, new technologies provide governments with an opportunity to implement welfare-enhancing reforms that improve how citizens interact with their government. Yet as discussed above, the adoption of technology-based public service reforms varies markedly across the Indian states.

How do political incentives shape the propensity of state governments to adopt new technologies? I argue that technology-enabled service centers offer electoral benefits to politicians but can also carry political costs; the size of benefits relative to costs shapes not only whether policies are adopted but also the form these policies take. To explain variation in technology policies across the Indian states, then, I posit that it is necessary to identify the factors that shape the electoral benefits and costs of implementing computer-enabled service centers.

In doing so, it is particularly important to consider the incentives of key decision makers who initiate technology-enabled service center policies at

the state level. Service center reforms are typically not legislated by an action of the full state assembly but are more often orders by a government ministry, generally Information Technology (IT), and so require only the approval of the IT minister and the chief minister. Once centers are implemented, individual government ministers with responsibility for particular services can also influence whether their departments' services are offered through computerized centers. However, the chief minister, who is usually the head of his or her party in the state and who serves as the state's chief executive (analogous to the prime minister at the national level, in India's parliamentary system), has ultimate decision-making power regarding the initiation and character of technology-enabled service centers. As one high-ranking bureaucrat made clear, "If the CM [chief minister] wants something then all other ministers will fall in line" (Rajasthan IT department official, personal communication, May 5, 2007). Thus, it is the chief minister who internalizes the overall electoral costs and benefits of reforms to the party and makes final decisions on whether and how extensively technology-enabled service centers should be implemented.[5]

Because these initiatives are announced at the state level, the most likely beneficiary is the ruling party as a whole—and, in particular, the chief minister of the state, who is the public face of the ruling party and whose political power depends strongly on the party's fate. The IT minister and those ministers whose departmental services are provided through the centers are also likely to receive electoral benefits, with their party colleagues receiving spillover benefits.

What electoral benefits can providing computer-enabled service centers bring to governments? Political analysts often note that elected governments must show they can deliver valued goods to citizens to increase chances of reelection (Fenno, 1978; Nooruddin & Chhibber, 2008). Citizens in India value one-stop centers, as these centers reduce the steep transaction costs normally associated with accessing government services in India (discussed further below). As one citizen noted when patronizing a center in Rajasthan,

> I am a lowly electrician in a textile mill and am hired on a daily wage arrangement. I cannot afford to waste a full day being sent back and forth between sundry government offices, without much hope that my job will be done. (Raju Mali, quoted in InfoChange, 2004)

The computerized center made it substantially easier for this citizen to access the government services he required.

Statements from officials across a range of Indian states reinforce the potential political importance of technology policies. In Punjab, one bureaucrat said,

"Politicians supported it [the service center policy]. . . . Anything that provides convenience to the people politicians know will be good for them" (Punjab IT department official, personal communication, February 4, 2008). Referencing a service center initiative in Rajasthan, an observer noted, "MLAs [members of the Legislative Assembly] didn't resist because they saw this as citizen friendly. . . . They know that this can be sold politically" (Rajasthan former IT department official, personal communication, May 7, 2007). Even in West Bengal, a state with one of the lowest government turnover rates in the country, "politicians see political incentives, as they are always trying to do new things for their constituents. The image building goes on, even with the stability" (West Bengal IT department official, personal communication, January 18, 2008).

To guarantee political benefits, politicians even take credit for initiatives launched by previous governments. In Andhra Pradesh, the first state to initiate a policy, the subsequent government "was able to rename the rural eSeva initiative to make it their own and claim credit for providing more services to rural citizens" (External government advisor, personal communication, April 30, 2007). Regarding an early service computerization project in Karnataka, "Everybody takes credit for it. Chief Minister Krishna took credit for it and the next chief minister took credit for it, as did the most recent chief minister" (Private company official, personal communication, December 19, 2007). In Tamil Nadu, a pilot initiative implemented under one government was given a new name when scaled to the state level by the subsequent government, to ensure the latter government received credit (Consultant to Tamil Nadu government, personal communication, May 17, 2007).

What are the political costs of technology reforms? These stem largely from disruptions to politicians' established relationships with citizens and the bureaucracy, which limit the ability of individual legislators, ministers, and parties as a whole to extract illicit resources that are necessary for maintaining political power.

Under the established (prereform) service delivery model, politicians can extract rents from service delivery because of two important factors. First, service delivery is an important and extremely valuable source of bribes for bureaucrats who interact with citizens. Low-level bureaucratic corruption is endemic in India.[6] Transparency International found that corruption in service delivery exists in all states and bribes paid by Indian citizens to receive government services total more than Rs.210 billion ($5 billion) a year (Transparency International, 2005, p. 3). Bureaucratic discretion facilitates bribe taking, as a "lack of transparency in the functioning of government

agencies can make it easy for perpetrators to cover their tracks" (Bhatnagar, 2002, p. 1). As one bureaucrat described, low-level bureaucrats

> used their power over files [citizen applications] to collect bribes. Babus would hold onto a file, or tuck it away in a drawer and say that it had been misplaced. In order to get him to look for it, people would have to pay a bribe. (Haryana IT department official, personal communication, February 4, 2008)[7]

Second, however, these bribes from citizens flow through the state bureaucracy and into the pockets of state politicians (Davis, 2004; de Zwart, 1994; Wade, 1985). State bureaucrats are given appointments at the behest of their superiors, who are ultimately controlled by the chief minister, the state minister overseeing their department, or the current member of the state assembly representing their constituency (Davis, 2004; de Zwart, 1994; Wade, 1985). Based on this control over bureaucratic postings, politicians can demand rents from bureaucrats, either to maintain a preferred position or to increase the chances of transfer to a more preferable post. An observer in the state of Karnataka noted, "In one district we know a new MLA came to power and. . . . All of the Tehsildar [subdistrict] officials were changed and his people were brought in. The politicians know there is money coming to them" (Private company official, personal communication, December 19, 2007). Often low-level bureaucrats pay politicians directly to influence their job placement. In a study of water provision, Davis (2004) found that "very few staff reported paying their [bureaucratic] superiors for such transfers; instead, monies are given to politicians . . . who exert influence (and sometimes share part of the fee) with higher-level bureaucrats" (p. 60).[8] Under the established (prereform) service delivery model, then, politicians can often benefit from the discretion that bureaucrats hold over service delivery.

Computerized service centers can affect these informal institutions of the service delivery process by increasing the transparency and efficiency of service provision, in ways that decrease opportunities for bureaucrats to collect bribes and for politicians to siphon a portion of these rents. Reductions in corruption are expected to result from changes to bureaucratic processes that simplify procedures, impose technical constraints on the sources of bribes, and generally reduce the frequency of government–citizen interaction. "Now they [bureaucrats] can't really play mischief because each application has a number so it can't be preponed or postponed. . . . The official now has no power to actually slow down or speed up the process"

(Haryana state former IT department official, personal communication, February 6, 2008). Similarly, in the state of Karnataka, the

> software doesn't allow people to move up in the queue, so this changes the incentives to the operator. If they can't move someone from fifth in line to the front, then they can't viably take a bribe from someone to do this. (India IT department official, personal communication, February 25, 2008)

The magnitude of rent reduction implied by service delivery reform is substantial. As noted above, the monetary value of bribes is estimated to be billions of dollars each year. Even a moderate decrease in the flow of these illicit funds could substantially affect the established income of corrupt bureaucrats and politicians. As one bureaucrat put it to me, "One of the biggest issues or challenges for eGovernment and kiosks [service centers] is all of the people who will lose money from the new system. . . . Politicians worry about loss of money" (West Bengal IT department official, personal communication, January 18, 2008).

Thus, the implementation of service centers can dramatically reduce the access of politicians to rents. Crucially, this can imply an electoral, and not merely pecuniary, cost to politicians. In India, corrupt funds provide a crucial source of campaign finance (Wade, 1985, pp. 472-473); this is because of the structure, or lack thereof, of campaign finance in India.[9] There is no explicit funding mechanism for elections to the state assembly. Parties give candidates tickets to run for a particular office in the state, but candidates must fund their election without significant party support (see Wade, 1985). Although the Election Commission of India limits expenditures by individual candidates in state assembly elections, supporters can legally spend unlimited amounts, thereby creating the potential for higher spending.[10] This loophole indirectly allows for higher spending by the candidate, who can attribute expenditures above the limit to the party or friends (Iype, 2004).[11] In the 2008 Karnataka state elections, an estimated Rs.40 billion ($1 billion) was spent (Sharma, 2008), with one successful candidate stating, "The quantum of money being used in elections has been increasing despite the restrictions. The ECI [Election Commission of India] can't contain it" (Kumar, quoted in Sharma, 2008). Most importantly for present purposes, the increasing economic demands on campaigns require politicians to find major alternative sources of funding (Singh, 1997). Corruption is a major source of campaign finance in state assembly elections. As one political analyst argues, "The root cause for corruption in our country is election funding. The cancer has spread

throughout the country and evolving a pattern for funding is the need of the hour" (Panadiker, quoted in Sarin, 1999).

However, although more transparent service delivery poses clear threats to these sources of corrupt campaign finance, multiple factors affect the relative size of the costs posed to different politicians across different states. First, although corruption in general persists across all states, the level of corruption varies dramatically, with fewer than 20% of citizens in states such as Kerala and Himachal Pradesh encountering demands for bribes when interacting with most government officials, whereas more than 60% of citizens Bihar or Karnataka have direct experience with bribing in multiple government departments (Transparency International, 2005).

Second, control over bureaucrats, and their rents, is particularly important for those politicians who control government departments. Although regular members of the Legislative Assembly only oversee bureaucrats in their own constituencies, those legislators who serve as ministers of a department have the power to extract rents from service delivery by their department across a state (Davis, 2004). So ministers in charge of departments with a high level of citizen interaction are likely to reap relatively larger monetary benefits from their positions than ministers overseeing nonservice delivery departments or nonministers.

Thus, overall incentives to promote, or not promote, computerized service centers vary across elected officials. As discussed above, chief ministers are likely, as the face of the ruling government, to individually benefit from the introduction of service reforms. But chief ministers also internalize the benefits and costs of policies to their party colleagues. Although all ruling party members should reap spillover benefits from technology policies, ministers of service-delivery departments face specific benefits and costs: If their services are provided in centers, they are likely to receive direct electoral benefits from improved service delivery, but they are also likely to lose a portion of the rents under their control. Ministers in states with higher levels of corruption will thus face greater costs from the provision of services under their control than those in less corrupt states, creating incentives for them to resist robust service offerings in their state's centers. In determining whether and how to reform service delivery, chief ministers are then likely to take into account both the individual effects of new policies and the overall effects on the party's future electoral prospects.

This discussion suggests several hypotheses to explain variation in technology policies across the Indian states. The electoral benefits and costs of reform, particularly to the chief minister and other key ministers, should shape the propensity of particular state governments to initiate

computer-enabled service centers and to provide services within these centers. However, the electoral benefits of creating computer-enabled service centers may, in the aggregate, be relatively constant across states. For example, the size of the electoral benefits from services reforms may be relatively independent of the partisan identity of the political party in power: Politicians and parties can amplify the electoral benefits of technology policies by targeting centers and services to their most important constituencies, yet because every incumbent should be able to benefit from such a strategy, the overall size of the electoral benefit of services reform should be similar for political incumbents across states.[12] On the other hand, the cost of implementing service centers, as proxied by the level of corruption, varies sharply across states and, by affecting the overall political incentives of the party leaders in power in a state, should predict variation in the initiation and scope of service reform.

My hypotheses contrast with those focused on economic conditions (Berry & Berry, 1990; McNeal, Tolbert, Mossberger, & Dotterweich, 2003; Nooruddin & Chhibber, 2008) or technological characteristics, such as the degree of previous Internet penetration (McNeal et al., 2003). Because I argue that the electoral benefits of policy implementation are relatively constant across states, at least relative to the electoral costs, my hypotheses also contrast in more subtle ways with explanations focused on the degree or character of electoral competition or election proximity (Berry & Berry, 1990; Chhibber & Nooruddin, 2004; Wilkinson, 2004). However, I believe my approach is complementary rather than competitive with these latter approaches. I further discuss alternative explanations below, after turning to the model and data I use to test my hypotheses.

Modeling Policy Outcomes

The first policy characteristic on which I focus in my empirical analysis is the timing of policy initiation. I emphasize timing as a key outcome for both theoretical and methodological reasons. First, because of both the ubiquity of the Internet and the relatively low monetary cost associated with initial policy implementation, a large majority of Indian states had adopted at least some technology-enabled service center policy by the end of the period under investigation (even if, as I discuss below, the extensiveness of the policies varied substantially). However, state governments varied markedly in their enthusiasm for centers, with some taking the lead whereas others lagged far behind. Evaluating the timing of policy initiation can provide us with insights into what factors influenced when governments were most willing to

introduce computerized services to citizens, at a time when this was a viable policy option for all states.

Second, analyzing the timing of policy introduction provides an opportunity to evaluate how time-varying factors within states may (or may not) affect the willingness of governments to implement policies. I analyze the timing of policy adoption using an event history model, which allows me to incorporate factors that change over time, such as state income and the presence of elections. Time-variant factors that influence policy timing may, in principle, also play a role in shaping other policy characteristics, such as the number of services that states provide in centers. Focusing my initial analysis on timing thus allows me to evaluate the explanatory power of variables that may influence other, more difficult to measure aspects of policy implementation.

However, it is also crucial to understand what explains variation in the extensiveness or scope of reforms (see Figure 2). After presenting the event history model of timing, I turn to the number of services offered per service center as a measure of the implementation scope. Before presenting my models and estimates, I now discuss measurement of the key dependent and independent variables.

Operationalizing the Variables

Dependent Variables

I measure the timing of "policy initiation" as the date of initial implementation of at least one computerized service center. This is the most appropriate measure for this analysis because, although it typically does not provide us with information on overall implementation, it is the "public" launch of the policy. Initiation of new government initiatives in India is usually marked by the participation of top government officials and significant media attention. For this reason these dates are both the easiest to confirm and the most relevant in terms of the potential electoral effects for politicians, as these are the dates when the public will be made most aware of a new government initiative. Thus, the question I ask with my event history model is, what is the likelihood that a state will initiate implementation of a computer-enabled service center policy, through the opening of the first center, at a given moment in time? In the event history model the dependent variable, policy, is a dichotomous measure of whether a state implemented a policy in a given month and year.

In addition to policy initiation, I evaluate policy scope by analyzing the number of different government services offered at each service center in a state. I collected the data for the dependent variables through interviews with

state government representatives in 16 Indian states. I also analyzed primary and secondary documentation related to state policies for the 20 states included in the data set.[13]

Independent Variables

I argued above that policy outcomes should depend on political leaders' estimations of how policies will affect their, and their parties', political futures. Because all ruling parties are likely to expect some electoral benefit from providing improved public services to their constituents, the most important source of variation in the overall benefits may be the electoral cost of the policies. I expect the size of this cost to be strongly influenced by the size of rents or bribes that will be foregone if technology-enabled service centers are implemented.

The size of potential foregone rents in a state is plausibly linked to the level of corruption in a state. In more corrupt states, politicians are likely to draw an important part of their income from bribes. Corruption may also reasonably be linked to citizens' need for help in accessing services; in states with high corruption, meaning that citizens will frequently encounter requests for bribes to facilitate service delivery, citizens may be more likely to appeal to their elected officials to lessen the hidden costs of services. In more corrupt states, then, politicians can benefit both from selectively assisting their preferred constituents and from drawing on bribes paid by other citizens. The importance of corrupt income to electoral resources provides a critical, and underinvestigated, explanation for variation in the character of technology policies across Indian states. The level of bureaucratic corruption differs across states, and I expect the level of corruption to exhibit a clear relationship with policy outcomes.

To test this proposition, I use a novel measure of state-level bureaucratic corruption, which is uniquely suited to testing my theoretical claims. This state corruption level variable draws on a Transparency International (2005) survey of corruption in India. The survey asked citizens about both their experience with corruption in acquiring services from government and their perception of corruption in government. Transparency International provides an indexed corruption score by state, based on 11 departments, including the police, municipal services, electricity, and the judiciary. The survey is particularly appropriate for the purposes of this analysis because it focuses explicitly on bureaucratic corruption in low-level service delivery, the area targeted by service center policies, rather than the high-level corruption more often engaged in by top officials (Rose-Ackerman, 1999).

The survey was conducted in 2005, 6 years after the initiation of the first service center policy. As a result, there is a risk of endogeneity with this variable because states that implemented early policies may have reduced their levels of corruption by the time the survey was taken. Although earlier state-level corruption scores are not available, I tested alternate measures of corruption from within the survey drawn from departments whose services have not typically been made available in computer-enabled service centers, such as the police. In general, these measures show similar results to those presented below using the indexed measure.

Control Variables

Arguments in the literature emphasize alternative political factors that may contribute to policy making. Analysts of India argue that the number of parties in the state legislature can affect policy outcomes (Chhibber & Nooruddin, 2004; Wilkinson, 2004). When there are a small number of parties in the legislature, ruling parties have incentives to provide policy goods to large portions of the population rather than small groups (Chhibber & Nooruddin, 2004). One-stop service centers, in theory, serve large population segments; thus, one might expect that states with a small number of ruling parties would be more likely to implement service centers.[14]

The proximity of elections may also influence policy adoption: When politicians expect an electoral benefit from a particular policy, they may be more likely to implement that policy in the period leading up to an election. As Berry and Berry (1990) find in their analysis of lottery policies, "Politicians do seek to adopt popular policies during election years, when the accompanying electoral rewards should be at their maximum" (p. 406). I measure this factor with a dummy variable for time periods in which state elections will take place within 12 subsequent months.

The ruling government's support base may also be a factor. The Indian media have emphasized the potential benefits of one-stop centers to poor citizens who have traditionally faced barriers to accessing government services. Those parties with large constituencies among lower socioeconomic categories may be more likely to expect that these policies will appeal to their constituents. The data for these measures come from the Electoral Commission of India and postpoll surveys conducted by the Center for the Study of Developing Societies.

The rich literature on policy diffusion often posits that as states around State A enact a new policy, the likelihood that State A will implement a similar policy goes up (Karch, 2007). In India, the initiation of the first major state

service center project is seen to have created an electoral incentive for other states to follow suit (former IT department official, government of Rajasthan, personal communication, May 5, 2007). But given improvements in communications and travel, geographical contiguity may no longer be relevant. As Karch (2007) notes, "The availability of information about an innovative program matters more than that policy's geographic locale" (p. 112).[15]

Analysts also emphasize a number of economic variables in attempting to explain policy characteristics. I include these variables to control for their effects. Characteristics such as income per capita and short-term economic health have been linked to the likelihood of policy implementation, especially where policies entail capital outlays on infrastructure and technology systems development (Berry & Berry, 1990; McNeal et al., 2003). Specific to the Indian case, Nooruddin and Chhibber (2008) argue that the fiscal capacity of Indian states may affect the ability of elected officials to implement development initiatives. When states have minimal, or no, income remaining after accounting for principal and recurring commitments or minimal "fiscal space," politicians will be restricted in their ability to provide goods to their constituents (Nooruddin & Chhibber, 2008, p. 1072). I replicate this measure using data from the Reserve Bank of India to test the effects of fiscal space on service reforms.

There are important theoretical reasons for why economic factors may not be important for technology-enabled service centers. Here large capital investments by government are not necessarily required. The cost of implementing individual centers is minimal relative to most Indian state budgets. A single center is estimated to cost approximately $1,000 (Srinivasan, 2005; Toyama et al., 2004), and the cost of implementing a moderate number of services and centers should be much lower than most other infrastructure or welfare initiatives. Service centers and service development can also be outsourced to private companies through contracts that place the financial burden on these private partners, thereby minimizing the state's financial exposure while still providing political benefits. As one observer noted,

> Building a road is costly and it takes time. If you need something done quickly to show that you are working for the people then this is not what you do because voters will not be impressed. An ICT [information and communication technology] kiosk can be implemented relatively quickly and is less costly. (IT professional, Noida, personal communication, January 30, 2006)

Development, as measured by education levels or life expectancy, may also affect policy diffusion (McNeal et al., 2003). High levels of human

development may reflect historical investments in welfare and basic services. Regional development patterns have also been emphasized in India, with the southern states seen as more developed than the "BIMARU" states farther north—Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh. Although these perceptions have minimal empirical support, at least where economic performance is concerned (Ahluwalia, 2001), regional demographic patterns could potentially influence policy outcomes.

Given the technological emphasis of these reforms, intracountry characteristics of the "digital divide" may also be relevant (McNeal et al., 2003). Because these policies intend to increase technology usage, they may be more likely in areas without significant technology diffusion. Good measures of computer and Internet penetration do not currently exist at the state level in India. However, measures of teledensity, the number of telephone connections per 100 citizens, should provide a reasonably good measure of overall technology infrastructure. The number of software companies present in the state could also affect policy, as software companies might encourage government technology use.

Additional control variables and their sources are listed in Table 1.

Modeling Policy Initiation

My unit of analysis is the Indian state, of which there are 28 in India, 3 of which became states during the period under investigation.[16] I have excluded 8 states from the analysis, the 7 northeastern states and Jammu and Kashmir, because of the implementation of a national government initiative in those states in 2001. None of these states had implemented their own state-level policies prior to the national government's initiative; 16 states implemented policies prior to 2006 and 4 did not.

Before discussing the event history model, I preview the results using bivariate scatterplots of a few key variables against the number of months elapsed between when the first service center project was launched (May 1998)[17] and when policies were implemented in the states.[18] For each of the graphs to be discussed, an ordinary least squares regression line is shown to highlight whether there is a generally positive or negative relationship between the variables. The graphs suggest what the multivariate analysis below will confirm: Although economic and other political variables have little or no association with the timing of policy implementation, we observe a strong association between bureaucratic corruption and policy timing.

First, as Figure 3 shows, there is no clear positive or negative relationship between a state's net domestic product per capita (in the year a policy was

Table 1. Variables and Measurements

Variable type	Variable name	Measure (frequency)	Variation	*n*	Source
Dependent variable	Service center policy initiation	Date of public initiation	State	20	Author's data collection
Socioeconomic	State income	Net state domestic product per capita, 0-1	State and year	180	Reserve Bank of India
	State financial stability	Ratio of total revenue minus total spending to total spending, previous year[a]	State and year	180	Reserve Bank of India
	Fiscal space	Revenue receipts and deficit minus civil administration and debt servicing costs	State and year	180	Reserve Bank of India
	Development	India state Human Development Index, 0-1	State (2001)	20	India 2001 human development report
	Technology infrastructure	Teledensity—phone lines per 100 people, 0-1	State (2003)	20	Ministry of Communications and IT
	IT companies	Number of it software and services companies per million people	State	20	Nasscom survey
Demographic	Population density	Number of people per square kilometer	State (1991 and 2001)	37	1991 and 2001 Indian censuses
	State region	Geographic region of state	State	20	Author's analysis
Political	Ruling government poor vote	What proportion of the poor voted for the ruling government?	State	16	Election Commission of India, CSDS reports
	State competitiveness	Effective number of parties holding seats	State and 5 years	48	Election Commission of India
	Election proximity	12 months prior to election	State and 5 years	84	Election Commission of India
	Substate initiatives	Number of nonstate government initiatives previously implemented	State and monthly	180	Author's data collection
	State corruption level	Transparency International index of corruption in public services, 0-10	State (2005)	19	Transparency International
	Contiguous state policy	Percentage of contiguous states with policies	State and year	180	Author's data collection

a. A normalized measure of the budget surplus (or deficit). CSDS = Center for the Study of Developing Societies.

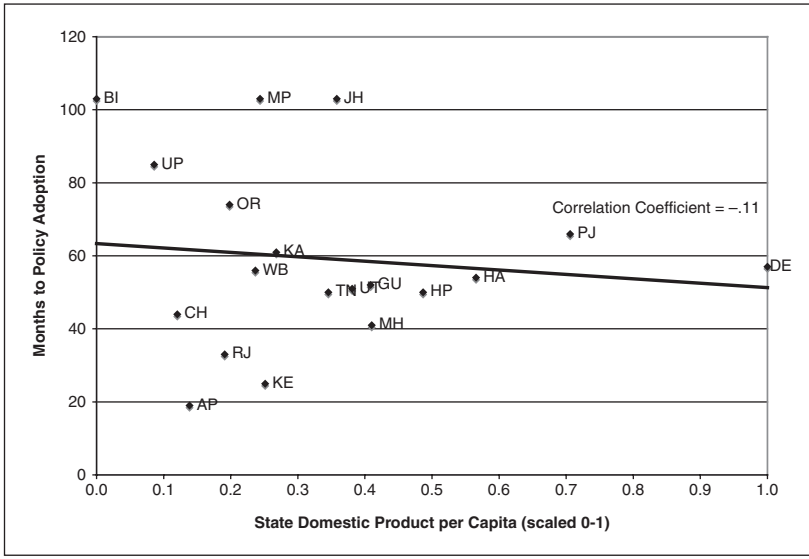

Figure 3. State domestic product per capita and months to policy initiation.

initiated) and the months elapsed before a policy was implemented. Turning to electoral competition, Figure 4 plots the weak relationship between the effective number of parties holding seats in the state assembly and the time elapsed before states implemented service center policies.

Figure 5, on the other hand, shows a quite strong and statistically significant relationship between the level of corruption in a state and the number of months before policy initiation. According to this representation of the data, those states with higher levels of corruption tended to implement technology policies later than those states with lower levels of corruption.

A Cox Proportional Hazards Model of Policy Timing

The main analytic technique I use for evaluating policy timing is event history modeling.[19] This statistical technique allows us to evaluate what characteristics of states help to predict when a policy is implemented. In an event history model the dependent variable is a measure of the "time that units spend in a state before experiencing some event" (Box-Steffensmeier & Jones, 2004, p. 1). The hazard rate for the model is the rate that defines the

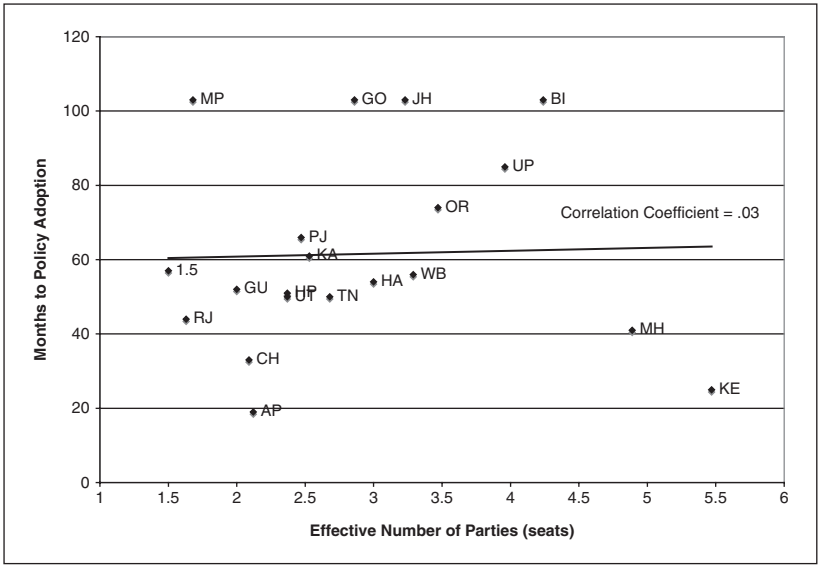

Figure 4. Effective number of parties and months to policy initiation.

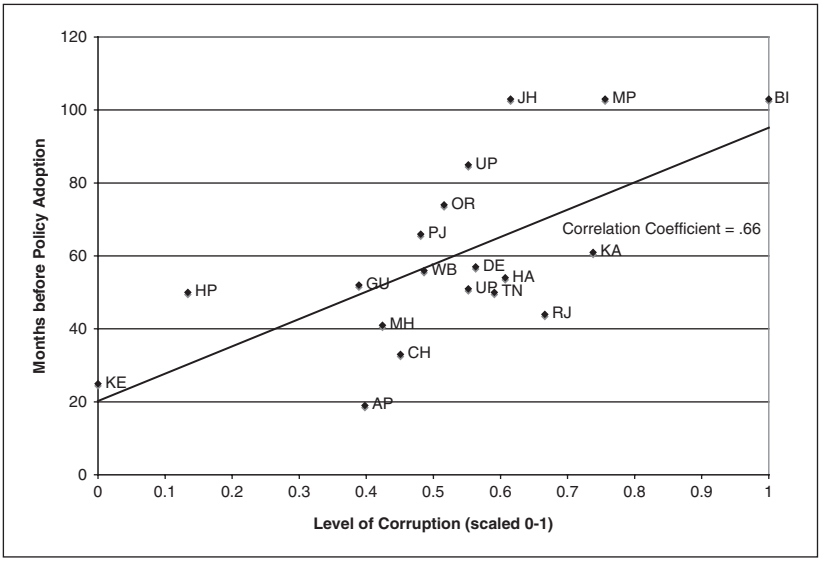

Figure 5. Level of corruption and months to policy initiation.

likelihood that units experience an event—for example, policy implementation—at a given moment. Once a unit has experienced the event of interest, it is dropped from the data and is no longer included in calculations. So for any moment in time the hazard rate is calculated based on the characteristics of those units that remain in the data set at that moment.

The type of event history model used for this analysis is a Cox proportional hazards model. The key benefit of the Cox model is that it does not require the analyst to predetermine a distributional form for the overall hazard rate (Box-Steffensmeier & Jones, 2004, p. 47). Alternatives to the Cox model include the exponential, Weibull, and log parametric models, which require an assumption that the underlying hazard rate is constant, is monotonically increasing or decreasing, or is shaped similarly to a log function, respectively. Theoretically, I expect the hazard rate for enactment of technology policies to change over time rather than be constant or monotonic, and thus it is most appropriate to utilize a Cox model in this case.

In the context of a basic Cox model, the hazard rate for a unit *i* is,

$$h_i(t) = h_o(t)\exp(\beta'x),$$

where the baseline hazard rate is $h_o(t)$ and the regression parameters and covariates are β'x (Box-Steffensmeier & Jones, 2004, p. 48). Another way of presenting this relationship, which will help us for interpreting the results of the model, is,

$$\log(h_i(t)/ h_o(t)) = b_1x_1 + b_2x_2 + \ldots .$$

Partial likelihood estimation is then used to analyze the ordered "failure," or initiation, times of the units and their related covariates to estimate the coefficients of the model. As we see from the above equation, the coefficients are related to the log of the hazard ratio. In other words, e^{b}_{1} is equal to the hazard ratio for the variable x_1. Thus, to calculate the hazard ratio for a specific variable, it is necessary simply to calculate *e* to the power of the coefficient.

The interpretation of hazard ratios for each variable is relatively simple. If a predicted hazard ratio in the model is greater than 1, this implies that as the variable increases, we would expect an increase in the hazard rate and, thus, the likelihood of policy implementation. For example, if the hazard ratio for a variable is 1.4, then a one-unit increase in that variable is associated with a 40% increase in the hazard (risk) of the outcome under consideration. If the hazard ratio is less than zero, then the variable is associated with a decrease in the baseline hazard rate. If the hazard ratio is 0.78, then a one-unit increase in this variable is associated with a 22% decrease (1 – 0.78) in the

baseline hazard. The closer the hazard ratio is to one, the smaller the effect of a change in the size of the variable on the likelihood of policy initiation.

I initially conducted bivariate tests of each independent variable and policy initiation and restricted multivariate models with variables grouped into economic, demographic, and political categories. In the bivariate analyses (results not shown), only the corruption variable displayed a significant relationship with the timing of policy enactment. In the economic subcategory model, only the human development indicator variable shows a significant relationship with timing of policy initiation. In the demographic model (results not shown), which included variables for state region and population density, BIMARU states exhibited a statistically significant relationship with later policy adoption. However, in a combined economic and demographic model, no regional variables exhibit statistically significant relationships with timing, indicating that the economic variables included in the model may be accounting for the characteristics attributed to regional development disparities. In the model for political variables, corruption is the only variable with a statistically significant relationship with timing outcomes. When all of the variables are tested together, only corruption displays a statistically significant relationship with policy timing. The results of these models are shown in Table 2.

Interpreting the Results

The first major result of the analysis is that economic variables cannot explain variation across states in the timing of policy implementation, nor can policy diffusion from contiguous states. None of the estimated hazard ratios on state domestic product, state budget surplus, fiscal space, primary sector, Human Development Index, technology infrastructure, and IT companies are significantly different from one in the model. Nor does policy diffusion, as proxied by policy adoption in contiguous states, explain variation in the timing of policies; the hazard ratio for contiguous state policy is insignificant.

On the other hand, although economic variables do not explain policy adoption, the variable measuring corruption plays a robust role in predicting the implementation of computer-enabled service center policies across states. The effect of this variable on likelihood of implementing a technology-enabled service center policy is substantial and in the predicted direction.

In the full model, with the relative corruption levels of the states scaled from 0 to 10, the hazard ratio for the corruption variable is 0.50. As per the above discussion, this means that a one-unit increase in the level of corruption is associated with a 50% decrease in the baseline hazard rate for the state. This means that if two states share the same values on all other variables but one

Table 2. Computer-Enabled Service Center Policies Cox Proportional Hazards Model

	Variable	Socioeconomic	Political	Full model
Socioeconomic	State net domestic product	0.67		1.28
		(–1.85)		(0.39)
	State budget surplus	0.25		1.25
		(–0.28)		(0.05)
	Fiscal space	0.55		0.12
		(–0.23)		(–0.80)
	Human development indicator	299.56*		25.02
		(2.31)		(0.80)
	Technology infrastructure	0.42		0.00
		(–0.34)		(–1.65)
	IT companies	1.86		26.69
		(0.54)		1.50
Political	State competitiveness		0.91	0.76
			(–0.27)	(–0.58)
	Election proximity		1.72	1.86
			(0.39)	(0.90)
	State corruption level		0.62*	0.50*
			(–2.67)	(–2.38)
	Substate initiatives		1.01	1.41
			(0.01)	(0.39
	Contiguous state policy		1.56	1.00
			(0.32)	(0.00)
n[a]		20	19	19
Log likelihood		–35.00	–30.89	–27.44
Prob. > χ^2		.32	.04	.07

Entries are estimated Cox model hazard ratios with z ratios in parentheses.
a. There is no 2005 Transparency International score for Goa, so this state is excluded from models when the corruption variable is included. A 2008 survey placed Goa in its most corrupt ("Alarming") category (Transparency International, 2008). Given that Goa did not implement policy before 2006, it is unlikely that Goa's inclusion would affect the results.
*$p < .05$

has a corruption score of 4 and the other has a corruption score of 5, then the risk that the state with a corruption score of 5 will implement a service center policy at any point in time is 50% smaller than that of the state with a score of 4, all else equal.

The effect of corruption contrasts with that of standard political arguments, which cannot explain policy adoption. Among the alternative political explanations, a higher number of parties holding seats in the state assembly is associated with a decrease in the baseline hazard rate, but this relationship is not statistically significant. The relationship between policy implementation and election timing shows an above-zero hazard ratio for the 12 months prior to an election, but again this is not statistically significant.

Robustness of Policy Implementation

Although evaluating the timing of policy initiation is valuable for the reasons discussed above, it does not help us to understand the extensiveness of policies. In this section I extend the above analysis to evaluate the relationship between state-level corruption, and alternative explanations, and the number of services offered in service centers.

Here I use bivariate and multivariate ordinary least squares models, as I do not have over-time data on the outcome variables. The main explanatory variable, state-level corruption, is measured dichotomously, such that I am comparing states with above average and below average levels of corruption. All other variables are measured as above.

The evidence shows a clear relationship between the level of corruption in a state and the total number of available services, with more corrupt states offering fewer services than less corrupt states. This relationship holds in both the bivariate model and when corruption is tested in multivariate models with alternative explanatory variables, including state domestic product per capita, fiscal space, and ruling government support from the poor. The number of services is also not associated with the length of time since policy initiation: Given the level of corruption, the date of policy initiation is unrelated to the extensiveness of service provision. In general, moving from a below average corruption state to an above average corruption state is associated with a decrease of approximately 14 services, more than a third of the maximum number of services available in any state, 41. Results of the models are presented in Table 3.

Conclusion

These findings provide an important new take on the role of political incentives in processes to increase the use of new technologies in developing countries and in efforts to reform public service delivery in general. The level of corruption in a state exhibits a strong relationship with both the timing of policy initiation and the number of computerized services made available to

Table 3. Evaluating Scope: The Quantity of Services

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	24.67	26.54	62.24	27.01	27.23
	(7.19)	(5.83)	(2.88)	(3.05)	(3.59)
Above average corruption	–13.97**	–13.98**	–13.86**	–15.82*	–12.34*
	(–3.22)	(–3.16)	(–3.43)	(–2.56)	(–2.01)
State net domestic product		–6.05			
		(–0.65)			
Fiscal space			–39.41		
			(–1.76)		
Ruling government poor vote				–3.72	
				(–0.29)	
Months since initiation					–0.07
					(–0.38)
n	16	16	16	12	16
r^2_{adj}	.38	.36	.46	.32	.34

Entries are unstandardized regression coefficients with t ratios in parentheses.
*$p < .05$. **$p < .01$.

citizens. Although public service reforms can create new opportunities for electoral benefits across states from politicians providing improved goods to constituents, variation in these policies is more likely explained by politicians' expectations about disruptions to established patterns of rent seeking. The anticipated threat to incomes politicians often rely on for funding future election campaigns can lead politicians in highly corrupt states to resist initiation of these policies and, if policies are implemented, restrict their scope. I provide evidence for this relationship in the first systematic study of these policies across the Indian states, utilizing new data that I have collected.

The results of this analysis are troubling from a policy perspective. An oft-stated goal of technology-enabled services policies is to reduce the corruption in government service delivery. Yet the results of this research suggest that implementation of policies intended to reduce corruption is *least likely* in those states that have high preexisting levels of corruption. Although states with low levels of corruption are still likely to benefit from these policies, potentially in terms of both reduced corruption and other benefits to citizens, these are the states where citizens, in terms of the corruption they face on a daily basis, arguably need these policies the least.

Policy concerns notwithstanding, these findings provide an important theoretical gain in terms of our understanding of the factors affecting policy

implementation and new technologies in developing countries in particular. Although analysts such as Acemoglu and Robinson (2006) have highlighted the potential relationship between electoral costs and barriers to the implementation of new technology, this analysis emphasizes a more specific relationship between the potential benefits and costs to politicians of increased efficiency in government service delivery and the likelihood that they will implement robust, efficiency-improving technologies. When the electoral benefits of improving government services do not outweigh the costs of decreased corruption, the developmental effects of new technologies may be irrelevant. Citizens are thus likely to be the biggest losers when the claws of corruption have a powerful hold on the purse strings, and therefore policy preferences, of ruling politicians.

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Notes

1. This excludes the seven northeastern states and Jammu and Kashmir.
2. In all cases the presumed motivation for the policy lies at the state level, as it was not until 2006 that a related policy was implemented by the central government.
3. I refer to the centers as technology-enabled, computer-enabled, and one-stop service centers. They are also known as telecenters, information kiosks, or common service centers.
4. Services are typically intermediated; citizens need not be literate or use a computer.

5. As I have shown in other work, however, this can depend on the party system: In coalition government ruled states, the chief minister's power is less absolute (Bussell, 2008).
6. Following common definitions in the literature, I consider corruption to be the use of public office for private gain, where "private gain" can entail broad private interests, such as reelection.
7. *Babu* in this usage originated during the British colonial period and refers to an Indian clerk. In current usage, the term is somewhat derogatory but still refers to lower level bureaucrats.
8. Chopra (1996) argues that an important role of members of the Legislative Assembly (MLAs) is to help constituents navigate bureaucratic processes. When citizens perceive that their MLA has helped them to negotiate the bureaucracy, they are more likely to vote for them in the future.
9. Politicians in other countries may also face a threat to electoral prospects from a reduction in corrupt funds, but the details of the system are likely to work differently in different contexts.
10. Expenditure limits for individual candidates run from Rs.500,000 ($12,500) in small states to Rs.1,000,000 ($25,000) in large states (Electoral Commission of India, 2007),
11. A candidate for national parliament noted, "I spent within the limit of Rs.1.5 lakh. But my friends and party put in Rs.20-25 lakh" (Jayant Malhoutra, in Rekhi & Shekhar, 1996).
12. In principle, electoral competition or election proximity may influence the political benefits. However, as I show below, these variables are poor predictors of policy characteristics.
13. Interviews were conducted in Andhra Pradesh, Delhi, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand, and West Bengal.
14. Effective number of parties (ENP) is a standard measure of electoral competition, giving greater weight to parties holding a larger number of seats or receiving a larger number of votes. ENP is calculated by the formula $n = 1/\Sigma p_i^2$ where n is the effective number of parties and p_i is the proportion of seats held by each party or votes received.
15. This resonates with the Indian case in which a bureaucrat from western India noted that his chief minister sent him to a southern state to observe the service centers implemented there (Rajasthan former IT department official, personal communication, May 7, 2007).
16. Jharkhand, Chhattisgarh, and Uttarakhand became states in 2000.
17. A district administrator implemented this project in the state of Maharashtra.

18. This visual technique is helpful only for continuous independent variables. Four states have the highest possible number of months, 103, because they did not implement policies. These observations are "right censored," a problem accounted for in the event history model.
19. Also known as survival analysis or duration modeling.

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