Evaluating Public Service Reforms in India: A Combined Experimental and Survey-Based Approach

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Abstract

Do public service reforms improve citizen services? Over the last two decades both public-private partnerships and information and communication technologies have been promoted as tools for reforming service delivery in developing countries, with the goal of providing both economic and political benefits to citizens. However, observational studies of policies intended to promote these reform models are hindered by selection bias. Experimental evaluations, on the other hand, can be limited in the potential for generalization to broader populations. In this study, I adopt a combined experimental and observational approach to evaluate the independent effects of privatization and computerization in an initiative to improve citizen services in the south Indian state of Karnataka. Through the use of a large citizen survey and field experiment, I show that privatization of service delivery has a larger positive effect on a number of service quality measures than computerization, most important of which is the reduced demand for, and size of, bribes from citizens. While private, computerized centers do not improve all facets of service delivery and, interestingly, do not engender higher levels of satisfaction from citizens, their effect on corruption in the service delivery process is marked.
Evaluating Public Service Reforms in India:
A Combined Experimental and Survey-Based Approach

Do public service reforms improve citizen services? A considerable portion of the development agenda in the last few decades has focused on strategies for improving the manner by which government provides services to its citizens, be it roads, water, official documents, or licenses. But have the reforms implemented by developing countries made a quantifiable difference in the quality of services received by citizens, in terms of reduced costs, reduced time, improved access, or improved accuracy? Do these reforms change the relationship between citizens and the state by affecting citizen trust in, and perceptions of, government, in terms of the role for the state in service delivery and its efficiency in executing its responsibilities to citizens? For many citizens, applying for public services is their main interface with government and modifications to the character of service delivery have the potential to entail substantial changes to basic government-citizen interaction.

In this paper I address these questions by evaluating a set of public service reforms implemented by the state government of Karnataka in India. Like most developing countries, the Indian government has, since the 1990s, faced a range of demands, and received complementary amounts of related advice, regarding the provision of public services to their citizens. Governments have been counseled to adopt new tools for service delivery, such as the use of information and communication technologies, and to change the service delivery channel itself, often through partnering with a private sector entity to serve as the service provider. In both cases, one of the major goals of these reforms is to place greater distance between government officials and citizens, by providing an alternative personal or technical interface. In doing so, reformers hope to improve the efficiency and quality of service delivery, while also reducing added costs from long distance travel and corruption.
But the implementation of service delivery reforms in developing countries often leaves questions about the effects of interventions unanswered. The literature on public-private partnerships offers mixed opinions on the efficacy of these relationships for improving service delivery (Rosenau, 1999). Given the complex nature of many government activities, let alone the wide range of potential partnering options available, promotion of public-private partnerships in general has met with criticisms that governments must consider the overall goals of an initiative, and the requirements for a successful partnership, before shifting to a public-private option.

Analysts of technology-based government reforms have attempted to assess the effect of reforms on the general quality of service delivery, but, in general, have taken a less critical eye to the potential effects of new technologies on the citizen-government relationship. Bhatnagar, in multiple works, addresses the effects of technology-enabled services, or eGovernment, on the quality of service delivery to citizens (inter alia, Bhatnagar and Singh, 2009; Bhatnagar, 2003). Benjamin provides a critical view of technology-based reforms, showing how pre-existing interests and the local political economy can affect service reform outcomes, in this case with regard to land-related services (Benjamin, 2005). But none of these works explicitly consider the effect of changes in service delivery on government relationships with citizens. In addition, from a methodological standpoint, none of these works moves beyond the case study or survey format to gain greater leverage over whether reforms display a causal relationship with observed differences in the quality of service delivery across the included cases.

In this project I build on previous research by addressing the effects of government service reforms through analysis of original survey and field experiment data from the Indian

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1 An exception to this is Kuriyan’s work on technology-enabled service reforms in the Indian states of Kerala and Andhra Pradesh. Based on citizen surveys and interview data, she examines the ways in which private-sector mediated service delivery is changing citizen perceptions of the state (Kuriyan, 2008; Kuriyan and Ray, 2009).
state of Karnataka. Like many other Indian states (Bussell, 2009; Forthcoming), the Karnataka government has introduced a number of public service reforms using information technology. One initiative in particular, the Nemmadi kendras,\(^2\) was implemented in largely rural areas of the state to provide both public and private services to citizens. The centers are owned and operated by a single company, Comat Technologies, and provide public services through an agreement with the state government. The approximately 800 centers are located at the village level.

I utilize a unique opportunity in the implementation of the Nemmadi initiative to evaluate the project’s effects on the quality of service delivery and government-citizen relations. Nemmadi centers provide government services to citizens through a technical interface that connects each Nemmadi office to the database of the local taluk office.\(^3\) The private companies in the initiative\(^4\) have worked with the state government to computerize all of the taluk offices, starting in 2006. But the computerization of taluk offices has been staggered, meaning that for a certain period of time computerized services have been available through Nemmadi centers in some parts of the state and not others. In addition, once the local taluk offices are computerized, they also can provide services to citizens even after Nemmadi centers are able to offer public services. In this way the computerized local taluk offices continue to provide most of the same

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\(^2\) “Nemmadi” means “peace of mind” in Kannada, the state language of Karnataka, “kendra” means center or office. I will refer to the Nemmadi offices here as “centers.”

\(^3\) The state of Karnataka is divided into districts, which are then sub-divided into taluks, and further into hoblis. These serve as administrative divisions and have traditionally determined where citizens must go to access government services.

\(^4\) Three companies were initially involved in the initiative. 3i Infotech provided capital as well as networking and technology services (Times of India, 2006), Comat Technologies owns and manages the centers, with Comat employees operating the centers in villages, and n-Logue Communications provided additional technological support. Currently Comat Technologies is the main company involved in the initiative.
services, creating the potential for competition between the two types of centers.\(^5\)

Due to these characteristics of the initiative—staged implementation across the state and computerization of both taluk and Nemmadi offices—it is possible to evaluate three distinct types of citizen experience in accessing services. First, those citizens in areas with non-computerized government offices; second, those citizens who live in areas with computerized services who visit government-run taluk offices; and third, those citizens who live in areas with computerized services who patronize the privately-run Nemmadi offices.

I make these comparisons by evaluating survey data collected from all three types of service locations and field experiment data from the two computerized types of service locations. Surveys of citizens leaving government offices and Nemmadi centers were conducted in both non-computerized and computerized regions. These surveys provide observational data on the characteristics of service delivery and opinions of citizens across the range of service-access options potentially available in the state. With this I am able to evaluate both the effects of computerization and privatization in service delivery. Table 1 summarizes the categories of service delivery and the subjects in the survey.

In the field experiment, I directly compare the service delivery experience across government offices and Nemmadi centers, a strategy explained in more detail below. Each subject was assigned to their home taluk,\(^6\) where they were asked to apply for three different services, an income certificate, a caste certificate, and a birth certificate,\(^7\) at randomly assigned

\(^{5}\) Competition is on the basis of non-cost factors, as the official cost of accessing public services is the same in either type of office.

\(^{6}\) Services are available to citizens only in their home region.

\(^{7}\) In those cases where a subject was not currently eligible for one or both of these services, they were asked to request the service for a local relative or friend. These modifications to the protocol are tracked in the questionnaire and included in portions of the analysis. In addition some Field Investigators applied for copies of their Birth Certificate, but in most cases birth
types of service locations, a Nemmadi center and/or the taluk office. The assignment of subjects
to treatment conditions is shown in Table 2. Once subjects completed the process, they were
asked to fill in a questionnaire for each service about their experience. The same questionnaire
was used in the citizen surveys. This research design provides a direct and controlled comparison
across service access locations and types of services.

Based on the citizen survey, I find clear differences in the characteristics of service
experienced by those citizens visiting different types of offices. Most importantly, citizens
visiting Nemmadi centers, on average, experienced improved service delivery over either type of
government office across a number of indicators. While there are no clear differences in the
number of days it takes to receive a service or the number of minutes spent at the office, citizens
patronizing Nemmadi centers spend less money overall to access their services, make fewer
visits to the office, and meet with fewer officials than those going to non-computerized public
offices, while those going to a computerized taluk also make fewer visits and meet fewer
officials. Nemmadi patrons, on average, also face significantly lower demands for bribes, in
terms of both frequency and size, than those citizens at either the computerized or non-
computerized government offices.

However, citizens at non-computerized offices were less likely to require outside help
and reported higher average levels of satisfaction than patrons at either type of computerized
center. In terms of citizen perceptions of government across the different types of centers, we see
some perhaps surprising results. Citizens at the non-computerized centers reported higher levels
of trust in government and perceived government to be more efficient than visitors to
computerized centers. Patrons of government-run offices also reported more trust in the private

records prior to the implementation of computerization had not been computerized by the state
government and were not available in either type of center.
sector than those who visited the private sector-operated Nemmadi centers. Even so, patrons of Nemmadi centers felt more positively about the potential for technology to reduce government corruption and supported government partnerships with the private sector to deliver services.

The experimental survey compares only across computerized taluk and Nemmadi centers, thereby providing an evaluation of the role played by the private sector in delivering services. The results here support the findings for Nemmadi centers in terms of the number of officials met in the process, with Nemmadi patrons meeting fewer officials on average than those going to taluk offices. Subjects visiting Nemmadi centers also reported higher average levels of satisfaction, but felt less positive about the government working with the private sector to deliver services than those visiting a government office. I consider the details of both surveys and the implications for external validity below.

Before addressing the findings in greater detail, I consider the background of services access and proposed reforms to service delivery in India specifically as well as developing countries in general, placing particular emphasis on strategies to utilize information technology and public-private partnerships to reform services. I then review strategies for evaluating service reforms prior to discussing the research strategy utilized here and the results of the two surveys.

**Citizen Access to Services in India**

The pre-existing system of service delivery in India has been wrought with difficulties for citizens. Accessing services is seen to be unpredictable, time consuming, and costly, with citizens traveling long distances and often paying above the official fee, without even being guaranteed that they will ever receive the service. Chand (2006a), in a discussion of public service reforms in India, highlights that the structure of the service delivery process makes
access difficult and does not create incentives that encourage officials to work for citizens. He posits that the "general weakness of accountability mechanisms is a barrier to improving services across the board," while "bureaucratic complexity and procedures make it difficult for ordinary citizens to navigate the system for their benefit". In general, "the lack of transparency and secrecy that shrouds government operations and programs provides fertile ground for corruption and exploitation" (Chand, 2006a: 19).

Chand (Ibid.) also emphasizes the pervasive quality of corruption in service delivery and the difficulty of prosecuting perpetrators within the Indian system. As recent surveys have shown, many Indian citizens are faced with corrupt practices when engaging with government. Transparency International India found that more than 60% of Indians have paid a bribe to receive a government service, amounting to more than Rs 210 billion (approximately $5 billion) in bribes each year across eleven different government departments (Transparency International India, 2005: 3). Often these bribes take the form of “speed money,” where citizens pay a bureaucrat to receive a service more quickly, with those citizens having the need or capacity to pay the most able to jump ahead in the queue. However, these bribes do not all come from a small, wealthy portion of the population. A more recent survey found that more than one-third of people below the poverty line in India had paid a bribe in the previous year to access government services (Transparency International India, 2007). The demand for bribes varies across the country, with bureaucrats demanding bribes from fewer than 20% of citizens in the states of Kerala and Himachal Pradesh, while more than 60% of citizens in Bihar or Karnataka have direct experience with bribing in multiple government departments (Transparency International India, 2005), but corruption exists, to some degree, in all regions.

This set of issues often makes the process of acquiring the most basic services, such as a
ration card that entitles the bearer to reduced-price foodstuffs or a death certificate for a family member, arduous tasks that require time and financial resources that are often not available to the average citizen. As noted above, a number of potential solutions to the problems of public service delivery have been proposed in the international development community over the last two decades. Two of these strategies, the strategic use of information and communication technologies in government operations and the introduction of private sector partners into service delivery, are of relevance to this discussion.

**Information Technology and Public Service Reforms**

First, consider the emergence of interest in the promotion of information and communication technologies in developing countries, which developed over the latter half of the 1990s. Advocacy for the use of information and communication technologies in developing countries typically focused on the ways in technology “can be used as a tool for development, by increasing access to and facilitating exchange of information” (Murray et al, 2002: 11). By affecting the availability of information in general, these new digital technologies were expected to contribute to developmental tasks across the range of “education, health, governance, agriculture, urban development, environment, and gender rights” (Ibid.).

The potential contribution of information technologies to development led to a major wave of interest in new technology among international development organizations and multinational corporations. From 1994 to 2005, the United Nations Development Program, the United Nations Conference on Trade and Development, the World Bank, and others produced dozens of reports on opportunities for ICTs in developing countries, typically emphasizing opportunities for improving economic growth, education, health care; reducing poverty; and, most importantly
for the current discussion, improving access to government services (Bussell, 2005).

While the enthusiasm for using information technologies in developing countries was strong, observers soon realized that differing access to new technologies both within and across nations could threaten countries' abilities to take full advantage of new technologies in their developmental and reform strategies. One outcome of this fear was the development of multiple models of "shared computing," with the goal of providing low cost access to technology for the general public. This took the form of computers in libraries, cyber cafes, and government sponsored citizen centers where individuals could often take computer classes and use computers for free or for minimal fees.

While the shared computing model initially gained some traction in India, with organizations such as Drishtee and n-Logue at the forefront of community computer centers, the model was transformed under government policies in multiple states to take the shape of computerized service centers. In most cases, these state-sponsored service centers are defined by three main components or characteristics. First, they deliver services to private individuals through the use of information technologies, and in particular computers and the Internet. The services themselves may be public and/or private in nature. Second, they provide these services through dedicated centers. Third, the combination of service delivery and dedicated centers produces a “one-stop shop” environment where there are services available from multiple government departments.

Projects to implement this type of computerized service center were initiated in almost all of India's major states by the end of 2006 (Bussell, Forthcoming), when the national government announced a program to put 100,000 "common service centers" in place in rural areas across the entire country. This initiative is still in progress, with tens of thousands of service centers having
been implemented by the middle of 2009. However the extent of variation in state-level policies, and in their implementation, is significant across the country (Bussell, 2009b). This includes variation in the number and type of services, the use of private sector partners, and the number of centers implemented per capita in a state, all of which could potentially affect the likelihood and degree of measurable effects on the quality of public service delivery. In other research I analyze the causes of this variation across the Indian states Ibid.). Below, I consider the specific policies of the Karnataka state government, on which the current research was conducted.

A few analysts have attempted to evaluate the effects of computerized service delivery on the quality of services and the relationship between citizens and the state. Bhatnagar and Singh find in general that citizens prefer computerized over non-computerized service delivery (2009, 183). In addition, the number of trips to a government office required to access a service were reduced at the computerized offices and in multiple cases there was a clear reduction in corruption. However, they also find that these outcomes vary across different services and computerization projects (Ibid.), implying that there is the potential for significant variation in the outcomes of reforms. Kuriyan, in an analysis of state government-sponsored service centers in two Indian states, finds that these centers "and their electronic delivery of services are being used as, and to some extent are becoming, symbols of responsiveness and of accessibility to all" (Kuriyan, 2009: 69). In this way the government is attempting to improve citizen impressions of state effectiveness in the delivery of services.

More generally, other analysts have attempted to evaluate the relationship between technology-based reforms and changes in citizen-state relations. Tolbert and Mossberger (2006) note that, "governments and institutions such as the European Union and United Nations have portrayed e-government as a renewal of the relationships between governments and citizens,"
and as such technology-based reforms are expected to affect the quality of trust and confidence between citizens and the state. They posit that "Traditionally, scholars have conceptualized trust as a product of citizen preferences regarding outcomes (either policy or electoral outcomes), but recent research provides evidence that citizens base their evaluations on process considerations as well—how fair, open, and responsive political and governmental processes are" (Tolbert and Mossberger, 2006). In these terms, it is clear that reforms to government processes for the delivery of basic government services could affect the quality of citizen trust in government.

Public-Private Partnerships in Service Delivery

Second, consider an older but parallel development strategy emphasizing government partnerships with private sector actors to conduct government business in general and, more specifically, to deliver services to citizens. The overarching goal of public-private partnerships has been to leverage the strengths of different sectors while avoiding their weaknesses. The public sector is expected to be “better at openness to public scrutiny, employment concerns, [and]…oriented toward social responsibility and environmental awareness” (Rosenau, 1999: 11), while the private sector “is thought to be creative and dynamic…better at performing economic tasks, innovating and replicating successful experiments, adapting to rapid change, abandoning unsuccessful or obsolete activities, and performing complex or technical tasks” (Ibid.).

Analysts and critics of public-private partnerships have noted a number of potential risks with their implementation, the most important of which, for current purposes, are the potential effects on access to, and the quality of, services. While the goal of partnerships is often to improve service delivery to citizens, Rosenau notes that “Service–users and citizens fear becoming objects of a profit-making calculus rather than a public service ethos” (2000, as quoted}
in Bovaird, 2004: 204). In those cases where “partnerships emphasize cost reduction or profit maximization at the price of significant quality compromises, vulnerable populations may not be able to respond appropriately and aggressively” (Rosenau, 1999: 16-17). However, Bovaird also finds that it is “clear from public opinion surveys that many service-users are unaware of (and uninterested in) the precise legal standing of the organization which provides their service—and quite content with whatever configuration is used to provide service, as long as the service quality is satisfactory” (2004: 204).

**Information Technology and Public-Private Partnerships in Development**

The emphasis on public private partnerships as a model for reforming government operations coincided with the international movement to promote information technologies in developing countries. As Bovaird notes, “the exponential rise in interest in e-government has driven governments to work more closely with private companies in the ICT sector, both in order to gain access to capital for the massive investment programmes which are needed and also, often more importantly, to access the expertise of these companies” (Bovaird, 2004: 201).

In the context of information technology and development projects, organizations such as the Global Knowledge Partnership argue that "multi-stakeholder partnerships," which bring together the public sector, private sector, civil society, and academia, “are necessary because it is increasingly clear that no one sector in society can deliver the complexities of development alone” (Global Knowledge Partnership 2003: 2). Large multi-stakeholder organizations, such as the UN ICT Task Force, the G8 Digital Opportunities (DOT) Task Force, and the UNDP/Accenture/Markle Foundation Digital Opportunity Initiative have played a major role in shaping debates on technology in developing countries, as well as providing funding sources.
Within developing countries, activities by the private sector to pilot technology initiatives have provided a learning platform for local governments, such as with Hewlett Packard’s e-Inclusion and Digital Villages initiatives (in multiple countries), Microsoft’s Digital Villages in South Africa, and the MIT Media Lab/IIT Madras/ Berkman Center/I-Gyan Foundation SARI digital village centers in Tamil Nadu, India.

But the use of partnerships in technology and development initiatives does not guarantee success. Instead, “The risks involved are all the greater because the public sector has little or no experience in these new technologies (Langford and Harrison, 2001), unlike the situation in traditional outsourcing, where the public organization had traditionally undertaken at least some of the activity in-house” (Bovaird, 2003: 201). The Global Knowledge Partnership also acknowledges that “While many laud the virtues of MSPs [multi-stakeholder partnerships], most are struggling to make them work (Ibid.: iii). State-society partnerships are thus promoted as a necessity for ICT initiatives, despite the absence to date of clear successes.

Despite these risks, “the imperative to mine the potential of the web and intranet for online service provision and for improved interaction with stakeholders is too great to hold back,” (Bovaird, 2004: 201). Governments have looked to the private sector for assistance because in “the struggle between limited fiscal capacities and rising public expectations, the use of partnerships has emerged as a strategy of government leaders who wish to benefit from advanced technologies” (Brown et al., 1998: 499).

Public-Private Partnerships, Technology, and Karnataka’s Nemmadi Initiative

The Nemmadi Kendra initiative in Karnataka emerged after a number of reasonably successful eGovernance initiatives in the state. The state government had been recognized domestically and
internationally for its pioneering efforts to computerize land records, the documents required by the state to prove ownership of land (Chawla and Bhatnagar, 2004). Based on the success of the land record initiative (called Bhoomi), the bureaucrat who led the project embarked on an effort to provide a range of government services through computerized centers, with the support of the state Chief Minister. This initiative materialized initially in the form of the Rural Digital Services (RDS) project, which was piloted in 2003. The goal of RDS, which became the Nemmadi initiative, was to provide a “single window,” or one-stop-shop, for government services at the village level. The implications of this computerized model were explicitly to “provide transparent, speedy, and efficient services to rural citizens,” thereby eliminating the need for middlemen and bribes in service delivery (Government of Karnataka, 2006).

Based on the perceived success of the RDS pilot in fourteen locations, the state government extended the initiative across the state at the sub-district level by implementing approximately 800 centers (IAS Officer, Karnataka Government, Bangalore, February 22, 2006; External Consultant to Karnataka Government, Bangalore, February 22, 2006). Implementation of these Nemmadi centers began in 2006 and was nearly complete in the summer of 2009. Centers were fully operational in all but two taluks at the time of this research project.

Nemmadi centers are owned and operated by a private company, Comat Technologies. The decision by Karnataka’s government to work with the private sector to implement rural service delivery centers was based largely on the expectation that an implementation of this scope would require external participation in order to be successful. The model for the partnership differed from that implemented in other states, such as neighboring Kerala, where individual entrepreneurs contract with the state to operate rural centers. In Karnataka, instead, the government partnered with a single company that was tasked with owning the centers and hiring
permanent employees who would operate the centers in villages. The Secretary for eGovernance who oversaw the design and initial implementation of the Nemmadi centers explained the ownership decision in this way, “The company that implements the centers will own all of the equipment and run the centers; this is not an entrepreneurial model. We think this is better because it’s difficult to control what is happening when there are entrepreneurs and it is difficult for the centers to maintain and fix their equipment when it breaks down” (IAS Officer, Karnataka Government, Bangalore, February 22, 2006).

In order to provide services through Nemmadi centers, the state computerized government offices at the taluk and district levels first, and then offered the services through a link at the Nemmadi centers to the database at the taluk office. This meant that computerized services could also be provided directly by government officials at the taluk offices. For nearly all services that have been implemented in the Nemmadi centers, citizens can go either to the taluk office or to a Nemmadi center, whichever they prefer. This implies that there is potential for competition between the Nemmadi centers and the taluk offices. Because the Nemmadi centers operate on a for-profit basis, this would also imply that there may be incentives for Nemmadi centers, but not necessarily government offices, to provide high quality service delivery. Prior to this survey, no comprehensive and independent evaluation had been conducted to measure the effects of computerization and Nemmadi centers on the quality of service delivery or citizen perceptions of government.

**Evaluation, Field Experiments, and Public Services in India**

The evaluation of service reforms is imperative for understanding the effects of reform on factors such as the quality of service delivery, the degree of access to services, and the relative
differences from previous delivery models. Project implementers and analysts alike have as a result focused on actively evaluating established and new interventions in order to gain insights into factors affecting the outcomes of reforms. In an introduction to a set of evaluative case studies on service reforms in India, Chand points out that the major goals of the collection are to "identify, across cases, common factors that help explain why these innovations worked. In addition, from these innovations, the report draws lessons that might help to improve service delivery across sectors and facilitate the transplanting of success stories to other settings" (Chand, 2006b; xiii). This study, like many, draws largely on cases studies, and is limited by the fact that it looks only at interventions that were considered to be successes, thereby limiting our ability to ascertain how these cases differed from those that were less successful.

Field experiments have become an important model for both designing and evaluating reforms, in order to avoid the difficulties arising from observational evaluations and to increase evaluators' ability to discern the causal effects of any initiative. In a review of randomization in evaluation of development initiatives, Duflo and Kremer argue that "randomized evaluations can be used to overcome the problems often encountered when using other evaluation practices to estimate program impact" (2003: 2). In particular "Programs targeted to individuals or local communities (such as sanitation, local government reforms, education, and health) are likely to be strong candidates for randomized evaluations" (Ibid.).

A number of studies in India have utilized randomization and field experiments to evaluate of development initiatives. Banerjee, Cole, Duflo, and Linden (2007) report the results of two randomized experiments to evaluate interventions in India's education sector. These projects were developed to evaluate the quality of initiatives to improve education in urban slums. The authors were able to identify clear effects of the intervention on test scores in
treatment schools, relative to those of students in the control schools.

Other recent studies in India have used field experiments not to gauge the quality of reforms per se, but to evaluate the characteristics of established service delivery processes. In their evaluation of Transport Department services in the Indian capital of Delhi, Bertrand, Djankov, Hanna, and Mullainathan (2007, 2008) evaluate the system for issuing driving licenses. They find evidence not only that it was easier to obtain a driving license if a citizen was willing to pay above the official price to a middleman (agent) or official, but also that a large portion of individuals were able to acquire licenses without taking the required driving test (Bertrand et al., 2008). In addition, the time required to acquire a license was much greater for those who did not hire an agent to help them (Ibid.).

An Evaluation of Public Service Computerization and Privatization in Karnataka

Research Design and Structure of Surveys

The above background on the RDS/Nemmadi initiative serves as the starting point for discussion of the specific evaluation considered here. The citizen survey and field experiment were conducted in the summer of 2009 and built on the characteristics of Nemmadi center implementation in order to evaluate the effects of computerization and public-private partnerships on the character of public service delivery and citizen perceptions of government. I combine a citizen survey with a field experiment in order to benefit from the strengths of both research models while attempting to alleviate some of the weaknesses of each.

The citizen survey allows me to gather a large sample of information from a randomly selected sample of citizens accessing government services across twenty taluks in six districts of
Karnataka. The primary problem with making causal claims based on the results of this survey, however, is that I am not able to manipulate the key treatment under consideration, which is the type of center visited by the citizen. Because there may be factors associated with the choice to go to a taluk office versus a Nemmadi center that may also be associated with perceptions about these centers, in addition to differences in personal characteristics that may exist across different parts of the state, I cannot claim any clear causal effect of the centers themselves in producing any differences that I find across the centers under examination. With the field experiment, however, I am able to randomly assign participants into a treatment condition, thereby creating treatment and control groups for which I can assume no major differences across the populations in each group, other than the treatment itself. In this way I should better be able to evaluate the specific effects of having privately-operated service centers on the characteristics of public service delivery, versus those run by the government.

**Citizen Survey**

Participants for the survey (observational) portion of the study were recruited from outside taluk offices and Nemmadi centers when they were leaving each of the respective offices. Subjects were asked to participate in the survey and were qualified on the basis of the conditions that they be both at least eighteen years old and that they were returning to the office to drop off materials or pick up documents, not to apply for a service for the first time. Surveyors approached every fourth person, in order to establish a random sample of visitors to the centers.

Taluks for the survey were chosen based both on the presence, or lack thereof, of computerized service delivery and the requirements of the experimental portion of the project, discussed below. At the time of the study, June and July 2009, two taluks in the state did not yet
provide computerized services to citizens. These taluks were included in order to establish a baseline for the characteristics of service delivery prior to any computerization or privatization. Risks of non-representativeness, or threats to external validity from comparisons with these taluks, are also considered below. All of the taluks are considered rural, under the administrative guidelines of the state, but are in the area of Karnataka surrounding Bangalore, the capital and largest city. In total, surveys were conducted in twenty taluks across six districts.

Respondents were first asked a set of preliminary demographic questions, followed by questions evaluating the characteristics of their visits to the office and their perceptions about the experience. These included background questions such as the service being applied for and whether the service would be used by the applicant or someone else, and then questions to evaluate the number of times required to access the service, the amount paid, and the number of officials with whom the citizen met. Surveyors also inquired whether anyone had asked the respondent for extra money to facilitate service delivery and whether they paid anyone to help. To avoid non-response bias due to the fact that citizens were unlikely to admit paying a bribe to government officials, respondents were asked first whether any official asked them for money above the required amount and then later asked whether they paid a middleman to help with getting the service, rather than asking directly whether they paid a government official.\(^8\)

In general, the use of middlemen, or agents, is common in India's service delivery system and in many cases it may be the agents who funnel bribes through to bureaucrats, rather than citizens.

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\(^8\) Some surveyors reported that less well-educated respondents seemed more afraid to report demands for and payments of bribes, for fear of retribution by government officials. These fears are likely to be either consistent across types of centers or stronger in the traditional and computerized offices, where citizens are actually interacting with government officials. As a result, the actual levels of demands for bribes may be suppressed in these findings, either generally across all cases or in the government operated centers, thereby affecting the relative findings for Nemmadi centers.
paying them directly (Bertrand et al, 2008). Subsequently, citizens were asked about their satisfaction with this experience in particular and then more general questions about their feeling regarding government efficiency, the use of technology by government, government partnerships with the private sector to provide services, and the corruption of government officials.

**Experimental Survey**

In the experimental portion of the study, I evaluate the characteristics of access to three services, caste certificates, income certificates, and birth certificates. These services were chosen for three main reasons. First, both caste and income certificates are extremely important for gaining access to a range of state-sponsored welfare programs. In the post-Independence period, major affirmative action programs were put in place to improve the conditions of citizens from what were previously called the "untouchable" castes. These programs include reserved seats for "scheduled castes"9 in universities, as well as in the electoral system (Parikh, 1997). In order to access these programs, citizens must provide evidence of their caste status, which is typically done using an official caste certificate. Other welfare programs, such as subsidized food programs, require proof of low income, which can be done through provision of an income certificate. Birth certificates in general are required as proof of identity to acquire other types of services. Second, caste and income certificates are services in which citizens often report paying bribes in order to gain either legal or illegal access to the certificate in question (Private Sector Representative, January 9, 2009, Bangalore). Finally, these are high demand services, and so changes in the quality of access to these certificates are likely to affect a large portion of the population (Ibid; Transparency International India, 2005). This point is reinforced by the data

9 "Scheduled Caste" or SC refers to those caste groups included in an official list that is attached to legislation as a schedule and denotes those groups eligible for such state programs.
from the observational study, in which these were the two most commonly requested services by respondents, making up 52% of the responses overall.

Surveyors took on the role of subjects in order to apply for services in a controlled manner. This research design was selected in order to avoid potential risks related to any attempts to modify the behavior of citizens who were already attempting to apply for services. While some studies have shown the use of citizens in experimental studies of service delivery to be a viable research model (Bertrand et al., 2008), because the services being evaluated here are seen to be quite sensitive in the local environment (as just noted, income and caste certificates are fundamental for receiving certain kinds of welfare benefits) it was deemed inappropriate to modify citizen behavior in this particular context. Instead, Surveyors were hired to apply for services, and were randomly assigned to treatment groups.

Experimental subjects implemented the experiment in their home taluk, where they were eligible to apply for services. These are the same eighteen taluks that were used for the citizen survey. Subjects were asked to inquire about when the certificate would be ready at each center and to go back to the centers at those times in order to pick up their certificates. The subjects then completed the same questionnaire as respondents in the observational portion of the study, filling in one questionnaire for each service to which they applied. In the analyses below, cases are pooled across the different types of services. While this may mask differences in the quality of services provided across service types, the goal in this case is to maximize our ability to evaluate differences across the types of centers, rather than the types of services.\(^\text{10}\)

\(^\text{10}\) It is also important to note that it was difficult for most of the subjects in the experiment to acquire a copy of their birth certificate. Because birth certificates have not been computerized, only new birth certificates are available at the computerized officers. As a result, the majority of the cases considered are income and caste certificate applications. This helps to explain a large portion of the discrepancy between the number of cases listed in Table 2 and the number
Hypotheses

I divide the analyses below into three thematic sections: characteristics of service delivery, demands for payments and additional assistance, and perceptions of government and public service reforms. In the first section I consider quantitative characteristics of the service delivery experience, such as the total amount of money spent, the length of time it took to receive a service, the number of visits made to the office, and the number of officials with whom the citizen needed to meet. The goal here is to evaluate effects on the character of service delivery that can be assumed to be unaffected by the individual perceptions of the individuals being surveyed. I then evaluate more controversial characteristics, such as whether any officials asked the citizen for a bribe, whether they felt the need to pay a middleman for help, and whether, based on this particular experience, they expect to need help when accessing services in the future. Finally, I consider the potential effects of these public service reforms on citizen perceptions of the state, the private sector, and the appropriateness and expected effects of using technology and public companies to deliver public services.

My expectations about the expected effects of computerization and privatization on these characteristics of service delivery and public opinion are based both on the general predictions in the literature regarding reforms and qualitative fieldwork conducted in Karnataka prior to implementation of the two surveys. With regard to nearly all of the factors considered below, I expect citizens visiting computerized centers, be they taluk offices or Nemmadi offices, to have less time-consuming and less expensive experiences than those patronizing non-computerized offices. These citizens should also be less likely to face demands for bribes and should have to pay lower bribes, if at all. I expect them to require the services of middlemen and other helpers appearing in the analyses below.
less frequently. Citizens visiting the new types of centers may also feel more positively about their government and government use of technology, while those visiting the Nemmadi centers may feel more positively about the private sector. In addition, I expect these findings to be more positive on average for Nemmadi patrons than for those at computerized taluk offices, given expectations about the higher quality of service expected from the private sector and differing sets of institutional incentives across the two types of employers. In only one case do I expect traditional, non-computerized offices to potentially be more efficient on average than computerized offices and this is in the overall length of time to deliver services. This is because the state government has imposed minimum and maximum wait times on the delivery of certificates and other services in computerized offices and the minimum time, seven days, is longer than a citizen might have to wait in the old system, especially if they had been willing to pay "speed money" (Private Sector Representative, June 17, 2009, Chikmagalur).

Findings

Worth noting before discussing the findings is that in all of the analyses of the observational survey, the strongest comparison from an analytical perspective is that between the Nemmadi centers and the computerized taluk offices. These surveys were conducted in the same taluks (with surveyors assigned to survey the same number of respondents at each type of center in their taluk) and so should involve less bias from environmental factors than the comparisons with the non-computerized taluks, where, by definition, no surveys could be conducted at computerized offices. I consider below comparisons of key variables across computerized and non-computerized taluks in the same district, which should control for more environmental factors. In the comparison between Nemmadi centers and computerized taluks, the greatest risk is that the
characteristics of those citizens who visit Nemmadi centers may differ in important but unaccounted for ways than those citizens who go to computerized taluk offices to acquire their services. I attempt to account for this source of bias in the accompanying field experiment.

**Characteristics of Service Delivery**

The initial set of questions in the survey attempts to gain insights into the basic characteristics of service delivery. Table 3 shows the overall findings for the number of days required to access a service, the total amount of money spent, the number of visits made to the office, the overall time spent at the office, and the number of officials with whom the citizen met. In all of this section the findings presented exclude the responses for citizens who were applying for land related services, most typically land records and alterations (mutations) to their land record. Because these services were computerized under a separate program, and because they tend to involve significantly higher costs and bribes, responses from citizens accessing these services can distort the findings for other services. I discuss these respondents separately below.

Do these characteristics vary across the three different types of service centers evaluated in the study? Table 4 presents the results of t-tests comparing the mean response across different groups of subjects. The first three columns show the overall means for each group and the second three columns provide the differences of means and p-values. As shown in the table, the effect of reform differs across the characteristics of service delivery. There are no statistically significant differences in the number of days required to receive a service or in the amount of time that citizens spend at government offices applying and waiting for their services. The

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11 These calculations exclude one extreme outlier, for which the respondent reported at a noncomputerized taluk office having waited 2,130 days to receive a service. Other than this response, the maximum reported waiting time was 60 days.
former finding contrasts with anecdotes from citizens that it takes longer to receive services in general at the Nemmadi centers due to the imposition of a minimum waiting period for services (Private Sector Representative, June 17, 2009, Chikmagalur). The lack of differences across both of these variables implies that computerized offices are not necessarily more efficient than non-computerized centers at providing services to citizens. At the same time, Nemmadi centers are not any slower than government-run offices despite the fact, as I show below, that the payment of “speed money” is significantly more frequent at the government offices.

Differences across other variables, however, do provide some evidence of benefits for citizens at computerized centers. The most striking finding is the difference in the number of visits required in order to acquire a service. In non-computerized offices citizens visited the office on average almost six times in the process of getting their services, while those patronizing computerized taluk offices or Nemmadi centers went, on average, only 3.8 or 3.2 times, respectively. This difference of means is statistically significant in both cases, in addition to the difference between Nemmadi centers and computerized taluks, with Nemmadi centers requiring fewer visits overall. There is a similar result for the number of officials met with in the process. Citizens visiting both computerized taluks and Nemmadi centers met with fewer officials on average than those going to the non-computerized office.

In the case of overall cost, citizens patronizing Nemmadi centers paid less than those going to either the non-computerized or computerized taluk offices. A secondary analysis shows that the findings for total cost of service do vary across the three most commonly requested individual types of services. Within Income and Caste certificates, the overall cost is lower for citizens going to Nemmadi centers in general, but this difference is statistically significant only in comparison to computerized taluk offices. There are no significant differences in the overall
cost of acquiring a birth or death certificate across the types of centers.

In the experimental study, there is also a strong finding for differences in the number of officials with whom the subjects had to meet. Those individuals visiting a computerized taluk office, on average, met with nearly one additional official than those who patronized the Nemmadi center. This finding was in the same direction in the observational study, though in that case the difference of means was not statistically significant.

These findings suggest that both computerization and privatization can have an effect on the quality of services delivered to citizens. While individuals may spend, on average, the same amount of time at offices and wait the same amount of time to receive their documents, they do not have to meet as many officials or go to the office as frequently. Those citizens going to Nemmadi centers also do not tend to spend as much money overall to receive their services.

**Demands for Payments and Additional Assistance**

This last point leads us to the next set of characteristics, with which I estimate the effects of service reforms on the demands for, and payments of, money from citizens above and beyond the official cost of services during the process of service delivery. I also evaluate the related demand for assistance from any type of individual, be it an official, middleman, friend, or family member, in order to gauge any changes in the complexity of the service delivery process. Finally I consider overall satisfaction with the service provided. Tables 5a and 5b summarize citizen responses in this section. For the yes or no questions, no was coded 0 and yes was coded 1; satisfaction was coded on a scale from 1 to 7, with 1 equal to not at all satisfied and 7 equal to totally satisfied; non responses are excluded from the analyses.
Observational Comparison

The first two rows of Table 6a highlight important differences in officials' demands for bribes from citizens. While there are no differences in the frequency or size of demands for bribes across non-computerized and computerized taluk offices, citizens visiting the privately-run Nemmadi centers reported paying bribes less frequently and, when requests for bribes were made, they were for smaller monetary amounts on average. This second finding is of particular substantive importance—the difference in the average size bribe demanded at Nemmadi versus non-computerized taluk offices is Rs. 91 and between the Nemmadi and computerized taluk offices is Rs. 71. Given that the average daily income in India is approximately Rs. 120, this difference in size of bribes demanded by officials would be meaningful to the average citizen.12

The purposes for which bribe monies are requested vary only minimally across the types of centers. Across all types of centers, more than 70% of respondents reported that the official demanding the bribe asked for it in order to provide the service more quickly. In the noncomputerized taluks and the Nemmadi centers the remainder of respondents reported either that the official wanted money to help with filling in forms or for some other service. In the computerized taluk offices, however, 21% of respondents reported that the demand was related to provision of approval for the service without the appropriate documentation.

There are similar results for the differences in the use of middlemen to assist in access to services. Citizens visiting computerized taluk offices are the most likely to utilize the services of a middleman, and the amount paid when a middleman is used is again the lowest at Nemmadi centers, with individuals paying Rs. 80 less versus non-computerized offices and Rs. 62 less than

12 According to the National council of Applied Economic Research's 2000-1 survey of consumer spending, 54% of rural Indian households survive on less than Rs. 45,000 per year, 31.7% survive on between Rs. 45,000 and 90,000, and 14.3% make more than Rs. 90,000 per year (Bery, 2004).
at computerized taluk offices. While this on its own does not prove that access to services is
tsimpler at Nemmadi centers, it does imply that external paid assistance is in general less
necessary and, when necessary, the fees paid are lower than in other settings. Interestingly, the
need for non-paid help is reported to be greater at Nemmadi centers and computerized taluk
offices than at the non-computerized taluk offices. Expectations about the need for future help
are also higher at these sites than at the traditional offices, and citizens patronizing Nemmadi
centers anticipate the greatest need for assistance in the future. Differences in the expectations
about need for future help are statistically significant across all groups.

The roles played by middlemen paid by citizens are relatively distinct from the sources of
bribe demands by officials. In approximately 40% of the cases across all types of centers,
middlemen are used to help citizens fill in forms. Getting approval without the appropriate
documentation is the next most common request at both the computerized taluk offices and the
Nemmadi centers, though this is not the case in the non-computerized taluks. Between 10 and
25% of respondents used middlemen to help them get the service more quickly, with this being
most common at the computerized taluk offices.

The sources of non-paid help vary dramatically across the different types of centers. At
non-computerized taluk offices, the majority of citizens who needed additional help asked for it
from a government employee (66%), while 20% acquired help from a friend. Only 10% asked
for help from a private person and 5% from a family member. This contrasts dramatically with
the two newer types of service centers, where the majority of those people requiring additional
help got it from a friend (nearly 50% in both cases) or a family member (approximately 30% in
both cases). Fewer than 15% of people in either case requested the assistance of a government
employee or private person.
Variations in the uses of additional help may also reflect qualitative differences across the types of offices. Citizens at non-computerized offices were in greatest need of assistance to find the appropriate government officials (65%), while only rarely requiring help to acquire or fill in forms (15% in total). At computerized offices, taluks and Nemmadi centers, the largest portion of citizens used their helpers to fill in forms (39% and 56%, respectively), followed closely by assistance to get the appropriate forms in the first place (30% and 25%, respectively). In these cases only 15-20% of respondents used assistance from others to find the appropriate officials for completing their tasks. Thus, while the computerized offices may be less complex in terms of accessing officials (there is typically only one person at a Nemmadi center), the process for accessing and filling in the required forms seems surprisingly more demanding, or requiring of help, than in traditional taluk offices.

Finally, the reported improvements in the demand for bribes and payments to middlemen, at least in the Nemmadi centers, are not strongly reflected in overall levels of satisfaction reported by citizens. Citizens at the non-computerized taluk offices were the most satisfied in general, with statistically significant higher average ratings than Nemmadi or computerized taluk offices. That said, citizens at Nemmadi centers were more satisfied in general than their peers at computerized taluk offices, reporting a .3 higher rating on a 7-point scale.

**Experimental Comparison**

The findings for bribes and assistance differ somewhat in the experimental group, but there are no strong statistically significant findings in the experiment overall. The finding for the question did you receive additional help is significant at the .1 level, but the direction of the finding is opposite that of the observational study (I consider differences in the characteristics of the two subject pools, which may be influencing the direction of findings, in the section below on
external validity). In this group those subjects who patronized Nemmadi centers required additional help less frequently on average than those going to the computerized taluk offices. The finding for satisfaction with the service delivery process is also statistically significant at the .1 level and in the same direction as that of the observational study--citizens who patronized Nemmadi centers reported higher levels of satisfaction than those at taluk offices.

**Perceptions of Government and Public Service Reforms**

The survey also included a range of questions to evaluate whether the experience of citizens at different types of public service centers affected their perceptions of government officials and government performance, the role for the private sector in public service delivery, and the potential for using information technologies in service delivery. Descriptive statistics for the responses to these questions are shown in Tables 7a and 7b. Again here for yes or no questions, no is coded 0 and yes is coded 1, while opinion questions are scored from 1 to 7 with 7 generally representing the most positive opinion, except in the case of corruption, where 1 represents "not at all corrupt" and 7 represents "totally corrupt" (as a result, higher scores tend to imply more negative opinions in the yes or no questions, while they represent more positive feelings in the questions coded 1 to 7).

**Observational Comparison**

In general the findings for questions related to citizen perceptions of government and reforms do not reflect major differences across the citizens patronizing different types of centers. Where large differences do exist, with some specific exceptions, citizens at the non-computerized taluk offices tend to view government more positively than those at the newer types of centers (Again, it is important to remember here that these findings may be biased based on environmental
differences across the non-computerized and computerized taluks.). There is no significant
difference in citizen opinions about the efficiency of computerized taluks versus Nemmadi
centers. Citizens visiting the non-computerized offices also report having greater trust in the
government and in the private sector than those at the computerized offices. While the risks of
bias across different taluks makes it difficult to draw strong conclusions from these findings, it
seems striking that citizens interacting with the government and the private sector in those
offices subjected to these reforms are less trusting of these actors than those visiting traditional
offices. Despite these findings, citizens who frequented Nemmadi centers also felt more
positively than those at other types of centers about government partnerships with the private
sector to delivery public services.

Within-district comparisons provide some leverage for reducing bias in these analyses.
When comparing only across taluks in a single district, the likelihood of environmental
differences across the two taluks may be lower. These analyses often involve a very small
number of respondents, reducing the likelihood that we will observe any statistically significant
differences, but also making any findings that do emerge more compelling. In the case of
government efficiency, within Tumkur district, those citizens at the non-computerized taluk
again give higher ratings than those at the Nemmadi center, and this difference in means is
statistically significant. The same results emerge for government and private sector trust. In
Mandya district, the non-computerized taluk gets consistently higher efficiency and government
trust scores on average, but the differences are statistically significant only in the case of the
computerized taluk office.

For private sector trust the non-computerized taluk again scores highest, and with
differences of means that are statistically significant versus both the Nemmadi centers and the
computerized taluks. Thus, the sub-region comparison is generally supportive of the overall findings with regard to citizen opinions on government efficiency and trust in the public and private sectors.

Does the use of a computerized or private sector-run office affect citizen perceptions of government and bureaucratic corruption? Computerization seems to have a positive effect on citizen perceptions of bureaucratic corruption, with those individuals at computerized offices reporting statistically significant lower corruption ratings on average for bureaucrats than those in the non-computerized office. The same cannot be said for politicians, who were viewed as more corrupt on average by those individuals the computerized taluks, though this difference was statistically significant only for the Nemmadi centers. The findings on corruption do not necessarily hold in the regional comparisons, where in Tumkur district visitors to Nemmadi centers give both bureaucrats and politicians the most corrupt ratings and in Mandya district there are no differences across the types of centers in terms of corruption ratings for either type of government official. Thus the effects of service reforms have decidedly mixed effects on citizen perceptions of corruption, despite the quantitative differences in the prevalence and magnitude of corruption discussed above. This said, it does seem relevant that any positive effects to be had fall to bureaucrats, the set of people citizens are accustomed to interacting with in government offices, and not their political superiors.

With regard to opinions about technology, visitors to service centers in general think that information technology can be used to increase government efficiency and there are no major differences across the types of centers. However, those citizens who visited a Nemmadi center on average felt more positive about the potential for technology to be used to reduce corruption than those citizens visiting other offices and these differences were significant in both cases.
**Experimental Comparison**

In this section the strongest findings are for the questions regarding whether the government should work with the private sector and the degree of corruption among politicians. In contrast to the observational group, in this case respondents who visited Nemmadi centers felt more positively about the potential for public-private partnerships than those who patronized government taluk offices. In addition, the Nemmadi patrons perceived politicians to be more corrupt than did the taluk patrons. Both of these findings are significant only at the .1 level.

**External Validity**

**Within-Study Considerations**

To what extent do the findings discussed here offer implications for understanding the effects of public service reforms in a wider context? First, it is relevant to consider questions of external validity within the broad project itself. The research design involves two separate surveys, one observational and one experimental, which draw on different subject pools. Given the above results, it is relevant to consider differences in the characteristics of the subject pools themselves, in evaluating the potential external validity of either portion of the overall study. Table 9 summarizes the demographic characteristics of the two groups, based on information collected in the surveys, and provides the results of difference of means tests comparing the two groups.

This demographic comparison highlights some potentially important differences between the observational and experimental subject pools. In many cases these differences are not unexpected, as the subjects for the experiment came from a university in Bangalore and so would in general be expected to be younger and have higher levels of education and related experiences than the general population. This is the case, with the experimental group being twelve years
younger than the observational group, on average, and having attended an additional seven years of school. The experimental group was also much more likely to have encountered computers in their past. However, the gender ratio was indistinguishable across the groups, as was their likelihood of voter registration.

In addition to these demographic differences, it is worth considering that the experimental subjects were not applying for services under a typical scenario, because they were being paid to participate, and so there was not the same kind of pressure on them to get the service as there might be on someone who is planning to use their certificate to apply for other benefits (this could affect the amount of effort they put in, and their likelihood to pay a middleman to help with the service). However, a large number of the subjects involved in the study are from scheduled castes and so at least in the case of caste certificates will see the benefit to having this certificate (or getting it for a friend or relative).\footnote{I also attempted to balance this by requiring that they provide evidence of receiving the certificate before they were paid for the study, unless there were exceptional circumstances.}

These differences are important to the extent that experiences and perceptions related to age, education, and position might affect the experiences of individuals attempting to access a public service. First, young, well educated citizens might be treated differently than other citizens by the service personnel at the centers. Experimental subjects were asked not to mention their educational qualifications while applying for the services, but this could still have an implicit effect on service delivery. Second, subjects’ own understanding of government processes and ability to manage the system could differ from average citizens, affecting the quality of their experiences. Note, however, that there are no clear differences in the average need for help across the two groups (Tables 5a and 5b). In general, it is important to recognize that any of the demographic differences noted here, or others excluded from the analysis, may have an
important effect on the ways in which citizens in the two portions of the study perceive and respond to government service delivery and the character of reforms, making comparisons across the two portions of the study difficult.

Beyond issues of external validity embedded in the research design, there are additional factors to consider before extrapolating these results to broader populations. The findings discussed here may in many ways be representative only of a small portion of India's state of Karnataka. Though similar reforms have been implemented in nearly all of the major Indian states, and are the subject of an ongoing central government initiative in all states, the character of this particular reform may vary in important ways that limit generalizations beyond the region considered here. Some of the potentially most important of these characteristics are regional demographic differences across Karnataka and India in general, let alone other countries; the structure of relationships between the government, private sector, and citizens in the implementation of reforms; and the characteristics of the specific services made available in these centers, and thus considered in this analysis. Here I consider this set of potential limitations in greater detail including, where possible, analyses of the potential relevance of each factor.

**Regional Considerations**

In the above analysis I attempted in certain cases to adjudicate between general comparisons and more specific within-district comparisons to evaluate the potential effects of regionally variant, unmeasured variables on the estimated effects. But it is also relevant to consider whether these findings are likely to be generalizable to the rest of Karnataka or India at large. In the next sub-section I consider structural characteristics of the Nemmadi program that may limit India-wide generalizations, but here I look only at demographic comparisons.
Table 10 highlights demographic and educational characteristics of the districts included in the study, Karnataka overall, and India in general. The data here provide some interesting comparisons. The urban character of Bangalore versus all of Karnataka and India implies that there might be important differences in the experiences of people at centers in Bangalore Urban district versus the majority of the state and country. At the same time, Nemmadi centers are only located in the parts of this district outside of municipal corporation limits, meaning that the differences in environment may not be as strong as implied here. In either case, it may be that the findings for the other districts in the study, Bangalore Rural, Kolar, Chikbalapur, Mandya, and Tumkur, are more representative of what we might observe in other parts of the state and in other rural parts of India. The same can be said for the educational status of these regions, with citizens in Bangalore Urban district in general having more years of formal education than the rest of the population, which might also lead to differences in service delivery experiences, as discussed in the context of the experimental and observational populations above. Thus, without more detailed information on the differences in demographics within the segments of Bangalore Urban district, it is likely that an analysis that excludes the data from Bangalore Urban could be expected to be more representative of the entire Karnataka state, and also the country, than the analyses presented here.

**Ownership and Management Models**

How might variations in the structure of ownership and management models lead to differences across reforms in different parts of Karnataka, or the world? In this study I took a first step toward answering this question by comparing the effects of public versus private sector management of service delivery in newly computerized offices. But management models can
vary beyond this basic characteristic. As noted in the introductory discussion, the Nemmadi centers evaluated here are owned by a single company, which employs individual managers to operate each center. This contrasts with a model used in many other Indian states, and advocated by the national government, in which individual entrepreneurs own and operate one or more centers.

While the Karnataka state government and the company managing Nemmadi centers expected their model to help spread costs across more and less profitable parts of the state, thereby allowing for improved service delivery even in poor and rural areas (IAS Officer, Karnataka Government, Bangalore, February 22, 2006), external observers note multiple potential problems with this model that could affect the findings presented here (Private Sector Representative, July 14, 2009, Bangalore). The major proposed problems with the company ownership/employee manager model involve the incentives for, and monitoring of, the individual center operators. First, under this model center operators are salaried employees who may have little incentive to improve on the basic service provision model or go above and beyond the call of duty to satisfy their clients. Entrepreneurial center owners, on the other hand, are seen to have greater incentives to serve their clients in a manner that increases the likelihood that they will return, rather than go to the taluk office, and that they might request additional, higher profit services. If these perceptions are correct, then we might expect patrons of entrepreneur-run private sector centers to find more benefits in these centers relative to the traditional model than those citizens surveyed here. Second, there may be a greater need for monitoring employee operators than there is for entrepreneur owners. Employees have a guaranteed salary, which, under strict monitoring should disincentivize them from demanding bribes or additional payments from citizens, at least in tight labor markets. But if there is not strict monitoring, then
employees may have few incentives not to demand extra payments, just like their undermonitored, securely employed bureaucratic counterparts. Especially in difficult economic times, when small companies managing a large number of centers may run into cash flow problems (as has reportedly been the case with a number of operators under the Indian national government scheme) (Private Sector Representative, January 23, 2008, Haryana; Former Comat Employee, July 6, 2009, Bangalore) and find it difficult to pay their employees, the potential for extra income in the form of bribes may provide an irresistible opportunity for these employee operators. Again, this is less likely to be the case where center operators also own the center, as they are then more dependent on the repeat business of individual customers for guaranteeing their economic viability and should find it more profitable to undercut competing government offices in terms of the demand for bribes, thereby making them more appealing to citizens.

Variation in Available Services

Finally, it is worth considering the specific services covered in this analysis and how effects of service reforms might differ for other services. This is relevant both because of varying demand for the range of government services, but also because the number and type of services offered in centers across India differs dramatically (Bussell, 2009a; Forthcoming). One way in which the type of service might matter is through significant differences in the average costs of access to a service. As noted above, the analyses to this point exclude consideration of land-related services, the most important of which are land titles (Records of Rights, Tenancy, and Cultivation or RTC) and mutations or alterations to land titles. In general, the responses to the questionnaire by citizens who were acquiring land-related services, particularly in terms of the costs of services and demands for bribes, were significantly higher than for all other services. For example, while
the average overall cost for all non-land services was Rs. 74 with a maximum cost of Rs. 3,000, the mean for RTCs was Rs. 1,886 with a maximum of Rs. 70,000. In many cases these costs were due to large bribes or payments to middlemen for assistance with land-related services. This shows that the character of the services themselves may affect the experience of citizens in accessing services and thus states providing a different range of services than those offered in Karnataka may then produce a different quality of outcome for their patrons.

**Discussion and Conclusion**

In this study I have attempted to build on previous analyses of public service reform using a combined experimental and observational research design in order to maximize our ability to draw conclusions about the effects of reforms on the quality of service delivery and changes to relationships between citizens and the state. However, differences in the demographic characteristics of the two samples make difficult direct comparisons across the two portions of the study and as such this was not the primary goal of the analysis. Instead, the priority was to take two different research models, both of which have important strengths and weaknesses, and bring them together in a way that can hopefully build on their respective strengths.

The strongest findings for differences across computerized taluk offices and Nemmadi centers are those that are statistically significant and in the same direction for both portions of the study, the number of officials on average with whom respondents met, and, at the .1 level, overall satisfaction and perceptions of politician corruption. Visitors to Nemmadi centers had an easier experience than those at the computerized taluk offices in terms of meeting with officials, and they also reported higher levels of satisfaction with their experience. This experience did not, however, have a positive influence on subjects' perceptions of politician corruption, and instead
Nemmadi patrons tended to have a worse view of politicians' behavior than other citizens. In general, the findings in the observational study for Nemmadi centers versus computerized taluk offices hold to the expectations set out above. Visitors to Nemmadi centers spend less money and make fewer visits to the office than those frequenting a taluk office. Nemmadi patrons also face fewer and lower demands for bribes and less frequently require the services of a middleman. These findings are in line with the expectation that private sector representatives who are incentivized not to demand bribes are less likely to do so.\textsuperscript{14} Interestingly, however, Nemmadi patrons had higher expectations that they would need future help in accessing services--while paid help is less common at these centers, non-paid help is more common and expected. It is possible that this is a function of supply, that there are fewer middlemen at Nemmadi centers offering their help and so citizens must rely on alternative sources, such as their friends. This question is worth further investigation. There were minimal differences between the Nemmadi and taluk offices regarding opinions on government, but in two important cases--opinions on whether technology can be used to reduce corruption and whether the government should work with the private sector to delivery public services--Nemmadi patrons felt more positively than those at taluks. Not only was visiting a private sector-run office associated with more positive feelings toward the private sector, but use of the same technology in that setting was viewed more positively than when it was used in the government-run office. Overall these findings support the claim that the private sector is capable of providing services to citizens in a manner that reduces some of the constraints of efficient and accessible services in the Indian environment, such as the need for frequent visits to government offices.

\textsuperscript{14} Of course, there is no evidence to say that public sector officials wouldn't also be less likely to demand bribes if they were incentivized, and monitored, in a different manner. Evaluating this claim is outside the realm of this study.
meetings with many officials, and demands for expensive bribes.

The findings for computerized versus non-computerized offices, while constrained by issues of potential bias discussed above, shed interesting light on the opportunities for service improvements and also the potential limits of service reforms on citizen attitudes toward the state. Computerization without privatization does seem to have some benefits, though these are typically limited relative to the combination of computerization and privatization. Computerized taluk offices required fewer visits and meeting with fewer officials, but garnered citizens no clear improvements in terms of the time spent at offices, time to receive documents, or the overall cost. Bureaucrats at computerized taluk offices were just as likely to ask for a bribe and showed only minimal evidence of demanding smaller bribes than their non-computerized counterparts. Citizens visiting these centers also reported greater demands for external help and lower levels of satisfaction than at non-computerized offices. Overall, the findings imply that computerization in and of itself only minimally affects the experience of citizens accessing services and true reform requires a much greater effort to restructure the entire service delivery process.
Bibliography


Service Reform in the Indian States,” *Comparative Political Studies*.


### Tables

**Table 1 - Subject Pool for Observational Survey**

<table>
<thead>
<tr>
<th>Type of Office/Center</th>
<th>Number of Taluks in Survey</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government taluk office in non-computerized locations</td>
<td>2 Taluks</td>
<td>155</td>
</tr>
<tr>
<td>(Traditional model)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government taluk office in computerized areas with public</td>
<td>18 Taluks</td>
<td>411</td>
</tr>
<tr>
<td>and private option (Current model)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Privately-operated center in computerized areas with</td>
<td>18 Taluks</td>
<td>437</td>
</tr>
<tr>
<td>public and private option (Current model)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2 - Subject Pool and Treatment Assignment for Experimental Survey**

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Office Type</th>
<th>Taluk Office (Control) Subjects</th>
<th>Nemmadi Center (Treatment) Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income Certificate</td>
<td>13</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Caste Certificate</td>
<td>16</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Birth Certificate</td>
<td>15</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>44</td>
<td>37</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3 - Summary Statistics for Characteristics of Service Delivery - Observational Group**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days to receive service</td>
<td>664</td>
<td>8.9</td>
<td>9.1</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>Overall cost (INR)</td>
<td>837</td>
<td>74.4</td>
<td>150.4</td>
<td>0</td>
<td>3000</td>
</tr>
<tr>
<td>Visits to Office</td>
<td>835</td>
<td>3.9</td>
<td>3.4</td>
<td>1</td>
<td>70</td>
</tr>
<tr>
<td>Time Spent at Office (Minutes)</td>
<td>835</td>
<td>327.4</td>
<td>221.8</td>
<td>20</td>
<td>2160</td>
</tr>
<tr>
<td>Number of Officials Met</td>
<td>834</td>
<td>2.9</td>
<td>1.4</td>
<td>1</td>
<td>12</td>
</tr>
</tbody>
</table>
### Table 4a - Difference of Means Tests for Characteristics of Service Delivery - Observational

<table>
<thead>
<tr>
<th>Variable</th>
<th>Computerized Nemmadi (A)</th>
<th>Computerized Taluk (B)</th>
<th>Non-Computerized Taluk (C)</th>
<th>A-C</th>
<th>B-C</th>
<th>A-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days to receive service</td>
<td>9.3 (.61, N=270)</td>
<td>8.9 (.65, N=194)</td>
<td>8.2 (.62, N=130)</td>
<td>1.06 (.22)</td>
<td>.65 (.47)</td>
<td>.41 (.64)</td>
</tr>
<tr>
<td>Overall cost (INR)</td>
<td>59.6 (5.2, N=372)</td>
<td>86.1 (11.5, N=323)</td>
<td>87.7 (8.2, N=138)</td>
<td>-28.1** (.004)</td>
<td>-1.6 (.91)</td>
<td>-26.4* (.04)</td>
</tr>
<tr>
<td>Visits to Office</td>
<td>3.2 (.07, N=371)</td>
<td>3.8 (.22, N=322)</td>
<td>5.8 (.41, N=138)</td>
<td>-2.6*** (.000)</td>
<td>-2.0*** (.000)</td>
<td>-.56* (.02)</td>
</tr>
<tr>
<td>Time Spent at Office (Minutes)</td>
<td>322.3 (11.9, N=372)</td>
<td>342.9 (13.4, N=323)</td>
<td>308.3 (12.5, N=138)</td>
<td>14.0 (.42)</td>
<td>34.5 (.06)</td>
<td>20.5 (.25)</td>
</tr>
<tr>
<td>Number of Officials Met</td>
<td>2.7 (.07, N=364)</td>
<td>2.9 (.08, N=321)</td>
<td>3.2 (.10, N=138)</td>
<td>-.49*** (.000)</td>
<td>-.33* (.01)</td>
<td>-.16 (.13)</td>
</tr>
</tbody>
</table>

For all analyses, *** = p<.001, ** = p<.01, * = p<.05.

### Table 4b - Difference of Means Tests for Characteristics of Service Delivery - Experimental Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Computerized Nemmadi (A)</th>
<th>Computerized Taluk (B)</th>
<th>A-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Officials Met</td>
<td>2.2 (.19, N=30)</td>
<td>3.1 (.29, N=17)</td>
<td>-.9* (.02)</td>
</tr>
</tbody>
</table>
Table 5a - Summary Statistics for Demands for Payment and Additional Assistance - Observational Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did any official ask you for money?</td>
<td>830</td>
<td>.23</td>
<td>.42</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>If yes, how much? (INR)</td>
<td>188</td>
<td>138.5</td>
<td>133.7</td>
<td>5</td>
<td>1000</td>
</tr>
<tr>
<td>Did you pay a middleman for help?</td>
<td>755</td>
<td>.26</td>
<td>.44</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>If yes, how much?</td>
<td>194</td>
<td>109.6</td>
<td>129.6</td>
<td>5</td>
<td>1000</td>
</tr>
<tr>
<td>Did you receive other help?</td>
<td>812</td>
<td>.53</td>
<td>.50</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Do you expect to need help in the future?</td>
<td>828</td>
<td>.65</td>
<td>.48</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>How satisfied are you with your experience accessing this service?</td>
<td>810</td>
<td>4.0</td>
<td>1.6</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 5b - Summary Statistics for Demands for Payment and Additional Assistance - Experimental Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did any official ask you for money?</td>
<td>50</td>
<td>.06</td>
<td>.23</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>If yes, how much? (INR)</td>
<td>3</td>
<td>103.3</td>
<td>95.0</td>
<td>10</td>
<td>200</td>
</tr>
<tr>
<td>Did you pay a middleman for help?</td>
<td>45</td>
<td>.04</td>
<td>.21</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>If yes, how much?</td>
<td>2</td>
<td>105.0</td>
<td>134.4</td>
<td>10</td>
<td>200</td>
</tr>
<tr>
<td>Did you receive other help?</td>
<td>48</td>
<td>.58</td>
<td>.50</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Do you expect to need help in the future?</td>
<td>50</td>
<td>.72</td>
<td>.45</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>How satisfied are you with your experience accessing this service?</td>
<td>50</td>
<td>3.7</td>
<td>1.8</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>
Table 6a - Findings for Demands for Payment and Additional Assistance - ObservATIONAL Group

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Computerized Nemmadi (A)</th>
<th>Computerized Taluk (B)</th>
<th>Non-Computerized Taluk (C)</th>
<th>A-C</th>
<th>B-C</th>
<th>A-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did any official ask you for money?</td>
<td>.15 (.02, N=367)</td>
<td>.28 (.02, N=320)</td>
<td>.25 (.04, N=138)</td>
<td>-.10* (.02)</td>
<td>.03 (.48)</td>
<td>-.14*** (.000)</td>
</tr>
<tr>
<td>If yes, how much? (INR)</td>
<td>86.4 (11.8, N=60)</td>
<td>157.6 (15.8, N=93)</td>
<td>177.1 (19.6, N=35)</td>
<td>-90.7*** (.000)</td>
<td>-19.6 (.44)</td>
<td>-71.2*** (.000)</td>
</tr>
<tr>
<td>Did you pay a middleman for help?</td>
<td>.19 (.02, N=312)</td>
<td>.37 (.03, N=302)</td>
<td>.18 (.03, N=136)</td>
<td>.01 (.83)</td>
<td>.18*** (.000)</td>
<td>.18*** (.000)</td>
</tr>
<tr>
<td>If yes, how much? (INR)</td>
<td>65.3 (4.6, N=63)</td>
<td>127.1 (15.6, N=104)</td>
<td>145.5 (23.1, N=27)</td>
<td>-80.2*** (.002)</td>
<td>-18.4 (.51)</td>
<td>-61.6*** (.000)</td>
</tr>
<tr>
<td>Did you receive other help?</td>
<td>.58 (.03, N=354)</td>
<td>.54 (.03, N=316)</td>
<td>.38 (.04, N=137)</td>
<td>.20*** (.000)</td>
<td>.16** (.001)</td>
<td>.04 (.29)</td>
</tr>
<tr>
<td>Do you expect to need help in the future?</td>
<td>.73 (.02, N=366)</td>
<td>.64 (.03, N=320)</td>
<td>.47 (.04, N=138)</td>
<td>.17*** (.000)</td>
<td>.26*** (.000)</td>
<td>.09* (.01)</td>
</tr>
<tr>
<td>How satisfied are you?</td>
<td>4.0 (.07, N=347)</td>
<td>3.7 (.09, N=321)</td>
<td>4.7 (.08, N=138)</td>
<td>-.71*** (.000)</td>
<td>-.99*** (.000)</td>
<td>.28* (.03)</td>
</tr>
</tbody>
</table>

*For Yes or No questions, 1=Yes and 2=No

Table 6b - Findings for Demands for Payment and Additional Assistance - EXPERIMENTAL Group

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Computerized Nemmadi (A)</th>
<th>Computerized Taluk (B)</th>
<th>A-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did any official ask you for money?</td>
<td>.06 (.04, N=33)</td>
<td>.06 (.06, N=17)</td>
<td>-.001 (.98)</td>
</tr>
</tbody>
</table>
| If yes, how much? (INR) | 150.0 (70.7, N=2) | 10.0 (N/A, N=1) | N/A
| Did you pay a middleman for help? | .03 (.04, N=29) | .06 (.06, N=16) | -.03 (.70) |
| If yes, how much? (INR) | 200 (N/A, N=1) | 10 (N/A, N=1) | N/A
| Did you receive other help? | .48 (.09, N=31) | .76 (.11, N=17) | -.28 (.05) |
| Do you expect to need help in the future? | .70 (.08, N=32) | .76 (.11, N=17) | -.07 (.61) |
| How satisfied are you? | 4.0 (.35, N=32) | 3.0 (.36, N=17) | .94 (.07) |

15 Too few observations to calculate a difference of means
Table 7a - Summary Statistics for Perceptions of Government and Public Service Reforms - Observational Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>How efficient do you think government is?</td>
<td>836</td>
<td>3.5</td>
<td>1.4</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Can government use technology to improve efficiency?</td>
<td>834</td>
<td>.91</td>
<td>.29</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>How much do you trust government?</td>
<td>836</td>
<td>3.6</td>
<td>1.5</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>To what degree are bureaucrats corrupt?</td>
<td>830</td>
<td>4.1</td>
<td>1.2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>To what degree are politicians corrupt?</td>
<td>829</td>
<td>4.5</td>
<td>1.4</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Can technology be used to reduce corruption in service delivery?</td>
<td>833</td>
<td>.88</td>
<td>.33</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>How much do you trust the private sector?</td>
<td>835</td>
<td>3.6</td>
<td>1.6</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Should government work with the private sector to deliver public services?</td>
<td>834</td>
<td>.65</td>
<td>.48</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 7b - Summary Statistics for Perceptions of Government and Public Service Reforms - Experimental Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>How efficient do you think government is?</td>
<td>50</td>
<td>3.1</td>
<td>1.3</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Can government use technology to improve efficiency?</td>
<td>49</td>
<td>.98</td>
<td>.14</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>How much do you trust government?</td>
<td>50</td>
<td>3.2</td>
<td>1.3</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>To what degree are bureaucrats corrupt?</td>
<td>50</td>
<td>4.1</td>
<td>1.2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>To what degree are politicians corrupt?</td>
<td>50</td>
<td>4.7</td>
<td>1.4</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Can technology be used to reduce corruption in service delivery?</td>
<td>50</td>
<td>1.0</td>
<td>0.0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>How much do you trust the private sector?</td>
<td>50</td>
<td>3.0</td>
<td>1.9</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Should government work with the private sector to deliver public services?</td>
<td>50</td>
<td>.58</td>
<td>.50</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
### Table 8a - Findings for Perceptions of Government and Public Service Reforms - Observational Group

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Computerized Nemmadi (A)</th>
<th>Computerized Taluk (B)</th>
<th>Non-Computerized Taluk (C)</th>
<th>A-C</th>
<th>B-C</th>
<th>A-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>How efficient do you think government is?</td>
<td>3.6 (.08, N=371)</td>
<td>3.4 (.08, N=323)</td>
<td>3.8 (.09, N=138)</td>
<td>-.23* (.05)</td>
<td>-.37*** (.002)</td>
<td>.14 (.21)</td>
</tr>
<tr>
<td>Can government use technology to improve efficiency?</td>
<td>.92 (.01, N=370)</td>
<td>.92 (.02, N=321)</td>
<td>.87 (.03, N=138)</td>
<td>.05 (.10)</td>
<td>.05 (.16)</td>
<td>.00 (.78)</td>
</tr>
<tr>
<td>How much do you trust government?</td>
<td>3.5 (.07, N=371)</td>
<td>3.4 (.08, N=323)</td>
<td>4.3 (.07, N=138)</td>
<td>-.71*** (.000)</td>
<td>-.87*** (.000)</td>
<td>.16 (.14)</td>
</tr>
<tr>
<td>To what degree are bureaucrats corrupt?</td>
<td>4.1 (.06, N=370)</td>
<td>4.1 (.08, N=319)</td>
<td>4.3 (.07, N=138)</td>
<td>-.22* (.04)</td>
<td>-.23* (.05)</td>
<td>.00 (.97)</td>
</tr>
<tr>
<td>To what degree are politicians corrupt?</td>
<td>4.6 (.08, N=364)</td>
<td>4.5 (.08, N=323)</td>
<td>4.3 (.07, N=138)</td>
<td>.34** (.002)</td>
<td>.18 (.11)</td>
<td>.16 (.17)</td>
</tr>
<tr>
<td>Can technology be used to reduce corruption in service delivery?</td>
<td>.92 (.01, N=371)</td>
<td>.84 (.02, N=319)</td>
<td>.81 (.03, N=138)</td>
<td>.11** (.002)</td>
<td>.03 (.41)</td>
<td>.08** (.001)</td>
</tr>
<tr>
<td>How much do you trust the private sector?</td>
<td>3.4 (.09, N=371)</td>
<td>3.4 (.09, N=322)</td>
<td>4.4 (.07, N=138)</td>
<td>-.93*** (.000)</td>
<td>-1.0*** (.000)</td>
<td>.09 (.44)</td>
</tr>
<tr>
<td>Should government work with the private sector to deliver public services?</td>
<td>.70 (.02, N=371)</td>
<td>.61 (.03, N=320)</td>
<td>.62 (.04, N=138)</td>
<td>.08 (.10)</td>
<td>-.02 (.73)</td>
<td>.09** (.009)</td>
</tr>
</tbody>
</table>
Table 8b - Findings for Perceptions of Government and Public Service Reforms - Experimental Group

<table>
<thead>
<tr>
<th>Variable*</th>
<th>Computerized Nemmadi (A)</th>
<th>Computerized Taluk (B)</th>
<th>A-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>How efficient do you think government is?</td>
<td>3.2 (0.22, N=32)</td>
<td>3.0 (0.33, N=17)</td>
<td>.10 (0.80)</td>
</tr>
<tr>
<td>Can government use technology to improve efficiency?</td>
<td>.97 (0.03, N=32)</td>
<td>1.0 (0.00, N=17)</td>
<td>-.03 (0.32)</td>
</tr>
<tr>
<td>How much do you trust government?</td>
<td>3.4 (0.22, N=32)</td>
<td>3.1 (0.31, N=17)</td>
<td>.26 (0.50)</td>
</tr>
<tr>
<td>To what degree are bureaucrats corrupt?</td>
<td>4.2 (0.21, N=32)</td>
<td>3.8 (0.3, N=16)</td>
<td>.44 (0.28)</td>
</tr>
<tr>
<td>To what degree are politicians corrupt?</td>
<td>4.8 (0.23, N=32)</td>
<td>4.1 (0.30, N=16)</td>
<td>.7 (0.06)</td>
</tr>
<tr>
<td>Can technology be used to reduce corruption in service delivery?</td>
<td>1.0 (0.00, N=32)</td>
<td>1.0 (0.00, N=17)</td>
<td>0.0</td>
</tr>
<tr>
<td>How much do you trust the private sector?</td>
<td>3.0 (0.38, N=32)</td>
<td>3.2 (0.32, N=17)</td>
<td>.34 (0.48)</td>
</tr>
<tr>
<td>Should government work with the private sector to deliver public services?</td>
<td>.48 (0.09, N=33)</td>
<td>.76 (0.11)</td>
<td>-.28* (0.049)</td>
</tr>
</tbody>
</table>

Table 9 - Demographic Comparison of Observational and Experimental Subject Pools

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Experimental (A)</th>
<th>Observational (B)</th>
<th>Difference of Means (A-B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (1=Man, 2=Woman)</td>
<td>1.3 (.06, N=50)</td>
<td>1.2 (.02, N=50)</td>
<td>.03 (.63)</td>
<td></td>
</tr>
<tr>
<td>Age (Years)</td>
<td>24.9 (.61, N=50)</td>
<td>37.4 (.64, N=658)</td>
<td>-12.5*** (.000)</td>
<td></td>
</tr>
<tr>
<td>Education (Years)</td>
<td>16.4 (.30, N=49)</td>
<td>9.3 (.20, N=694)</td>
<td>7.1*** (.000)</td>
<td></td>
</tr>
<tr>
<td>Have a Computer at Home?</td>
<td>.2 (.06, N=50)</td>
<td>.09 (.01, N=694)</td>
<td>.11 (.07)</td>
<td></td>
</tr>
<tr>
<td>Have used a Computer before?</td>
<td>.64 (.07, N=50)</td>
<td>.22 (.02, N=696)</td>
<td>.42*** (.000)</td>
<td></td>
</tr>
<tr>
<td>Registered to Vote?</td>
<td>.94 (.33, N=50)</td>
<td>.97 (.01, N=696)</td>
<td>-.03 (.39)</td>
<td></td>
</tr>
</tbody>
</table>

---

16 For all Yes or No questions, 0=No, 1=Yes.
Table 10 - Demographic Comparisons of Included Districts, Karnataka, and India\textsuperscript{17}

<table>
<thead>
<tr>
<th>Characteristic\textsuperscript{18}</th>
<th>India</th>
<th>Karnataka</th>
<th>Bangalore Urban\textsuperscript{19}</th>
<th>Bangalore Rural</th>
<th>Kolar\textsuperscript{20}/Chikbalapur</th>
<th>Mandya</th>
<th>Tumkur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (Mil)</td>
<td>1,028.6</td>
<td>52.8</td>
<td>6.5</td>
<td>1.8</td>
<td>2.5</td>
<td>1.8</td>
<td>2.6</td>
</tr>
<tr>
<td>Urban</td>
<td>27.8</td>
<td>34.0</td>
<td>88.1</td>
<td>21.7</td>
<td>24.7</td>
<td>16.0</td>
<td>19.6</td>
</tr>
<tr>
<td>Scheduled Caste</td>
<td>16.2</td>
<td>16.2</td>
<td>13.0</td>
<td>20.1</td>
<td>26.5</td>
<td>14.0</td>
<td>18.3</td>
</tr>
<tr>
<td>Scheduled Tribe</td>
<td>8.2</td>
<td>6.6</td>
<td>1.3</td>
<td>3.3</td>
<td>8.1</td>
<td>1.0</td>
<td>7.5</td>
</tr>
<tr>
<td>Without School</td>
<td>1.9</td>
<td>1.9</td>
<td>1.3</td>
<td>2.4</td>
<td>1.9</td>
<td>1.9</td>
<td>1.7</td>
</tr>
<tr>
<td>Below Primary</td>
<td>14.1</td>
<td>25.2</td>
<td>13.9</td>
<td>23.5</td>
<td>23.8</td>
<td>21.1</td>
<td>23.2</td>
</tr>
<tr>
<td>Primary School</td>
<td>14.3</td>
<td>27.8</td>
<td>20.8</td>
<td>29.3</td>
<td>29.3</td>
<td>30.1</td>
<td>29.0</td>
</tr>
<tr>
<td>Middle School</td>
<td>8.8</td>
<td>12.5</td>
<td>12.4</td>
<td>16.6</td>
<td>16.2</td>
<td>18.0</td>
<td>16.2</td>
</tr>
<tr>
<td>Matriculated</td>
<td>11.8</td>
<td>17.0</td>
<td>36.3</td>
<td>24.2</td>
<td>24.1</td>
<td>24.2</td>
<td>24.7</td>
</tr>
<tr>
<td>Graduate +</td>
<td>3.7</td>
<td>7.3</td>
<td>15.4</td>
<td>4.0</td>
<td>4.7</td>
<td>4.8</td>
<td>5.2</td>
</tr>
</tbody>
</table>

\textsuperscript{17} All data in this section is from the 2001 Census of India. All entries are percentages, excluding the overall population numbers.

\textsuperscript{18} All statistics, other than Population, are the percentage of the overall population in the given geographic unit that falls within this category.

\textsuperscript{19} These statistics are for the entire Bangalore Urban district, however the citizens serviced by Nemmadi centers (34.2% of the district's population) live in the portions of the district defined as rural by the state government.

\textsuperscript{20} At the time of 2001 Census, what is now Chikbalapur district was a part of Kolar district. Statistics listed here are for the combined entity.