Management of Bureaucrats and Public Service Delivery

Evidence from the Nigerian Civil Service

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Abstract

We study how the management practices under which public sector bureaucrats operate, correlate to the quantity and quality of public services delivered. We do so in a developing country context, exploiting data from the Nigerian Civil Service linking public sector organizations to the individual projects they are responsible for. For each of 4700 projects, we have hand coded independent engineering assessments of each project's completion rate and delivered quality. We supplement this information with a survey we conducted to elicit management practices for bureaucrats in each of the 63 civil service organizations responsible for these projects, following the approach of Bloom and Van Reenen [2007]. We find management practices related to autonomy significantly *increase* project completion rates and project quality; management practices related to performance-based incentives significantly *decrease* project completion rates and project quality. We then document: (i) how the impacts of autonomy vary by project and organizational characteristics following Aghion and Tirole [1997]; (ii) whether the negative impacts of performance related management practices are driven by issues related to project complexity/multi-tasking, and bureaucrats operating under multiple principals. Finally we provide evidence on how each dimension of management practice interplays with bureaucrat characteristics, such as their tenure, intrinsic motivation and perceptions of organizational corruption. Our findings provide among the first evidence to quantify the potential gains to public service delivery arising from marginal changes in how civil service bureaucrats are managed.

Keywords: autonomy, bureaucracy, performance incentives.
JEL Classification: H00, H11, J33, J38, M1, O20.

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1 Introduction

We study the correlates of effective public service delivery in a developing country using novel data from organizations in the Nigerian civil service, including government ministries and other federal agencies. Our analysis focuses on the relationship between the management practices bureaucrats operate under, and the quality and quantity of public sector projects delivered.

From a macroeconomic perspective, the quality of the bureaucracy is an important determinant of economic growth [Besley and Persson 2010]. Public services account for a substantial share of all economic activity; in social sectors such as health, water and education, government provided services are often especially important. Effective public service delivery also matters from a micro-economic perspective: program evaluations of micro-scale interventions are often partly motivated by the assumption that successful interventions can be faithfully scaled-up by governments.

Despite the importance of government effectiveness for citizen welfare, the literature on public administration is almost devoid of concrete evidence linking practices in civil service organizations to public goods outcomes [Goldfinch *et al.* 2012]. At the same time, economic analyses of incentives in the public sector have largely focused either on the selection and motivation of *politicians* [Besley 2004, Gagliarducci and Nannicini 2013], or on the response to incentives of *frontline* staff such as teachers and health workers [Glewwe *et al.* 2010, Muralidharan and Sundararaman 2011, Duflo *et al.* 2012, Ashraf *et al.* 2012, Miller and Babiarz 2013]. In both rich and poor country contexts, there is little evidence linking the managerial practices that the vital middle-tier of *bureaucrats* operate under, to public service delivery. It is this gap our analysis starts to fill.[1]

Banerjee *et al.* [2007] highlight two constraints restricting research on public good provision in developing countries: (i) the process of project implementation is rarely quantifiable; (ii) public good quality varies enormously, but these quality differences are difficult to measure. The data we utilize allows us to make progress on both measurement issues. More precisely, we exploit a unique period of history for the Nigerian civil service, during which the activities of public organizations were subject to detailed and independent scrutiny. As part of this process, quantitative information was collected to measure the actual *implementation* success and *quality* of public sector projects in the social sector domains of health, education and infrastructure for example. The scrutineers were independent teams of engineers and members of civil society.

We have hand coded this information to obtain potentially unbiased assessments of individual project completion rates and their quality, for over 4700 public sector projects that began in 2006/7. The bulk of project types we study are construction projects, such as boreholes, buildings, dams and roads. We have also used the technical documents available for each project to work with engineers to construct measures of each project's *complexity*, following engineering best-practice [Remington and Pollack 2007]. The aggregate budgetary cost of the projects we study is US$800 million or 8% of all social spending in Nigeria over this period.

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[1] A notable exception is Dal Bo *et al.* [2013] who present evidence from Mexico, exploiting experimental variation in salaries to identify their impact on the *selection* of public sector officials. We return to discuss the relation between our work on management practices with this paper in the conclusion.

To measure the management practices that bureaucrats operate under, we follow Nick Bloom and John Van Reenen's pioneering work [Bloom and Van Reenen, 2007, 2010; Bloom *et al.* 2012, 2013], adapting their management surveys to the Nigerian public sector setting, and taking account of insights from public administration literature on the management of bureaucrats [Rose-Ackerman 1986, Wilson 1989]. We collected data on management practices for 63 organizations of the Federal Civil Service in Nigeria, including central ministries, that represent the most important service delivery agencies in the social sectors that we study. For each organization, we derive two measures of management practices: one related to the *autonomy* provided to bureaucrats, and one related to the provision of *performance-based* incentives for these bureaucrats.

The autonomy management index captures the extent to which a civil service organization spreads the burden of the organization's work load, gives staff the opportunity and flexibility to achieve the organization's goals, the extent to which different tiers bureaucrat can define organization policy, the flexibility of the organization's work culture, and the extent to which it is conducive to team work. There are long-standing views in the public administration literature on the importance of autonomy. As Rose-Ackerman [1986] describes, at one extreme lies the view that public agencies ought to delegate as much decision making to bureaucrats as possible, relying on their professionalism and resolve to deliver public services [Simon 1983]. At the other extreme lies the Weberian view that, because the objectives of bureaucracies and society diverge, only an entirely rules-based system of public administration, that leaves little to the individual judgement of bureaucrats, can ensure consistent and acceptable levels of public service.

The second reason to focus on autonomy stems from the economics of organizations literature. Despite the early prominence of autonomy in this literature [Simon 1951, Harsanyi 1978], and the more recent contribution of Aghion and Tirole [1997] that has led to a theoretical resurgence of interest in how formal and real authority is allocated within organizations, little empirical evidence exists that relates to the causes and consequences of providing autonomy or delegating decisions in organizations. Our analysis also starts to fill this gap.[2]

The performance-based management index captures the extent to which an organization collects indicators of project performance, how these indicators are reviewed, and whether bureaucrats are rewarded for achievements reflected in these indicators. We view this as a second important dimension of management practices given the enormous economics literature on incentive theory that stresses the positive impacts of performance based incentives have on organizational performance. However, the impacts of such incentives in public sector settings is more open for debate, especially given concerns for why performance pay in the public sector might not be optimal [Hasnain *et al.* 2012, Muralidharan 2012], including that they can crowd out the intrinsic motivation of those individuals that self-select into the public sector [Perry and Wise 1990, Benabou and Tirole 2006, Francois and Vlassopoulos 2008]. We explore these trade-offs in our analysis.[3]

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[2] Aghion and Tirole [1997] emphasize that complex managerial decisions require subjective knowledge inputs, and the holders of such knowledge have real authority. This information cannot easily be communicated. Even when information transmission is perfect, information might not arrive on time, or those with formal authority might be inattentive or overburdened to act on it.

[3] In education, positive impacts of pay for performance for teachers have been documented using RCTs in

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Establishing a causal relation between management practices for bureaucrats and public sector projects delivered is not straightfoward given that exogenous or experimental variation in such equilibrium practices is unlikely to be observed. Crucially for our analysis, for any given project type, *multiple* organizations are observed conducting similar project activities. For example, small-scale dams are constructed by the federal ministries of water, agriculture, and environment. We are thus able to assess how the delivery of the *same* project type varies depending on the management practices in place for bureaucrats in the specific organization responsible, holding constant all other project characteristics, such as their complexity and scale, as well as other organizational characteristics, such as managerial spans of control and bureaucrats' levels of education.

To provide support for a causal interpretation to our results linking management practices to project outcomes, we tackle four central econometric challenges through the paper. First, to address concerns that bureaucrats might *sort* into organizations based on the management practices in place, we present descriptive evidence that bureaucrats have no influence over their initial assignment to civil service posts, and nor are the characteristics of bureaucrats in organizations correlated to the management practices in place. Second, to address concerns over the *non-random assignment* of projects to organizations, we describe political forces determining how Parliament assigns projects to organizations, and provide empirical evidence consistent with this assignment not being driven by organizations' management practices. We also present evidence that the management practices of organizations do not correlate with other outcomes that might impact project completion rates, such as the organization's total budget, or the average (or standard deviation in) complexity of projects assigned to them.

Third, to address concerns over *reverse causation* between project outcomes and management practices, we present results from a SUR model that simultaneously estimates the factors correlated with each management practice. We find no evidence management practices themselves are driven by the organization's project completion rates or the complexity of projects assigned to it. Finally, to address concerns that our management practice measures pick up the impact of some *omitted* organizational characteristic, we determine the conditions under which our estimates would simultaneously underestimate the true impacts of both management practice, and we then measure the separate impact of the nine underlying topics of practice that make up our two aggregate indices on autonomy and performance.

We present six core findings linking civil service management practices and public service delivery in Nigeria. First, the management practices bureaucrats operate under matter: both dimensions of practice have robust and significant correlations with project completion rates. Despite

developing countries by Glewwe *et al.* [2010], Muralidharan and Sundararaman [2011], and Duflo *et al.* [2012], although Fryer [2013] finds zero or even negative impacts in the US. In health, a nascent literature documents positive impacts of performance pay in developing countries when provided to frontline workers [Miller *et al.* 2012, Miller and Babiarz 2013]. In line with our findings, Ashraf *et al.* [2013] document how non-monetary incentives elicit far more effort than monetary incentives for such tasks. In job placement and training, Burgess *et al.* [2011] report no mean impacts of performance pay for public sector teams in the UK, Heckman *et al.* [1987] report more positive impacts from the US, and Courty and Marschke [1997] present evidence of gaming in response to these incentives. Olken *et al.* [2012] document how relative performance incentives between Indonesian villages has little long term impact on the use of block grants provided for health and education goods and services.

the measures being positively correlated to each other, they have *opposing* correlations with the quantity of public service delivery: a one standard deviation increase in autonomy for bureaucrats corresponds to a significantly *higher* project completion rate of 14%, and a one standard deviation increase in performance-based incentives corresponds to a significantly *lower* project completion rate of 12%. The backdrop to these results implies these magnitudes are of economic significance: 38% of projects are never started, whose aggregate value is $240million. Hence the potential gains to marginally improving management practices are huge, all else equal.

Second, we find management practices correlate to project *quality* in similar ways as documented for project completion rates: higher levels of autonomy for bureaucrats are associated with projects being of significantly higher quality; higher levels of performance-based incentives are associated with projects being of significantly lower quality, all else equal.

Our third and fourth results use insights from contract theory to understand further why each dimension of management practice impacts organizational output in these opposing ways. On autonomy, viewed through the lens of models of authority in organizations [Aghion and Tirole 1997, Baker *et al.* 1999], a principal is more likely to grant autonomy to an agent in the following scenarios: (i) tasks that are considered less important; (ii) tasks that require more technical competency; (iii) when the principal has a greater span of control; (iv) when agents have expertise. It is in these circumstances that we expect the provision of autonomy to have especially positive impacts on the organization's effectiveness as measured by project completion rates.

Our third set of results present evidence of such heterogeneous correlations. However, we find the relation between autonomy and project completion rates to actually be quite *homogeneous* over projects of different scale or importance (proxied by their budgets) and over projects of differing complexity. In support of theory, the impacts of autonomy are found to be higher when managers have greater span of control, but contrary to theory, we find the impacts of autonomy provision are smaller when the expertise of bureaucrats is higher (as proxied by the share of organization staff that hold a university degree). These mixed findings suggest the need to further develop models of the provision of authority and autonomy specifically tailored towards public sector contexts, and/or the need to obtain better data to more precisely map existing theory to evidence from public bureaucracies in developing countries.

On the negative impact of performance-based incentives, we focus on models that we can take to our data that highlight circumstances under which performance incentives have detrimental impacts. One class of model emphasizes multi-tasking [Holmstrom and Milgrom 1991]: the provision of potentially more narrowly defined performance incentives, perhaps those that are more easily observed and contractible upon, skews the allocation of agent's effort towards those aspects that are rewarded, reducing overall output. Alternatively, the provision of performance-based incentives might negatively impact public service delivery because bureaucrats operate under multiple principals [Martimont 1986], that has always been considered a hallmark distinction between public and private sector contracting environments [Dixit 2002].

Our fourth set of results document such heterogeneous impacts that line up well with these predictions: performance-based incentives are especially detrimental for projects that require multi-

tasking (proxied by project complexity), or when bureaucrats potentially operate more principals (as proxied by the number of senior-tier bureaucrats per lower tier bureaucrat).

Our fifth set of results consider the interplay between management practices and three characteristics of bureaucrats relevant for public service delivery: their tenure, intrinsic motivation, and perceptions of organizational corruption. As described in more detail later, to measure civil servant characteristics along each dimension, we use the survey we administered to a representative sample of around 4100 (13% of all) officials across the 63 organizations in our main analysis.

Nigerian bureaucrats enjoy long tenure, and this can impact the effectiveness of management practices: longer serving bureaucrats might better identify to whom decision-making power should be delegated, or be better able to respond to incentives by exploiting other flexibilities etc. We find that when bureaucrats have longer tenure, the impacts of management practices become bifurcated: when bureaucrats have more years of service in the organization, the positive correlation between project completion rates and autonomy is even greater, but the negative correlation with performance-based incentives is even more negative.

The second characteristic considered relates to the literature suggesting performance-based incentives might crowd out the intrinsic motivation of public sector workers, or through other psychological channels [Gneezy *et al.* 2011]. We find that the generally positive effect of providing autonomy to lower-tier bureaucrats, is *offset* when a greater share of senior bureaucrats themselves are intrinsically motivated. There is no such offsetting impact when low-tier bureaucrats are intrinsically motivated. This suggests that although on average providing autonomy to lower-tier bureaucrats is positively correlated with public service delivery, this is not necessarily the case when autonomy is *taken from* intrinsically motivated senior bureaucrats. Moreover, we find no evidence that the impact of performance-based incentives to managers varies with the share of senior or low-tier bureaucrats that are intrinsically motivated. Hence the provision of performance-based incentives does not crowd out effort among intrinsically motivated bureaucrats, in line with the evidence for health workers in Ashraf *et al.* [2012].

While the recent economics literature has emphasized the role of intrinsic motivation, a long-standing literature in public administration emphasizes that civil servants pursue their self-interest [Tullock 1965, Downs 1967, Buchanan 1978, Wilson 1989]. This more negative view of bureaucrats spurs our final set of results, that explore how the impacts of management practices are mediated through *perceptions of corruption* among civil service organizations, as elicited in our civil servant survey. We find the impacts of management practices do vary by perceptions of corruption of senior- and lower-tier bureaucrats in organizations. The positive impacts of autonomy are greater in organizations in which more bureaucrats report observing corrupt practices. This might suggest that the provision of autonomy can help senior managers delegate tasks away from the most corrupt officials. Second, the negative impacts of performance-based incentives do not vary with perceptions of corruption from bureaucrats. Whatever are the performance incentives in place, they appear not be sufficiently high powered to offset corrupt practices.

Our final set of results provide direct evidence on the underlying determinants of management practices themselves. To do so, we use a SUR model to simultaneously estimate the correlates

of each dimension of management practice, at the organizational level. We control for three classes of variable: (i) characteristics of senior and lower-tier bureaucrats, such as their years of schooling and tenure in the organization; (ii) organization characteristics, such as whether it is a decentralized body, the average budget and complexity of projects assigned to it; (iii) proxies for competition the organization faces in the provision of public services. In support of some of the underlying identifying assumptions for our main analysis, we find management practices are uncorrelated with the characteristics of projects assigned to them, or the past project completion rates achieved by the organization. We also find limited evidence that competition between public sector organizations providing similar project types, leads to better management practices.

The central contribution of the paper is to provide novel evidence on how management practices for bureaucrats in civil service organizations relate to effective public sector service delivery, and how the impacts of each dimension of management practice vary across the characteristics of projects, organizations, and bureaucrats. Our results point to new directions for theoretical research to better understand the contracting environment in public bureaucracies, as well as highlighting specific areas in which the better measurement of inputs and outputs of public sector organizations can aid our understanding of public service delivery in the developing world.

The paper is organized as follows. Section 2 overviews the relevant aspects of the Nigerian civil service. Section 3 details our data sources and empirical method. Section 4 presents our main results linking public service delivery and management practices for bureaucrats. Section 5 documents how these impacts vary by characteristics of projects, organizations and bureaucrats. Section 6 concludes with a discussion of what correlates with management practices in place, including measures of competition between public organizations, and links our findings to the wider literature on improving public services, including recent contributions on the selection of public sector workers [Dal Bo *et al.* 2013]. The Appendix presents further data description and robustness checks.

2   Institutional Background

Nigeria is Africa's most populous country, home to 160 million individuals, double the size of any other African country or 20% of all the population of sub-Saharan Africa. It thus represents a leading setting in which to understand the determinants of public service delivery in the developing world. It also shares other important features with other developing countries: government expenditures represent 26% of GDP, very much in line with countries at similar stages of development; it has generally weak institutions holding government to account, and corrupt practices in public sector organizations are commonplace.[4]

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[4]According to the International Monetary Fund World Economic Outlook Database (October 2012), government expenditures as a percentage of GDP are 28% in India, 21% in China, 30% in South Africa and 27% in Kenya. Nigeria's public sector is ranked in the bottom decile of countries rated by Transparency International's Corruption Perceptions Index. Whilst there were was a gradual improvement until 2005, Nigeria's Corruption Perceptions Index rating has been relatively stagnant since then. Other measures, such as the Ibrahim Index of African Governance and Worldwide Governance Indicators Control of Corruption scores paint a similar story.

The transfer of institutions modelled on its colonial power also mirrors the history of other Commonwealth countries. At the end of the nineteenth century, Britain expanded its rule progressively across southern Nigeria and then into northern Nigeria during the early twentieth. The administration of these territories was undertaken by the British Crown until Nigeria's independence in 1960, when it passed to the newly formed Nigerian government. The colonial government fashioned its Nigerian administration after the British Parliamentary Civil Service System, and this is essentially what passed to the independent government of Nigeria.

Since independence, Nigeria's political history has been marked by a series of military dictatorships, each accompanied by changes in the country's constitution. The country returned to civilian rule with Presidential elections in 1999 and celebrated its first civilian-to-civilian transfer of power in 2007. Although there have been a number of periodic reforms of the civil service, and despite the fact that Nigeria has moved to a Presidential system of government, Nigeria's civil service structure still largely replicates its British colonial origins.[5]

2.1   Civil Service Organizations

Ministries are the central coordinating authority within each public sector domain, such as health or water. Each is headed by a politically-appointed Minister who is aided by a bureaucratically-appointed Permanent Secretary.[6] The civil service is organized around the federal structure of the nation's polity, so that there are federal, state, and local government civil services. Our analysis relates exclusively to federal civil service organizations. Various *organizations*, including ministries, are established by statute to render specified public services.

Table A1 lists the federal civil service organizations we study. These include ministries of health, education, environment, and water resources, and organizations that have regional bases (such as seven federal polytechnics, twelve federal medical centres, twelve river basin development authorities etc.). Table A1 highlights how these organizations vary in the size of their budgets, staffing levels, and decentralization from central government. The federal ministries are typically the largest in terms of budget, with regional organizations typically having fewer staff and being deconcentrated from central government.[7]

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[5]The constitution adopted since 1999 has many similarities with that of the United States Constitution. Legislation is enacted by a bicameral National Assembly composed of the Senate and the House of Representatives. Each federal state has its own government headed by a Governor and a state parliament. Although the introduction of a Presidential system of government in 1979 saw initial reforms to the civil service, for example under the 1988 Civil Service Reorganization Decree No. 43, later decrees reversed some of these changes.

[6]The Civil Service is governed by a set of Public Service Rules and Financial Regulations, *ad hoc* Circular Instructions, decrees circulated across government, and Gazette Notices (decrees published in the government's gazette). Together these outline the laws regulating the business of government, and cover appointment to and exit from the service, discipline, salaries, management of public funds, and other major aspects of official assignments.

[7]Budget figures are averages for 2006-10. Staff numbers are taken from administrative data for 2010. In the few cases such administrative records are unavailable, we estimate staff numbers from personnel expenditures (which are correlated with staff numbers by more than .9). 'Concentrated' organizations refer to the central organizing authority for the sector, with a direct line of responsibility to the President and the National Assembly. Decentralized organizations refer to those whose day-to-day running is largely independent of the central authority. They have boards of governors that make decisions over policy and operation, and they have a separate budget line to central ministries. In line with the literature, we refer to such organizations as being 'deconcentrated' or

Each civil service organization provides a series of *project* types. These types include construction projects: boreholes, buildings, roads and canals; as well as non-construction project types such as procurement, training, and advocacy. Crucially for our analysis, for any given project type, *multiple* organizations are observed conducting similar project activities. For example, small-scale dams are constructed by the federal ministries of water, agriculture, and environment, and by all of the river basin development authorities. We are thus able to assess how the delivery of the *same* project type varies depending on the incentive structures in place for bureaucrats in the specific organization responsible, holding constant other project and organizational characteristics.

2.2   The Assignment of Civil Servants and Projects to Organizations

The Head of the Civil Service of the Federation organizes the postings and conditions of Nigeria's federal civil servants. Our representative survey of over 4000 individual civil servants (13% of the total workforce of the organizations we study) confirms this: on their initial posting, 88% of civil servants said they had no influence over their destination; with regards to the current posting, 60% report being posted 'at random', with a further 22% reporting being transferred by a member of the organization that did not know them personally. Hence it is unlikely that bureaucrats self-select into organizations on the basis of the management practices in place. Indeed, we later document there is little correlation between the management practices in place and bureaucrat characteristics such as their average tenure, intrinsic motivation or perceptions of corruption.

Once posted, civil servants tend to enjoy job security. Our survey reveals mean tenure at the *current* organization to be almost 13 years. For senior managers (those above grade level 12) this rises to almost 16 years. The survey also reveals that movements across organizations are rare: the majority of bureaucrats report never having moved organization. We later exploit this to explore whether the relation between management practices and public service delivery varies with bureaucratic tenure in organizations.

Projects are assigned to organizations centrally by the National Assembly, that enacts a budget law defining the profile of projects to be implemented each fiscal year. The projects we study were all established in law by Budget Appropriation Bills passed in 2006 or 2007. The passage of these bills is as follows. Having received inputs from the executive branch of government, a draft Appropriation Bill is presented to the National Assembly. The draft bill is then split into sectors (water, health etc.) and sent to sectoral committees of the House and Senate. These committees are delegated to hold hearings with relevant parties, scrutinize the proposals and define budgets for each of the organizations we study. These committees are staffed by politicians with qualifications or experience in the relevant sector. These sectoral committees then recommend a budget for the sector to an Appropriation Committee which merges the recommendations into a single budget. This unified budget is then voted on by both houses to form that year's Budget Appropriation Bill. This legal document then defines the responsibilities of government organizations in terms

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'fiscally decentralized'. Central subsidiaries are organizations with a separate budget line in the national budget and distinct institutional structure, but in which central ministries play a part in the day-to-day running of.

of projects to be delivered. Once a project is assigned, the organization's chief executive officer delegates the planning and delivery of these projects to the relevant sub-departments.

2.3 Management of Bureaucrats

It is at this point that the *management* of civil servants becomes crucial for the transformation of government plans into public service delivery. Hierarchy is a central organizing principle in Nigerian culture [Graf 1988]. As such, the chief executive and other senior managers of the organization can marshal changes in management culture. Directorate-level staff at the organization have some room to determine their department's management practices, with responsibility to the chief executive for their department's activities. However, the chief executive is ultimately held accountable for the performance of the organization.

To better understand how management practices evolve, we held structured interviews at four of the federal organizations in our study. These revealed three common themes in determining the management practices in place in any given organization: (i) the Public Service Rules of the Nigerian civil service establishes guidelines on how bureaucrats should be incentivized, and these are common to all federal organizations; (ii) the history of management staff that have worked in an organization; (iii) the role of external events such as demands of trade unions. Taken together, these interviews consistently emphasized the nature of management practices in the civil service organizations to be slowly evolving over time, and not necessarily tailored to maximize public service delivery of the types of project organizations are used to being assigned.[8]

Indeed, later in Section 6 we estimate a SUR model to simultaneously estimate the correlates of each management practice and we find these to be unrelated to the characteristics of projects assigned to the organization, past project completion rates, and the tenure of bureaucrats.

3 Data and Empirical Method

3.1 OPEN Data on Project Completion and Quality

The Nigerian Government began a program of sweeping reforms in the major organs of government in 2003 [Nkonjo-Iweala and Osafo-Kwaako 2007]. Years of military rule had undermined

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[8]The structured interviews and responses were broadly similar across the four organizations. These took place more than two years after the other surveys were fielded. In the Nigerian public sector, management practices are said to take the Public Service Rules as their foundation. These rules provide the framework for the running of the public service, including rules around the distribution of authority, the nature of discipline, the provision of training, and so on. In each of the organizations we visited, these were said to be central to determining management practice. However, we were repeatedly told that a secondary influence on an organization's management practices was the history of management staff who had worked at the organization. Officials are promoted into management positions based primarily on tenure. Views on management practices are said to be aggregated by committee, with the chief executive marshalling, rather than defining, the direction of reform. This situation, we were told, leads to a relatively slow changing management environment, but one that over the years can lead to substantial divergence in management practice across organizations. It was consistently argued that the set of all managers were important to management, rather than just the chief executive. Finally, external events, such as the demands of trade unions, were said to have a third-tier influence and constrain management practices.

the country's public institutions and the newly-elected President began his second term aiming to strengthen Nigeria's economic position. A fiscal rule was introduced to de-link public expenditures from volatility in oil-revenues, state institutions were privatized, and a number of sectors deregulated to encourage private sector participation. As a result, the Nigerian Government received cancellation of its external debt to the tune of US$18 billion from the Paris Club.[9]

At the federal level, the annual savings from debt interest were channeled into the social sectors (health, education, water etc.) that are our focus. The Presidency saw this as an opportunity to track the effectiveness of government expenditures, and so in 2006 and 2007 the Nigerian Government undertook the Overview of Public Expenditure in NEEDS, known as the 'OPEN initiative', in which it traced, at a project level, the use and impact of 10% of *all* federal Government social sector expenditures between 2006 and 2007.[10] The projects selected to be part of the OPEN initiative were designed to be representative of existing social sector expenditures, but also to be informative for those projects that were most needed to be scaled-up nationwide.

Under the OPEN initiative, visits to public projects by expert teams identified the extent to which they had been implemented as planned in the Federal Budget, and embodied in each project's technical document. The Presidency contracted national and regional teams to undertake the monitoring process outside of the institutions of the civil service. Hence the public sector projects were *not* evaluated by potentially biased civil servants, but rather by teams of independent engineers and civil society. The engineers evaluating the projects were not those working on the project sites and the civil society groups were recognized third sector organizations.[11]

We consider projects traced under the OPEN initiative that were approved in either the 2006 or 2007 federal budgets. For projects funded in the 2006 (2007) federal budget, monitoring teams visited the relevant project sites around June 2007 (2008). Therefore, project implementers were given roughly 18 months from the time the project was centrally approved until when it could be utilized by the community. All the projects we study had twelve month completion schedules, so that even accounting for any delay in the disbursement of funds, it is feasible for these projects to be completed by the time of the monitoring survey.

The OPEN evaluation teams coded: (i) whether the project had started; (ii) its stage of completion; (iii) the quality of the inputs and work. Our main outcome variable is a *continuous* measure, from zero to one, of project completion rates: zero refers to the project never having been started, one corresponds to the project being completed as specified in the original project description, and intermediate scores reflect part completion.

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[9]It was public knowledge that Nigeria had received debt relief, and it was stated early that as a result funding would be directed to the social sectors. Of course, each organization would be unaware of how much additional funding it might receive until any Appropriation Act is signed into law.

[10]NEEDS stands for 'National Economic Empowerment and Development Strategy', that was published in 2004 to act as an agenda for economic reform in Nigeria. Details of the OPEN operational framework of monitoring and evaluation are provided in Federal Government of Nigeria [2007].

[11]The teams were recruited in a competitive tendering process that was regulated by the government's procurement agency. The decision to use monitoring teams independent of government was a function of the weakness of existing government systems as well as the need for impartiality [Federal Government of Nigeria 2007]. Prior to the OPEN initiative, the government had its own monitoring and evaluation systems in place (based on unannounced visits) but these were largely perceived to be ineffective.

To maximize data coverage on project quality, we are forced to utilize the most aggregate formulation of quality reporting. A project was either of insufficient quality, satisfactory, or commended for an 'above average or high' quality level. With this definition, we obtain 2235 quality observations, the majority of which (2206) also have project completion data. We then define a project quality indicator equal to one if the project is of satisfactory quality or above.

To further ensure the accuracy of monitoring reports, the Presidency put in place a system of checks and balances. First, a centralized team of technocrats monitored the evaluation teams, providing them with training and opportunities for standardization of their methods at national conferences. Second, evaluators were asked to provide material, photographic, or video evidence to support their reports. Third, the national teams and Presidency performed random checks on evaluated sites, all of which were consistent with the findings of OPEN monitors. Evaluations of the OPEN process indicate it successfully achieved its aims [Eboh 2010, Dijkstra *et al.* 2011].

The reports of OPEN evaluators describe the fate of projects budgeted for execution in the 2006 and 2007 federal budgets [Federal Government of Nigeria 2008, 2009]. We hand coded the material from all projects recorded in OPEN initiative reports from the 63 federal civil service organizations listed in Table A1.[12] Taken together, the coverage of projects in our sample traces 8% of all Federal Government social sector expenditures in 2006/7 budget years, corresponding to 4721 projects from 63 organizations, with an aggregate budget of around US$800 million.[13]

While the OPEN reports form the basis of our measures on project-level implementation, we have combined this data with other project level characteristics such as the budget allocated to the project, whether it was a rehabilitation project, and a brief summary of its technical specifications. These technical specifications are later utilized to form engineer-approved measures of the complexity of each project, as described below.

Table 1 provides descriptive evidence on each project type studied. Boreholes are the most common type, corresponding to 29% of all OPEN projects. Table 1 also details the number of organizations that are engaged in providing each project. Key to our empirical method is that most project types are implemented by a range of organizations: for example there are 18 civil service organizations that construct boreholes, as shown in Column 2 of Table 1. This variation of project types across organizations is summarized in Figure 1A. It plots the division of each project type by the organizations that implement them. All project types bar electrification are implemented by a myriad of organizations. Hence our empirical approach will be to explore the impact of management practices for bureaucrats, that vary across civil service organizations, on

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[12]We have a relatively broad sample of federal social sector organizations. In the water and power sectors, we cover all the relevant federal organizations. In the health sector, we cover 28% of health organizations, with the excluded a subset of the medical service providers such as a number of Federal Medical Centres. Similarly, in education we cover 14% of education organizations, excluding a range of institutions of learning such as some Federal Colleges of Education.

[13]Table A2 compares the share of expenditures by social sectors in the OPEN projects (that correspond to 10% of all government expenditures), to the expenditure shares across sectors for all government expenditure in 2006/7. These two series are closely matched for each sector with the one exception that works sector projects are underrepresented in the OPEN data: this is likely because this sector is not a form of social expenditure. We do not use projects in the works sector in the analysis below.

project implementation, *conditional on* project-type fixed effects.

Column 3 emphasizes the scale of projects is quite small: the median budget for these small-scale dams is US$18,000, and the median budget for a building is US$120,000. These projects therefore often constitute the 'nuts-and-bolts' of rural infrastructure development. Column 4 then highlights that there is considerable variation *within* project-types in budget allocations. Given our core analysis examines the impact of management practices on public service delivery within project type, it will be important to condition on project characteristics to compare similar projects in terms of scale, complexity etc. implemented by different civil service organizations.

Figure 1B summarizes the data on completion rates aggregating across all project types: we see that 38% of projects are never started, and only 31% are fully completed. Conditional on being started, the average project completion rate is .75. The remaining Columns of Table 1 provide evidence on project completion rates, by project type. This again emphasizes the variation of completion rates across and within project types. For example, 79% of dam projects are never started, while only 12% of road projects are never started. Conditional on being started, most projects are more than 50% complete, although the proportion of projects fully completed varies from 47% of procurement and advocacy projects, to only 10% of dams.

A recorded completion rate of zero does not imply the organization has not worked on the project at all. Rather, the project was formulated and prepared, with responsibility for implementation having been delegated to a department and bureaucrats within the organization. At that point however, progress on the project halted, with funds either being returned due to lack of use, or being lost. We cannot distinguish whether this lack of implementation reflects active or passive waste [Bandiera *et al.* 2009]. Given the prevalence of corruption in Nigeria, we later explore the interplay between bureaucrats' perceptions of corrupt practices taking place in their organization, and the management structures in place for bureaucrats.[14] A completion rate of one implies the project matched its full specification. For the infrastructure project types we consider, such as boreholes, roads, electrification, dams and canals, the full completion of the project nearly always implies it can be utilized by intended beneficiaries.

The final column provides information on the percentage of projects rated to be of satisfactory quality by the team of independent engineers and civil society: here we tend to observe the majority of projects being ranked highly irrespective of project type.

Table 2 presents descriptive evidence on the public service delivery of the ten largest civil service organizations in our sample, as defined by the total number of projects implemented (although this maps closely to the size of organizations as measured by total budget). These organizations are responsible for the delivery of 75% of projects in our sample. Table 2 again emphasizes that, with the exception of the Federal Ministry of Power and Steel, each organization is engaged in providing multiple project types.

The second half of Table 2 describes the extent to which projects are being delivered by these organizations in our sample of projects. We observe huge variation across these large organizations

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[14]To shed more light on why projects do not even start, in our civil servant survey we asked the main reasons for this: only 3% reported it was because of projects being technically too complex; 64% reported because of corruption.

in the percentage of projects that are never started (11% to 95%), and that are fully completed (3% to 89%). The final column provides information on the percentage of projects rated to be of satisfactory quality: here we observe far greater variation across civil service organizations (25% to 100%) than we previously documented in Table 1 across project types.

These statistics suggest there might be important factors at the organization level that drive this variation in the quantity and quality of public sector projects. We next detail how we measure one such factor: the management practices civil service bureaucrats operate under.

3.2 Measuring Management Practices

There has been a revival of research investigating the impacts of management practices on the performance of private sector firms [Ichniowski *et al.* 1997, Black and Lynch 2001, Bloom and Van Reenen, 2007, 2010; Bloom *et al.* 2012, 2013]. We follow Bloom and Van Reenen's (henceforth BVR) approach to measuring management practices in organizations. We adapt their survey tool and practices to the Nigerian public sector setting, taking into account long-standing views on the importance of autonomy and delegation in public administration [Simon 1983, Rose-Ackerman 1986, Wilson 1989] as well as recent insights from the 'new performance management' and 'good governance agenda' perspectives [Francois and Vlassopoulos 2008, Goldfinch *et al.* 2012].[15]

To obtain reliable information on management practices in public sector organizations, we have to recognize that protocol and language-use in civil services are country-specific. We therefore worked closely with members of the OPEN office in the Presidency, as well as members of the Office of the Head of the Civil Service of the Federation in undertaking the questionnaire development process. A number of pilots using semi-structured interviews like those in BVR were held to outline key similarities and deviations from the BVR methodology. After a number of months of collaborative questionnaire design, civil servants from each organization practised the survey with each other and identified where wording or phrasing was not suitable for the Nigerian context.

The management survey enumerators were trained together for a number of weeks including practice interview sessions before undertaking the first few interviews together. The aim was to ensure a consistent interview engagement across sessions. To obtain information on management practices, senior management staff from the key departments of the organization, but not the chief executive officer, were brought together in a private office to discuss managerial practice at the organization in confidence. Whilst each manager filled in their own questionnaire during the discussion, the enumerator looked for a consensus among the group and recorded that in his own questionnaire. This is the underlying information we use to construct management practice indices for each organization.[16]

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[15]Our approach following BVR differs from how autonomy has been measured in managerial science, using organizational charts (organograms), job titles, or statements of job responsibilities [Rajan and Wulf 2006], that might however miss the distinction between formal and real authority emphasized by Aghion and Tirole [1997].

[16]Hence individual manager responses on management practices are available, but we cannot link individual managers to specific projects and so do not utilize that information (moreover each project is delivered by teams of bureaucrats across sub-departments): rather we use the consensus measure recorded by the enumerator. To reiterate, managers were told their individual responses would remain confidential.

From September to November 2010, our survey team held interviews at the organizations listed in Table A1.[17] Enumerators were unaware of the OPEN data on project completion rates or project quality from the organization, allaying concerns that enumerators could be biased in recording consensus views on practices. However, the delay between the collection of the OPEN data set in 2006/7 and the Civil Servants Survey in 2010 raises the question as to whether the civil service structures changed significantly in between data collection periods. For example, those organizations that were found to have especially low completion rates might have instigated reforms to increase autonomy and performance-based incentives for their bureaucrats. We therefore checked whether each management practice measured in 2010 is correlated to project completion rates in 2006/7, at the organizational level. We find no such evidence for either management practice. This is true unconditionally, and conditional on various organization level controls.[18]

The BVR evaluation tool is such that scores from one (worst practice) to five (best practice) are derived for key management practices used by industrial firms, grouped into four topics: operations, targets, incentives and monitoring, and are elicited through a semi-structured question line.[19] Within each topic, BVR document a wide-ranging series of survey questions that form the basis of indices related to each practice. We replicate the BVR method eliciting information on the same four broad topic areas from our civil service organizations, although we do so using a more limited set of underlying questions related to each topic. Table A3a details the questions asked on each topic.[20]

Following the public administration literature, we are interested in using this information to investigate the impact of management practices along two broad dimensions: one related to *autonomy* granted to middle- and lower-tier bureaucrats, and another related to *performance-based incentives* provided to those middle- and lower-tier bureaucrats. Table A3a shows how the

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[17]We were unable to obtain data on management practices for another five organizations for which OPEN data on project completion are available: two had been closed; one was closed by strikes throughout the survey period; and two were logistically infeasible for us to visit during the study period.

[18]There is little evidence from other sources of any major civil service reforms being implemented over this period, or of significant changes in the political organization of federal agencies [Alabi and Yinka Fashagba 2010, Ogundiya 2011]. On a wide variety of metrics, including Worldwide Governance Indicators, the Ibrahim Index of African Governance, the Freedom House Index, Transparency International Corruption Perceptions Index, and Global Competitiveness Index, Nigeria's scores have remained stable between 2006 and 2010.

[19]The operations section focuses on the introduction and spread of best-practices and the response of operations to the peculiarities of a particular project. The targets section examines the breadth and depth of organizational targets, assessing the extent of use of targets in operations. The monitoring section focuses on the tracking of performance of individuals and projects. The incentives section examines the use of incentives both to reward success and punish failure.

[20]Hence there are two important deviations from how we elicit management practices using the BVR method. First, when we were developing the questionnaire with public officials, they would often suggest wording that would be better understood by Nigerian officials. Thus, while we aimed to capture the same information on dimensions of management practice as BVR, we tailored the precise wording of some questions to better fit our context. The second difference is that we did not use the same universe of questions from the BVR survey. In the majority of cases, this was because we could not identify an analogous concept in the public sector that was relevant or not covered by other questions. For example, the majority of questions on lean manufacturing in BVR (e.g. 'What kinds of lean (modern) manufacturing processes have you introduced?') were not utilized. However, those on improving manufacturing processes ('How do you go about improving the manufacturing process itself?') were translated into the redefinition of procedures in response to new needs or challenges ('Does your organization make efforts to redefine its standard procedures in response to the specific needs and peculiarities of a community?').

underlying topics are grouped to construct these two indices, that we refer to as the BVR-autonomy and BVR-performance measures respectively. Questions related to operations and targets are aggregated, as described below, to form the BVR-autonomy measure, and questions related to incentives and monitoring are aggregated to form the BVR-performance measure.

However, to better measure management practices relevant in civil service organizations, we extend the BVR method to cover practices more relevant for managing bureaucrats. These extensions ensure there were also questions on capacity building, flexibility, roles and delegation. At the same time, we also ensured there were sufficient questions on both performance monitoring and incentives, tailored to the civil service setting, and in line with the broad topics measured by BVR. As a result, in our management survey, the topics covered can be grouped into nine categories: facilities, skills, staffing, targeting, flexibility, roles, culture, incentives and monitoring.[21]

Table A3b then provides details of how the nine broad topic areas are divided and aggregated into our autonomy and performance indices (that we refer to as the CS-autonomy and CS-performance measures respectively), and provide examples of the types of management practice asked about under each topic. As a point of comparison, the final Column in Table A3b shows which of these questions overlap with the BVR measures. Areas of management practice related to facilities, skills and culture are largely new and specific to the public sector setting. In contrast, areas of management practice related to incentives and monitoring are similarly measured in our CS-performance measure as in the BVR-performance measure. Eliciting both the BVR- based and the newly derived CS- based measures of management practices in the same context allows us to provide evidence on the sensitivity of our findings linking management practices to public sector service delivery, to alternative constructions of these management indices.

For each individual question shown in Tables A3a and A3b, we follow BVR by converting responses into normalized z-scores, where in all cases, variables are increasing in the commonly understood notion of 'better management'. For our core analysis, we aggregate z-scores by taking the unweighted mean of the underlying z-scores, and later show the robustness of our results to other weighting schemes. We aggregate the individual question z-scores into the two types of management practice indices: on autonomy and on performance. We do this for the series of questions we designed to specifically examine management practices in civil service organizations and hence construct CS-autonomy and CS-performance measures. We also do this for the questions on management practice asked in BVR to industrial firms to construct BVR-autonomy and BVR-performance measures. As each index is an unweighted mean of z-scores, each CS- and BVR- is a continuous measure with mean zero by construction.[22]

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[21]The monitoring and incentives groupings take on similar interpretations as the BVR case. The facilities section assesses the quality of infrastructure and equipment available to staff. The skills sections assesses the skills and training opportunities embodied in the staff body. The staffing section assesses the effective utilization of that body of staff. The targeting section examines the extent of use of targets. The flexibility section assesses the extent to which the organization is able to respond to best practice and project peculiarities. The roles section assesses the extent to which staff can play a role in the direction of the organization. The culture section assesses whether the organization inculcates a productive work culture.

[22]We have also used principle components analysis to assess the importance of individual practices through factor analysis. Replicating the uni-dimensional measure of practices as in BVR, we find one dominant factor that

Table 3 describes the CS- and BVR- measures of management practices. Column 1 shows each index to have mean zero by construction. Column 2 shows there is more variation in management practices related to performance than related to autonomy across organizations. Indeed, a formal variance ratio tests rejects the null of equal variances [p-value of .000]. We link this to our later results highlighting how the heterogeneous impacts of both measures vary by the characteristics of projects, organizations and bureaucrats, and so shed light on how the optimal management practices on each dimension should vary across the organizations we study.

Columns 3 to 5 show pairwise correlations between the CS- and BVR- measures. Two points are of note. First, the management scores are all *positively* correlated with each other, so organizations with greater performance-based management practices also have greater investment in the autonomous capacities of their bureaucratic staff. This is true within and across the CS-based and BVR-based measures. Hence in the cross section of federal organizations, the provision of autonomy and performance incentives do not appear to be substitutes. Figure 2 shows a complete scatterplot of the two CS- measures across the 63 civil service organizations we study.[23]

Second, these correlations are not high: the CS-based measures have a correlation coefficient of .49, and the BVR-based measures have a correlation coefficient of .42. Combined with the underlying variation in each measure across organizations, this opens up the possibility to precisely identify the separate relationship of each measure to public service delivery. As expected the CS-performance and BVR-performance measures are highly correlated (.89) because as shown in Tables A3a and A3b, there is a large overlap in the underlying questions on which they are based.

These indices, and the underlying management questions, provide us with our core explanatory variation. Following BVR, we also collected data on the interviewees for each survey, interview characteristics and the quality of the survey session. These 'noise controls' will also be conditioned on in our baseline empirical specifications.

3.3 Project Complexity and Other Variables

When relating project outcomes to management practices for bureaucrats across organizations, it is important to condition on project complexity. As Column 3 of Table 1 shows, there is considerable within-project variation in budgets, and this might partly reflect differing project complexities. To measure project complexity we collaborated with a pair of Nigerian engineers familiar with the OPEN initiative and a group of international scholars with research interests in project complexity. The complexity indicators were based on the detailed technical specifications specified for each project, and are constructed following engineering practice that emphasizes multiple dimensions of complexity [Remington and Pollack 2007]. The Appendix: (i) details the construction of these

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explains 47% of the variation. For our CS- measures, the factor loadings are more evenly spread, with the first factor explaining 28% of the variation.

[23]Such substitution might have been observed if bureaucrats have strong career concerns, and so performance incentives are not required once autonomy is given to individuals. Alternatively, if bureaucrats are intrinsically motivated they might need only to be provided autonomy, and indeed, the provision of performance incentives might crowd out their intrinsic motivation.

indices, and presents descriptive statistics for them; (ii) describes checks we put in place, using multiple engineers, to establish the validity of these complexity measures.

For our empirical analysis, the other project level controls in addition to project complexity that we have collated include the budget allocated to the project, whether it was a rehabilitation project, and a brief summary of its technical specifications. Finally, organizational variables we have collected that will also act as controls include administrative data on the number of employees at each organization, the proportion of staff with graduate/postgraduate qualifications, and the organization's total budget. In some specifications we also condition on controls for the state in which a given project is located. We construct these state controls using aggregated data provided by the National Bureau of Statistics.

3.4 Empirical Method

To assess the impact of management practices for civil service bureaucrats on the quantity and quality of public services delivered, our baseline empirical specification has as its unit of observation project i of type j in organization n. The project types are listed in Table 1, and the federal civil service organizations from which management practices have been elicited are listed in Table A1. We estimate the following OLS specification,

$$y_{ijn} = \gamma_1 CS\text{-}autonomy_n + \gamma_2 CS\text{-}performance_n + \beta_1 PC_{ijn} + \beta_2 OC_n + \lambda_j + \epsilon_{ijn}, \tag{1}$$

where y_{ijn} corresponds to the project completion rate, or the assessment of project quality, as described in Table 1, and the two main indices of management practice are the CS-autonomy and CS-performance indicators described above.

PC_{ijn} includes project characteristics such as the project complexity, log project budget and whether the project is a rehabilitation or not. OC_n includes organization level controls such as the log number of staff, log total organization budget, log capital budget, and the proportions of officials with a college and postgraduate degree. Following BVR, within OC_n we also condition on 'noise' controls related to the management surveys. These include four interviewer dummies, indicators of the seniority, gender, and tenure of the managers who responded, the day of the week the interview was conducted, the time of day the interview was conducted, a dummy variable indicating whether the interview was conducted during Ramadan, the duration of the interview, and an indicator of the reliability of the information as coded by the interviewer, which is a simply a subjective assessment as to whether the interview went well.[24]

As typically many organizations are observed implementing the same project type j, we control for project fixed effects λ_j in our baseline specification (1). Our parameters of interest are γ_1 and γ_2: the marginal impacts of the two dimensions of management practice on public service delivery.

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[24]Our staff numbers come from administrative data for 2010. In the few cases we do not have the staff numbers explicitly, we estimate them from the personnel expenditures, which have a correlated with staff numbers of over 0.9. Our budget variables are averages for 2006 to 2010. The education of the officials and years of management experience is taken from the survey of officials that was undertaken in conjunction with the management surveys.

Given that these CS- measures are normalized z-scores, we typically divide the estimates of γ_1 and γ_2 by the standard deviation of the relevant CS- measure, shown in Table 3, to obtain effect sizes of management practices on public service outcomes. As our main specification controls for project fixed effects, we allow standard errors to be clustered by organization. Our working sample is based on 4721 projects from 63 organizations on which we have data on management practices and project, organization and bureaucrat characteristics.

In specification (1) we are implicitly assuming that, within project type and controlling for project characteristics such as their scale, multiple dimensions of complexity, and other organizational characteristics, the underlying production function is the same across projects. Specification (1) then corresponds to a reduced form representation of an underlying production function that contains managerial practices as inputs into production, where these practices convert the raw total of available bureaucratic labor into effective labor inputs in the completion of public projects.

3.5 Econometric Concerns

To provide support for our results measuring the true impact of management practices on project outcomes, we need to tackle four central econometric challenges for the consistent estimation of (γ_1, γ_2). The first is that bureaucrats might *sort* into organizations based on the management practices in place. If so then the impacts of management practices are confounded by any direct relation between bureaucrat characteristics and project delivery. To address this concern, we have already noted in Section 2 the descriptive evidence suggesting bureaucrats have no influence over their initial assignment to civil service posts. Throughout the remaining analysis and especially in Section 5.3, we highlight that various characteristics of bureaucrats in organizations are uncorrelated to the management practices in place.

A second concern is that projects are *non-randomly assigned* to organizations based on their management practices. We note that, first, as described in Section 2, the allocation of projects to organizations is determined by a lengthy Parliamentary procedure that is partly subject to influence from politicians lobbying for projects in their jurisdictions. While organizations might be another stakeholder potentially lobbying for certain projects, the concern for our analysis would be that they do so *on the basis of* the management practices they have in place, again biasing our estimated parameters of interest.

We address this concern using three empirical strategies. First, in the Appendix we use a conditional logit model to directly estimate the factors determining the assignment of project i to organization n, and check whether this is correlated to the management practices in place for bureaucrats in organization n. As is described in more detail in the Appendix and Table A5 shows, we find no evidence of such a correlation, unconditionally, conditional on organization characteristics, or conditional on interactions between project and organization characteristics. Hence the assignment of projects to organizations appears, on the margin, unrelated to the management practices in place along either dimension.

Second, we aggregate specification (1) to the organizational level and check whether the average

complexity of projects, or total budget, assigned to organization n correlates to its management practices along the two dimensions considered. As described in the Appendix and shown in Table A8 we find no such evidence, again indicating there is no systematic differential assignment of 'easier to implement' projects, or greater resources given to, organizations with different management practices in place for bureaucrats.

Third, in the concluding discussion we use a SUR model to simultaneously estimate the determinants of both management practices at the organizational level. We find that controls related to project characteristics, such as the average complexity of projects the organization is tasked to implement, or the standard deviation in assigned project complexity, have no significant impact on either management practice, their point estimates being precisely estimated zeroes (Table 8).

While there is likely some complex bargaining process determining project assignments that takes place between Parliament, civil service organizations and other stakeholders as discussed in Section 2.2, these three pieces of evidence suggest this assignment is uncorrelated with management practices in place. Indeed, in terms of external validity, our parameter estimates based on this equilibrium outcome of some complex bargaining game between multiple actors, would appear to be the more policy relevant parameters than those based on pure random assignment of projects to organizations, that is not observed in any real world setting.

The third econometric concern we address relates to there being *reverse causation* between project outcomes and management practices. For example, organizations with low completion rates might introduce performance-based incentives, and those with high completion rates might decide to introduce more autonomy for bureaucrats. To check for this we again use the results from a SUR model that simultaneously estimates the factors correlated with each management practice. We find no evidence management practices themselves are driven by the organization's past project completion rates or the complexity of projects assigned to it.

The final econometric concern is that our management practice measures might still be correlated to other unobservable organizational practices that also determine project completion rates. To develop some intuition on the direction of bias in our OLS estimates in (1), we consider the simplest case where we only condition on the constant term and the two CS- measures in (1), ignoring other covariates. It is then straightforward to show that the parameters of interest are functions of the variances of the two management practices, denoted $\sigma^2_{CS\text{-}a}$ and $\sigma^2_{CS\text{-}p}$, their covariance with each other ($\sigma_{CS\text{-}a,CS-p}$) and with the outcome ($\sigma_{CS\text{-}a,y}$, $\sigma_{CS\text{-}p,y}$):

$$\widehat{\gamma}_1 = \frac{\sigma_{CS\text{-}a,y}.\sigma^2_{CS\text{-}p} - \sigma_{CS\text{-}p,y}\sigma_{CS\text{-}a,CS-p}}{\sigma^2_{CS\text{-}a}.\sigma^2_{CS\text{-}p} - [\sigma_{CS\text{-}a,CS-p}]^2}, \tag{2}$$

and $\widehat{\gamma}_2$ can be analogously defined. From the descriptives in Table 3, the denominator in (2) is positive.[25] Substituting in for y in $\sigma_{CS\text{-}a,y}$ and $\sigma_{CS\text{-}p,y}$ in the numerator in (2) for the simple case,

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[25]Table 3 documents that $\sigma^2_{CS\text{-}a} = .29^2 = .0841$, $\sigma^2_{CS\text{-}p} = .49^2 = .2401$. The correlation coefficient between the two CS- measures is .49, so their covariance is $\sigma_{CS\text{-}a,CS-p} = .49 \times \sigma_{CS\text{-}a} \times \sigma_{CS\text{-}p} = .49 \times .29 \times .49 = .0696$. Hence the denominator in (2) is $(.0841 \times .2401) - .0696^2 = .0202 - .0048 = .0154$.

it can then be shown that the direction of bias depends on the following term:

$$\widehat{\gamma}_1 - \gamma_1 = \sigma^2_{CS\text{-}p}cov(CS\text{-}a, \epsilon) - \sigma_{CS\text{-}a,CS\text{-}p}cov(CS\text{-}p, \epsilon). \tag{3}$$

Hence the impact of CS-autonomy management practices on project completion rates is actually underestimated, and so in truth, even more positive than our baseline findings suggest, if:

$$\frac{cov(CS\text{-}a, \epsilon)}{cov(CS\text{-}p, \epsilon)} \leq \frac{\sigma_{CS\text{-}a,CS\text{-}p}}{\sigma^2_{CS\text{-}p}} \approx .3. \tag{4}$$

Following a similar logic, it can be shown that the impact of CS-performance management practices on project completion rates is actually overestimated ($\widehat{\gamma}_2 \geq \gamma_2$), and so, in truth, even more negative than our baseline findings suggest, if:

$$\frac{cov(CS\text{-}p, \epsilon)}{cov(CS\text{-}a, \epsilon)} \geq \frac{\sigma_{CS\text{-}a,CS\text{-}p}}{\sigma^2_{CS\text{-}a}} \approx .8. \tag{5}$$

Figure A1 shows the parts of the $(cov(CS\text{-}p, \epsilon), cov(CS\text{-}a, \epsilon))$ parameter space where both conditions can be met, when only one of them is met, and when neither condition is satisfied. Assuming both covariances are positive, if the CS-performance measure, that might be more easily observable to those outside the organization, is sufficiently more correlated to unobservables than the CS-autonomy measure, then $\widehat{\gamma}_1 < \gamma_1$ and we underestimate the impact of CS-autonomy on project completion rates, and $\widehat{\gamma}_2 > \gamma_2$ so we overestimate the impact of CS-performance on project completion rates. If both management practices are approximately equally positively correlated with unobservable organizational practices (so $cov(CS\text{-}a, \epsilon) \approx cov(CS\text{-}p, \epsilon)$), $\widehat{\gamma}_1 > \gamma_1$ and we would overestimate the positive impact of CS-autonomy, but it would still be the case that $\widehat{\gamma}_2 > \gamma_2$ so that, in reality, the impact of CS-performance is even more negative than estimated.

To further address the concern, we also decompose our management practice measures into their nine underlying components, as shown in Table A3b: facilities, skills, staffing, targeting, flexibility, roles, culture, incentives and monitoring. As shown in Table A9, many but not all of these components are individually significantly associated with project completion rates.

4 Baseline Results

4.1 Project Completion Rates

Table 4 presents our baseline results on how civil service management practices impact public service delivery. The first half of the table focuses on project completion rates as the outcome of interest. Column 1 only controls for the two CS- measures, and does not condition on any of the other classes of controls described in (1). We see that higher levels of autonomy for bureaucrats lead to significantly higher project completion rates ($\widehat{\gamma}_1 > 0$). The impact of CS-performance on project completion is negative but not significantly different from zero. However, as Columns

2 shows, once organization and noise controls are included, both management practices have significant impacts on project completion rates, at the 1% significance level.

More precisely, Column 2 shows that, conditional on organizational and noise controls, organizations with higher levels of autonomy for lower-tier bureaucrats have significantly *higher* project completion rates; those with higher levels of management practices related to performance-based incentives for bureaucrats, have significantly *lower* project completion rates. These opposite signed effects exist despite the two management practices themselves being positively correlated as shown in Table 1. The basic pattern of results in Table 4 will be shown to be robust to nearly all the specifications that follow.

The magnitude of the coefficients implies that a one standard deviation increase in CS-autonomy corresponds to a significantly higher project completion rate of 12%, and a one standard deviation increase in CS-performance corresponds to a significantly lower project completion rate of 8%. Recall that these magnitudes are observed against a backdrop where 38% of projects are never started, and only 31% are fully completed. The foot of the table reports the p-value on the null that these impacts are of equal and opposite magnitude (p-value=.07). The rejection of this null implies public service delivery is, on the margin, more sensitive to management practices related to CS-autonomy than those related to CS-performance.

Column 3 shows our core findings to be unchanged once project controls are included, that condition on the project's budget, its aggregate complexity as assessed by engineers, and whether it is a rehabilitation project or not. Column 4 then estimates (1) in full, exploiting the fact that multiple organizations implement the same project type to control for a complete set of project fixed effects. The results show that, within project type, management practices continue to have significant impacts on project completion rates. The absolute magnitude of both coefficients of interest, $\widehat{\gamma}_1$ and $\widehat{\gamma}_2$, increase relative to the earlier specifications.

This is our preferred specification, and it implies that a one standard deviation increase in CS-autonomy corresponds to a significantly higher project completion rate of 14%, and a one standard deviation increase in CS-performance corresponds to a significantly lower project completion rate of 12%. The foot of the table again shows that these impacts are *not* of equal and opposite magnitude: public service delivery appears *more* sensitive, on the margin, to management practices granting autonomy to lower-tier bureaucrats, than to management practices providing performance-based incentives for bureaucrats.[26]

A priori, the impact of performance related incentives in public sector organizations is ambiguous. On the one hand, standard incentive theory suggests better monitoring of workers and linking pay to performance typically raises productivity and organizational performance. On the other hand, performance incentives might have detrimental impacts if bureaucrats need to multi-task, monetary incentives reduce cooperation among bureaucrats, or they crowd out intrinsic motivation of workers attracted to the public sector: all these channels are explored in Section 5. The evidence on the impacts of performance pay in public sector settings, in either rich or poor countries, is

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[26]These results are robust to clustering standard errrors by project type rather than by organization. Indeed, although standard errors rise, $\widehat{\gamma}_1$ and $\widehat{\gamma}_2$ remain significantly different from zero at the 1% significance level.

scarce and mixed, as described in the introduction. It is to this nascent literature that we add, providing among the first estimates of the impacts of performance-based incentives for the vital tier of bureaucrats in public organizations.

Our final baseline finding is presented in Column 5: in this specification the two management practices are interacted. We don't find any evidence of any interplay between the two practices (the point estimate on the interaction is also orders of magnitude smaller than the coefficients of interest). This evidence goes against the notion that the provision of autonomy is *only* effective if coupled with providing agents monetary performance-based incentives. This evidence also goes against an explanation often given for why performance incentives have weak impacts on outcomes in public sector settings, namely, unless accompanied by agent autonomy, individuals lack the flexibility to change behavior to respond to performance pay.

In Appendix Tables A6 and A7 we present a battery of robustness checks on our baseline result in Column 4 of Table 4. These probe the robustness of the results along the following margins: (i) defining threshold completion rates that deem the project usable and seeing how management practices relate to reaching these thresholds; (ii) alternative constructions of the CS-management practice indices (rather than the equal weighting procedure we adopt from BVR); (iii) additionally controlling for BVR-based indices of autonomy and performance; (iv) controlling for the state level characteristics of project locations, and exploring how the results vary by project location; (v) alternative estimation techniques based on a fractional regression model; (vi) alternative subsamples of organizations and project types.[27]

We also re-conduct our main analysis at the organizational (rather than project) level. These results in Table A8 highlight two main findings. First, the significant relationships between each management practice and project completion rates continue to hold even when we aggregate across the various projects assigned to an organization. Second, organizations do not appear to be assigned projects of differing complexity, or assigned larger aggregate budgets, as a function of the management practices in place. This again alleviates concerns that there might be systematically different types of project assigned to organizations on the basis of management practices, or that it might be easier for such organizations to achieve higher completion rates because they are provided additional resources.

Once concern with the baseline findings is that there might be omitted organizational practices that correlate with our management indices and that determine project outcomes. While we can never rule this out, our next set of results decompose our management indices into their nine components to shed light on which dimensions of management practice drive our findings. Table A3b documents the nine topics covered: facilities, skills, staffing, targeting, flexibility, roles, culture, incentives and monitoring. Constructing z-scores along each dimension, we note that the pairwise correlations between these nine dimensions are not especially high: varying from $-.24$ to $.69$, so it is feasible to decompose each management index.

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[27]We also note that the baseline results are robust to the additional inclusion of sectoral fixed effects in specification (1): the resulting coefficients of interest are $\widehat{\gamma}_1 = .36$ (with standard error .11), $\widehat{\gamma}_2 = -.22$ (with standard error .07) so that both remain significant at the 1% level.

Table A9 presents the results. Column 1 shows our baseline estimates for comparison. Column 2 splits the CS-autonomy measure into its components: all of its components have non-negative impacts on project completion rates, with especially positive and significant impacts of the components related to flexibility and roles. We can also reject the null that all seven autonomy components are of equal magnitude. Column 3 splits the CS-performance measure into its two components: both monitoring and the provision of incentives have significant and negative impacts on project completion rates, and these impacts are not significantly different to each other.

4.2 Project Quality

We next consider the quality of projects implemented. As described in Section 3, this information was also collected as part of the OPEN initiative; the drawback of using this outcome measure is that information on project quality is only available for around half the projects for which we have project completion data, originating in 51 civil service organizations. Columns 6-9 in Table 4 show the results for project quality. To ease comparison of the samples used, Column 6 re-estimates our main specification from Column 4 with project completion rates as the dependent variable, but for the sample of projects for which quality data is available. Qualitatively, the results are not much different across Columns 4 and 6, although the marginal impacts of both management practices are smaller in absolute value (although not significantly so) in the sample of projects for which quality outcomes are available.

Column 7 then estimates a specification analogous to (1) but where y_{ijn} is defined as a dummy variable that is equal to one if the project is classified to be of satisfactory quality or higher, and zero otherwise. The results indicate that management practices impact project *quality* in similar ways to those documented for project completion rates. Higher levels of CS-autonomy are associated with significantly higher quality projects, and higher levels of CS-performance are associated with significantly lower quality projects. Both coefficients of interest are significant at the 1% significance level, and we can reject the null that the management practices have equal and opposite sized impacts on project quality. As with project completion, project quality is more sensitive to management practices related to CS-autonomy than those related to CS-performance.[28]

One concern is that project quality as an outcome on its own may not be a useful indicator: projects may be implemented to a high quality, but to a low level of project completion, or *vice versa*. Column 8 in Table 4 therefore simultaneously accounts for project completion and project quality. To do so, we construct a 'quality-weighted' proportion completed variable where the proportion completed is multiplied by the binary quality indicator. Where quality is unsatisfactory, whatever the level of completion, this variable is set to zero. These results are in line with those documented separately for each margin: higher levels of CS-autonomy are associated with significantly higher quality projects, and higher levels of CS-performance are associated with

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[28]We also note that the qualitative results continue to hold if we redefine the quality variable to be set equal to one if the OPEN evaluation is of above average quality, and set equal to zero otherwise. The impact of both management practices remain significant at the 1 and 6% level respectively, although the point estimate on CS-performance is smaller (in absolute value) than in Column 7 of Table 4.

significantly lower quality projects. Finally, Column 9 shows there to be no interactive impact of the two management practices on project quality, in line with the earlier results on the lack of interplay between these measures for project completion rates.

5 Extended Results

To interpret our findings through the lens of contract theory, we probe how the relation between management practices and project completion rates varies with the characteristics of projects, organizations, and bureaucrats. Incentive theory provides insights as to how some such factors interact with each dimension of management practice considered.

5.1 Autonomy: Linking to Aghion-Tirole and Baker et al.

On the provision of autonomy or authority to lower-tier bureaucrats within organizations, Aghion and Tirole [1997] and Baker *et al.* [1999] develop models suggesting autonomy is more likely to be granted in the following scenarios: (i) tasks that are considered less important by the principal; (ii) tasks that require more technical competency; (iii) when the principal has a greater span of control; (iv) when agents have particular expertise. In such circumstances we expect the provision of autonomy to have especially positive impacts on organizations' effectiveness as measured by project completion rates.[29]

Our data allows us to proxy these four factors. The first two relate to project level characteristics; the latter two are organizational characteristics. We proxy the importance of tasks by the share of the organization's budget devoted to the project; we proxy tasks that require more technical competency by the project complexity measure we construct; we use administrative records on staff ranks at each civil service organization to construct a measure of managers' span of control, defined as the ratio of managers to non-managers in the organization; we use our survey to civil servants to also construct a measure of expertise among the organization's bureaucrats, defined as the share of staff that are university graduates.[30]

Table 5 explores how the impacts of management practices on autonomy vary according to these characteristics. For project level interactions we continue to cluster standard errors by organization. For interactions with organization level controls, robust standard errors are reported. As a point of comparison, Column 1 presents a specification analogous to our baseline estimate from Table 4. In the remaining columns, each interaction term is defined in terms of its deviation

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[29]Bolton and Dewatripont [2011] survey economic theories of authority in organizations. Aghion and Tirole's [1997] seminal contribution emphasizes the notion of vertical authority, that is what our autonomy measure most closely approximates. Extensions to their setting have considered cases where more complex information transmission between the agent and principal is possible [Dessein 2002], or to the notion of adaptive organizations [Dessein and Santos 2006] where agents can specialize in tasks and the organization faces a rapidly changing environment. A rich agenda for future work is to bring such models of authority to data.

[30]Both Aghion and Tirole [1997] and Baker *et al.* [1999] predict that autonomy is more likely to be granted when implementing decisions need to be made quickly. In our data, all OPEN projects have similar expected lengths of completion and so this is one comparative static we cannot explore.

from mean, and so the coefficients on CS-autonomy and CS-performance are interpreted as the marginal effect of these management practices evaluated at the mean of the interaction variable.

We find the impact of CS-autonomy on project completion rates to be rather homogeneous: it does *not vary* with two of the four dimensions considered: (i) for projects of different scale or importance (Column 2); (ii) for projects of differing complexity (Column 3). More encouragingly, we do see the impacts of autonomy to be higher when senior managers have a greater span of control (Column 4). On the last dimension, the impacts of autonomy are actually significantly lower when there is greater expertise among bureaucrats as measured by the share of bureaucrats that are graduates (Column 5).

These findings have two important implications. First, the homogenous impacts of autonomy found across project and organization characteristics suggests the *optimal* level of provision of autonomy across civil service organizations might be quite similar, all else equal. Indeed, we note from Table 3 that there is significantly less variation in our measure of CS-autonomy across organizations than for management practices related to performance-based incentives.[31]

Second, the lack of congruity between the predictions of theory and these findings is striking. This suggests the need to further develop models of the provision of authority and autonomy specifically tailored towards public sector contexts, and/or the need to obtain better data to more precisely map existing theory to evidence from public bureaucracies.[32]

5.2   Performance Incentives: Multi-tasking and Multi-principals

As described in the introduction, the evidence on the impacts of performance-related incentives in public sector settings is far more limited (often focusing on the impacts of specific incentive schemes on frontline teachers and health workers) and more mixed than in private sector settings.[33] Ours is among the first evidence to suggest the possibility that such management practices, more broadly defined, have negative impacts on civil service *bureaucrats*. Indeed the robust negative correlation we find between management practices related to monitoring and performance incentives might well be argued to be our most puzzling finding. We therefore now focus on hypotheses that emphasize circumstances under which such practices related to performance have detrimental

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[31]Some of the levels impacts of these project and organizational controls are of interest. Projects of larger scale than average for the organization have significantly lower completion rates; organizations with a higher proportion of graduates than the mean also have significantly lower completion rates. Project complexity or an organization's span of control have no relation with project completion rates. This latter finding suggests that moral hazard in teams, as reflected by higher spans of control does not limit project completion.

[32]A few empirical studies have shed light on the Aghion-Tirole framework, all in the context of private sector firms. Li *et al.* [2009] use transcripts from 17,400 firm conference calls to measure CEO's real authority. They find this to be linked to organizational features in a way predicted by Aghion-Tirole, and that CEOs with real authority receive higher wages. Bloom *et al.* [2012] present evidence from management surveys that decentralization is more likely to occur if plants are located in regions where trust is higher, for larger firms, and if the workforce is more skilled. Fehr *et al.* [2012] reject some of the predictions of Aghion-Tirole in a laboratory setting because individuals display a strong desire to retain control and not be overruled.

[33]In health, two recent Cochrane reviews have come to different conclusions on the efficacy of pay for performance [Flodgren *et al.* 2011, Scott *et al.* 2011]. Hasnain *et al.* [2012] review over 60 public sector studies, and find the vast majority are for tasks where outputs are more easily measurable such as teachers, health workers, and revenue inspectors. They argue there is simply insufficient evidence of the impact of incentives on bureaucrats.

impacts on individual and organizational performance, and that we can take to our data.

The first relates to multi-tasking [Holmstrom and Milgrom 1991]: bureaucrats might be required to exert different types of effort to ensure projects are successfully implemented. The provision of potentially more narrowly defined performance incentives – perhaps only for those efforts that are easily observed – can skew the allocation of effort towards those aspects that are rewarded, reducing overall project completion if tasks are highly complementary. We examine this hypothesis by establishing whether the impact of management practices for bureaucrats related to performance incentives varies with the complexity of projects, assuming that more complex projects require a greater number of types if effort to be exerted, all else equal.[34]

A second hypothesis is that the provision of performance-based incentives might negatively impact public service delivery because bureaucrats operate under multiple principals [Martimont 1986], that has always been considered a hallmark distinction between public and private sector contracting environments [Dixit 2002]. We examine this hypothesis by using the number of senior managers per non-manager in each organization (the inverse of the span of control) as a crude proxy for the number of principals each non-manager might operate under.

Table 6 takes these predictions to the data. For project level interactions we cluster standard errors by organization. For interactions with organization level controls, robust standard errors are reported. As a point of comparison, Column 1 presents a specification analogous to our baseline estimate from Table 4. In the remaining columns, each interaction term is defined in terms of its deviation from mean, and so the coefficients on CS-autonomy and CS-performance are interpreted as the marginal effect of these practices, evaluated at the mean of the interaction variable.

Three results are of note. First, the negative impact of CS-performance related practices for bureaucrats is even more exacerbated in more complex projects, in line with a multi-tasking interpretation. To probe further the notion that it might be difficult to target performance-related management practices towards those efforts that generate the most public services, we next examine how the impacts of this practice vary across projects conducted by the organization.

More precisely, for each organization we can define the *modal* project type that it is tasked to implement. We thus create a dummy equal to zero if project i is of this modal type and equal to one if it corresponds to a more atypical project that the organization is tasked to complete. Column 3 shows the impact of performance incentives to be very similar across both project types. Hence we do not find any evidence that management practices related to performance are better tailored to the modal project type each organization is engaged in. This might be unsurprising: recall that earlier in Table A9 we documented how both the performance and monitoring aspects of this management practice are strongly negatively correlated with project completion rates, where monitoring practices might indeed be less specific to a given project type.

The final result is that the negative impacts of performance incentives are also accentuated in organizations where lower-tier bureaucrats are potentially answerable to multi-principals (Column 4). For the results in Columns 2 and 4 we explored whether there exist any values of project

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[34]The evidence on multi-tasking is rather mixed, even within similar contracting environments. In health contexts, Olken *et al.* [2012] find little evidence for multi-tasking concerns, while Mullen *et al.* [2010] find they do matter.

complexity or the ratio of managers to non-managers at which the total marginal impact of practices related to performance incentives become significant and positive. This is not the case: even for the least complex projects, and lowest multi-principal structured organizations, the marginal impact of management practices related to performance-incentives is negative.[35]

One remaining speculative explanation for the robust negative impact of management practices related to performance incentives in this context comes from the public administration literature: the notion of 'isomorphic mimicry' denotes circumstances in which the outward forms of bureaucracies (as would be measured using a BVR-style management survey) would actually camouflage a persistent lack of function [Pritchett *et al.* 2012]. In short, those worse performing organizations are those most likely to be want to be outwardly seen as adopting good management practices, and practices related to monitoring and performance incentives might be most easy for them to identify and mimic.

The results on heterogeneity documented in Table 6 are informative of why management practices related to performance might optimally differ across organizations. More precisely, fewer performance related incentives should be provided in civil service organizations dealing with more complex projects or those in which lower-tier bureaucrats might be answerable to more senior bureaucrats. In line with this, we note that the descriptive evidence provided in Table 3 suggests there is significantly more variation in our measure of performance-based management practices than in our measure of autonomy. We return to the issue of optimal management practices in the concluding discussion.

5.3 The Tenure, Intrinsic Motivation, and Corruption of Bureaucrats

We now consider the interplay between both dimensions of management practice and three characteristics of bureaucrats relevant for public service delivery: their tenure, intrinsic motivation, and perceptions of organizational corruption. To measure civil servant characteristics along each dimension for both senior- and lower-tier bureaucrats, we use the survey we administered to a representative sample of officials at each organization. We interviewed 4148 civil servants from the 63 federal organizations studied here, corresponding to around 13% of their total workforce.

As described in Section 2, Nigerian bureaucrats enjoy long tenure. Tenure can interplay with the effectiveness of management practices: longer serving bureaucrats might be better able to identify to whom in the organization decision-making power should best be delegated, or be better able to respond to incentives by exploiting other flexibilities and so forth. The interplay between managerial tenure and performance based incentives has been documented in private

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[35]Another strand of literature emphasizes the provision performance incentives for individuals can have negative impacts because it reduces incentives for workers to collaborate [Itoh 1991]. Although a somewhat crude proxy, we can view the span of control measure defined above as capturing in part the number of bureaucrats that operate under each senior manager and so might need to cooperate. However, we actually find that in organizations in which bureaucrats are structured into larger teams, by this definition, the marginal impacts of management practices related to performance-incentives are actually weaker (so less negative). This result, and all those reported in Table 6, are worth pursuing further in future research.

sector settings [Griffith and Neely 2009].[36]

To check whether such channels mediate the relationship between management practices and public service delivery, we estimate a specification analogous to (1) but augment it with interactions between the two CS- management practices and the average tenure of bureaucrats, as well as controlling for the levels impacts of tenure for each civil servant tier. Table 7 shows the results, where each interaction term is defined in terms of its deviation from mean, and so the coefficients on CS-autonomy and CS-performance are interpreted as the marginal effect of these management practices, evaluated at the mean of the interaction variable. We report robust standard errors as our interactions of interest are with organization level controls.

Column 1 shows the tenure of senior bureaucrats matters: when senior bureaucrats have more years of service in the organization, the positive impacts of autonomy are even greater, and the negative impacts of performance-based incentives are even worse. Column 2 shows a very similar pattern of coefficients if we interact with the tenure of lower-tier bureaucrats. The fact that management practices related to autonomy are more beneficial when bureaucrats are more experienced might suggest, for example, that such senior bureaucrats are better able to understand who in the organization has the critical soft knowledge for project completion, and are able to allocate decision-making rights to them. We can only speculate on what might drive the negative interaction between tenure and management practices related to performance-based incentives. Following the results from the previous subsection, this might be because senior bureaucrats are assigned to the most complex projects, or be subject to more principals.[37]

A burgeoning literature suggests those attracted to public service might be relatively more *intrinsically motivated* than those working in the private sector. Performance incentives might then be detrimental if they crowd out such intrinsic motivation [Rose-Ackerman 1986, Perry and Wise 1990, Benabou and Tirole 2006, Francois and Vlassopoulos 2008]. Our next set of results examine this hypothesis.[38]

To measure civil servant's intrinsic motivation, in our survey to individuals we asked each which factor that had most influenced them to *originally* enter the civil service from the following options: 'I was interested in the type of work', 'income prospects', 'the prestige associated with such a job', 'the stable career path that a job in the service affords', 'the chance to serve Nigeria', 'it was the only employment I could get', 'educational opportunities', 'other'. We define those that answered, 'the chance to serve Nigeria' as being intrinsically motivated. Roughly a third

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[36]Griffith and Neely [2009] show how the introduction of 'balanced scorecards' in a private sector firm in the UK, a commonly used but potentially complex system of performance-based incentives, has little impact on branch performance except for those branches with more experienced managers. Theirs is also a setting in which multi-tasking is important for firm output.

[37]Another channel worth exploring in future is changing bureaucrat preferences: Buurman *et al.* [2012] document how with tenure, public sector employees become less likely to display pro-social preferences.

[38]Delfgaauw and Dur [2008] and Buurman *et al.* [2012] review the evidence suggesting individuals self-selected into the public sector are more intrinsically motivated than those in the private sector. Gregg *et al.* [2012] use the BHPS data in the UK to show that public sector workers are more likely to donate labor in the form of unpaid overtime. Importantly, they find no evidence of changes in behavior when individuals switch sectors, suggesting it reflects an individual trait rather than sectoral differences in workplace environments or implicit contracts.

of officials state that they entered the civil service to serve Nigeria.[39] For each organization, we then construct the fraction officials who are defined to be intrinsically motivated, and we do so separately for senior- and lower-tier bureaucrats at each organization.[40]

Columns 3 and 4 in Table 7 then show how the impacts of our CS-autonomy and CS-performance measures vary by the intrinsic motivation of senior- and lower-tier bureaucrats in organizations. Two results are of note. First, we see the impact of providing autonomy to lower-tier bureaucrats is offset when a greater share of senior bureaucrats are themselves intrinsically motivated (Column 3). There is no such heterogeneous impact of providing autonomy *to* intrinsically motivated lower-tier bureaucrats (Column 4). This suggests that although on average providing autonomy to lower-tier bureaucrats generally has positive impacts on public service delivery, this is not the case when autonomy is being *taken from* intrinsically motivated senior managers.[41]

Second, we find no evidence that the impact of performance incentives varies with the share of senior- or lower-tier bureaucrats that report being intrinsically motivated. Hence it is not the case that the provision of performance incentives crowds out effort and hence lowers project completion rates in organizations made up of more intrinsically motivated bureaucrats. This result is in line with Ashraf *et al.* [2012] who also find no evidence from a field experiment in Zambia, that monetary incentives crowd out the effort of more intrinsically motivated agents hired to engage in pro-social tasks, and with findings reported in Berg *et al.* [2013] based on a field experiment insurance workers in India.

While the recent economics literature has emphasized the importance of the intrinsic motivation of bureaucrats, a long-standing literature in public administration emphasizes that civil servants might pursue their own self-interest [Tullock 1965, Downs 1967, Buchanan 1978] or be disinclined to exert effort [Wilson 1989]. This more negative view of bureaucrats spurs our final set of results, that explore how the impacts of management practices are mediated through perceptions of corruption among civil service organizations.

Corruption in public bureaucracies is a first order issue in Nigeria, and in many countries at

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[39]In the public administration literature, public service motivation is usually measured using the scale developed in Perry [1996], based on statements related to politics, public service and pro-social activities. This is the approach also followed in Dal Bo *et al.* [2013]. Alternative approaches employed in the economics literature include: (i) dictator games to examine how many resources an individual transfers to a pro-social task [Ashraf *et al.* 2012]; (ii) unpaid overtime [Gregg *et al.* 2012]; (iii) charitable contributions [Buurman *et al.* 2012]. In our civil servant survey, 'the chance to serve Nigeria' was the modal answer given. The other two most frequent reasons were 'I was interested in the type of work' and 'the stable career path that a job in the service affords', that were each given by around 20% of individuals

[40]We checked whether each management practice was correlated to the proportion of staff that report being intrinsically motivated. Conditioning on organization controls, there is no significant relation found between this and either management practice. Hence it does not appear that organizations limit the provision of performance-based incentives to attract intrinsically motivated workers [Delfgaauw and Dur 2010], or that the matching of intrinsically motivated workers to public sector organizations limits the need to use performance-based incentives [Besley and Ghatak 2005].

[41]This finding also relates closely to recent evidence from the laboratory in Fehr *et al.* [2012] showing individual's value the holding if authority *per se*: their distaste of being overruled is a driver of the desire to retain control even when it is otherwise optimal for the principal to delegate decision-making to an agent. An earlier experimental literature has explored other costs of a principal retaining control, for example in terms of less reciprocity from agents [Falk and Kosfeld 2006].

similar stages of development. As documented in Table 3, the fact that 38% of projects are never started, provides one insight into the potential extent of the problem, and serves as a further reminder on the economic significance the impacts of management practices we document, on effective public service delivery in this context.

We again use our civil service survey to measure perceptions of corrupt practices among bureaucrats. To elicit such information, we began with vignettes of hypothetical situations, then made those scenarios closer to the bureaucrat's actual situation, and finally asked individuals about their own observations and experiences of corruption. We asked on what proportion of recent projects the official had worked on did they observe 'others breaking service rules for their own benefit'. On average, officials stated that on 38% of projects such observations of corrupt practice had been made (that, by chance, coincides exactly with the proportion of projects with a zero completion rate as described in Section 3). We then aggregate this to the organization level to construct measures of the share of senior- and lower-tier bureaucrats that report having observed corrupt practices taking place.[42]

Columns 5 and 6 in Table 7 then show how the impacts of our CS-autonomy and CS-performance measures vary by perceptions of corruption of senior- and lower-tier bureaucrats in organizations. However, to begin with we note the robustly negative *levels* impacts of the percentage of senior and lower-tier bureaucrats that report observing corrupt practices, on project completion rates. This affirms that our measure is indeed capturing some element of civil servant behavior that is deleterious for public service delivery. Two further results are of note. First, the positive impacts of autonomy are greater in organizations in which a higher than average share of senior- and lower-tier bureaucrats report observing corrupt practices. This might suggest that the provision of autonomy can help senior bureaucrats delegate tasks away from the most corrupt lower-tier officials. This might especially be the case in our setting because of the relatively small-scale and localized nature of the projects considered (see Column 3 of Table 1). Second, the negative impacts of performance-based incentives do not vary with perceptions of corruption from either senior- or lower-tier bureaucrats. Whatever are the performance incentives in place, they appear not be sufficiently high powered to offset corrupt practices.[43]

6 Discussion

We have studied the correlates of effective public service delivery in a developing country context. To do so, we have combined novel project level data on project implementation, quality and com-

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[42]We also asked whether officials had themselves been put under pressure to: (i) change the project location; (ii) change project specifications; (iii) help select particular contractors/suppliers/consultants; (iv) divert some of the funds. Aggregating responses across these four variables into an organizational average, we find that officials stated that they had experienced such pressures on 19% of projects. We prefer to use the measure related to observed corrupt practices over the measure related to pressures of corruption because officials are obviously cautious when potentially incriminating themselves.

[43]We checked whether each management practice was correlated to the proportion of projects on which officials state they observe corruption. Conditioning on organization controls, there is no significant relation found between this and either management practice.

plexity, from various public sector organizations in the Nigerian civil service, with a management survey we implemented in each civil service organization. Our study sheds light on the relationship between the management practices under which bureaucrats operate, and the quantity and quality of public sector projects each organization is assigned to deliver. Despite the importance of government effectiveness for economic growth [Besley and Persson 2010] and societal welfare, and the voluminous literatures on public management and incentives in organizations in economics, evidence linking practices in civil service organizations to public goods outcomes is currently almost entirely lacking [Goldfinch *et al.* 2012].

Our results provide evidence on how management practices for bureaucrats relating to the provision of autonomy and performance-based incentives, have statistically and economically significant impacts on public sector service delivery. We also document how the impacts of each dimension of management practice vary across the characteristics of projects, organizations, and bureaucrats. Our results point to new directions for theoretical research to better understand the contracting environment in public bureaucracies, as well as highlighting specific areas in which better measurement of inputs and outputs can aid our understanding of public service provision in the developing world.

To the extent that other developing countries have civil services organized along British colonial lines, and also operate in contexts where public accountability is weak and corrupt practices commonplace, our results might well have external validity to those other settings. The dearth of existing evidence linking management of civil servants and public sector delivery certainly suggest such mechanisms need to continue to be explored in other contexts. The relevance of such investigations is first order, given the large number of developing countries engaged in reforming public bureaucracies along the lines of the 'good governance' agenda of the World Bank and United Nations [Goldfinch *et al.* 2012].[44] In this final Section we discuss the implications of our findings for understanding optimal management practices in public bureaucracies, and relate our findings to an established literature examining other mechanisms to improve public service delivery.

6.1   Optimal Management and the Role of Competition

Our core result is that management practices for bureaucrats matter for public service delivery: it is not that civil service organizations are optimizing practices for bureaucrats. Rather, we document the potentially large gains to be had from marginal changes in management practice. Taking literally the baseline estimates reported in Table 4 implies a one standard deviation increase in CS-autonomy corresponds to a significantly higher project completion rate of 14%, and a one standard deviation decrease in CS-performance corresponds to an additional significantly higher project completion rate of 12%. Given these results are estimated against a backdrop where 38% of

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[44]Rauch and Evans [2000] provide evidence from 35 countries on how effective recruitment and promotion practices in government bureaucracies relate to bureaucratic performance. These impacts are found to be relatively homogenous across countries, albeit in a small sample. Hasnain *et al.* [2012] describe how the majority of OECD countries have introduced some form of performance related pay in public administrations, with middle and lower income countries now following suit.

projects are never started, the potential gains to improving management practices in the direction implied by the evidence, are huge.

This naturally begs the question of why civil service organizations are not optimizing over management practices. The first explanation is based on the Weberian view, that the objectives of bureaucracies and society necessarily diverge. Such agency considerations lead to the need for rules-based systems for bureaucracies. In short, organizations might well be optimizing their management practices according to whatever is their true (unobservable) objective, but this objective is only weakly aligned with maximizing project completion rates.[45]

As discussed by BVR for private sector firms, suboptimal management practices might also exist and persist in equilibrium despite the resultant loss of efficiency because: (i) the fixed costs of adopting better practices; (ii) best management practices might be heterogeneous across organizations.[46] On the first point, our baseline results suggest there remains scope to modify management practices that would significantly improve project completion rates for the average organization. To derive a back of the envelope estimate of the required fixed costs of not doing so, we note that the sum of capital expenditures for all projects from the 63 organizations we study is $3,694mn. Focusing on the impacts of management practices on those 38% of projects that never start, assuming a linear relationship between costs and completion rates, and taking the marginal impacts from Table 4 of a one standard deviation change in each management practice, implies there would need to be fixed cost per organization of around $(.38 \times .26 \times 3,694)/63 =5.79mn for such a move not to occur for this reason alone.[47]

The second point has been examined when we estimated heterogeneous impacts to management practices in Section 5. We documented the impacts of autonomy to be rather uniform over project and organizational characteristics, although all three bureaucrat characteristics considered (tenure, intrinsic motivation and perceptions of corruption) caused the provision of autonomy to have significantly heterogeneous impacts. The evidence suggested the impact of performance-based incentives are heterogeneous based on project and organizational characteristics. Such incentives are found to be especially detrimental for complex projects, that might require bureaucrats to multi-task, or in organizations where lower-tier bureaucrats have to work with greater numbers of senior bureaucrats. In contrast to the findings for autonomy, the impacts of performance-based incentives are generally found to be more homogenous with regards to bureaucrat characteristics.

As further discussed in BVR, inefficient management practices might also persist for dynamic reasons: learning and adjustment costs might cause best practice to diffuse over time. This is

[45]To assess the degree of alignment of each organization with project completion rates, we regressed the log of project budgets on each subcomponent of the project complexity indicator, as shown in Table A4. The residuals from this regression, that might capture the rents to be gained from the project if it is completed, are found to be weakly positively correlated with actual project completion rates, with a correlation of .13.

[46]As documented by Fehr *et al.* [2012] in a laboratory environment, individuals might derive utility on the basis of holding authority: this preference for decision-making and not to be over ruled can lead to suboptimal delegation. Dixit [2002] discusses that optimal management practices can differ in public and private sectors because of the existence of multiple principals, multiple tasks, a lack of competition, and motivated agents.

[47]This is likely to be a lower bound estimate because, as Figure A2 emphasizes, the impacts of management practice on project completion rates apply not only at the margin of ensuring projects are started, but have similar impacts at all thresholds of project completion rate.

certainly in line with the evidence collected in our survey to civil servants: the average tenure of bureaucrats was 13 years, with only 12% of them reporting ever to have changed organization since joining the service. Hence good management practices are unlikely to spread through channels related to bureaucrat re-assignments. As discussed in Section 2, this explanation for persistent inefficiencies is also in line with the information we garnered from structured interviews with senior managers at four civil service organizations. These all highlighted how management practices in civil service organizations evolve slowly over time as a function of ground rules laid out in the Public Service Rules of the Nigerian civil service, the history of management staff in an organization, and external events such as demands of trade unions.

A particularly acute concern is that a lack of competitive pressure enables poorly managed public sector organizations to survive. This might especially be true in developing country contexts where mechanisms are rarely in place to allow citizens to choose across alternative public providers of a given good or service.[48] To shed light on this, our final set of results use a SUR model to simultaneously estimate the correlates of each dimension of management practice, at the organizational level. The SUR model mirrors the correlation in error structure that is implied throughout the paper by analyzing the management indices jointly. We control for three classes of variable: (i) characteristics of senior bureaucrats, such as their years of schooling and tenure in the organization; (ii) the same characteristics for lower-tier bureaucrats; (iii) organization characteristics, such as whether it is a decentralized body, the average budget and complexity of projects assigned to it; (iv) proxies for competition the organization faces in the provision of public services.

Table 8 presents the results, and we focus attention on the two proxies for competition we employ: the first is the number of other organizations in the same sector, e.g. health, water, education. The results in Columns 1a and 1b on the SUR system estimated shows that management practices for autonomy and performance-based incentives are significantly higher for those organizations facing more competition thus defined. The marginal impact on performance-based incentives is in the *opposite* direction for what would increase completion rates or quality among the public sector projects we study (although it is in the direction of what would be regarded as better management in private sector contexts). In Columns 1b and 2b when we use the alternative measure of competition based on the number of organizations implementing similar project types, we see no impact on the management practices in place. Overall we conclude any competitive pressures on organizations to improve management practices in an optimal direction are weak.[49]

Two further points are of note, and bolster the interpretation of our main results in Table 4 as causal. First, the controls related to project characteristics, such as the average complexity of projects the organization is tasked to implement (or the standard deviation in project complexity),

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[48]Bloom *et al.* [2013] present evidence on the impact of competition between UK public hospitals on management practices in hospitals. They find evidence that hospitals that face competition for patients from more rival hospitals do indeed adopt better management practices.

[49]As is relevant for Columns 1a and 2a, Table A1 shows the list of federal organizations studied by sector: these range from 20 organizations each in education and health, to a single organization in the sectors of the environment, housing and power. As is relevant for Columns 1b and 2b, Column 2 of Table 1 showed the number of unique organizations implementing each project type, ranging from 41 organizations engaging in procurement projects, to two organizations engaged in electrification projects.

34

have no significant impact on either management practice. Their point estimates are precisely estimated zeroes. This further addresses the concern that projects are selectively assigned to organizations on the basis of factors correlated with management practices.

Second, the results in Table 8 show that average project completion rates do not themselves predict the management practices in place. This ameliorates the concern that there is reverse causation between project completion rates and management practices that might have been driving our earlier findings.

6.2   Other Mechanisms To Improve Public Sector Delivery

The evidence we have provided shows how top-down practices for bureaucrats in the civil service filter through to public service delivery. Our analysis fits within a broader literature documenting various mechanisms through which public service delivery might be improved in developing country contexts. There are at least two additional mechanisms that can interplay with the management practices for bureaucrats within organizations that we have emphasized.

First, a better understanding is required of what drives the *selection* of workers into the public sector in the first place. This is especially relevant if the long tenures of civil servants that we document are reflective of public servants in developing countries more generally. Bureaucratic tenure is important both because longer serving bureaucrats shape the management practices in place, but they might also react differently to any given set of incentives, as highlighted in Section 5. There is a need to reconcile the competing views of which types of individuals might sort into the public sector, be they self-interested and lazy, or intrinsically motivated. A recent model combining these views is Prendergast [2007], who demonstrates conditions under which the equilibrium selection to bureaucratic positions becomes bifurcated: only the most intrinsically motivated and most self-serving enter. Hence selecting on intrinsic motivation alone need not be efficient. There remains much scope to combine and jointly test models of *selection* into, and practices *within*, public sector organizations.

A recent contribution in this direction is Dal Bo *et al.* [2013] who present evidence from Mexico, exploiting experimental variation in salaries to identify their impact on the selection of public sector officials. They find higher wages attracted more able workers, and that there are no adverse selection impacts in terms of motivation. This evidence neatly complements our findings on the impact of management practices once bureaucrats are hired.

Second, the role of grass roots monitoring or accountability of public service providers is also important and might well interplay with management practices in place. For example, Bjorkman and Svensson [2009] present evidence from an RCT in Uganda on how community based monitoring of primary health care providers led to large increases in utilization of services and improved health outcomes: in part these findings are driven by changes in the behavior of health providers themselves. Reinikka and Svensson [2011] and Duflo *et al.* [2012] provide other examples of the gains to public service delivery to be had from bottom-up monitoring of frontline public sector workers. On the other hand, such findings are not uniform: Olken [2007] finds more muted

impacts of community based monitoring on reducing corruption in road infrastructure projects in Indonesia. Rather, top-down audits are effective in reducing corruption on such locally organized public works projects. Along the same lines of top-down monitoring, Besley and Burgess [2002], Stromberg [2004] and Ferraz and Finan [2008] have all documented the significant role that media scrutiny can play for public service provision.

We view there to be a rich future agenda for understanding public service delivery – in rich and poor countries – that effectively links incentives and practices in civil service organizations, the selection and retention of bureaucrats, and public monitoring and accountability of organizations.

A   Appendix

A.1   Measuring Project Complexity

Data on the complexity of government projects is not collected by the Nigerian Government nor is a part of the OPEN data set. We thus worked with a pair of Nigerian engineers familiar with the OPEN projects and a number of international researchers working on technical complexity to define a relevant set of indicators. We followed the perspectives on complexity suggested by Remington and Pollack [2007], by asking the engineer-assessors to individually assess projects along the following five topics, each with their own set of indicators.

Structural complexity stems from the scale of different interconnected tasks and activities. The indicators associated with this topic capture structural aspects such as project size and the number of inputs required for production. They also capture issues in raw material and labour supply, and the ease with which any necessary specialized skills and equipment can be sourced. *Temporally complex* projects are those whose production involves uncertainties. Hence there are indicators for uncertainties in design and implementation. *Technically complex* projects are those whose production have ambiguous risks, namely their uncertainties are not well understood. Hence some indicators capture ambiguities in design and implementation. *Directional complexity* refers to the potential for preferences over the project to diverge. The engineer assessors are thus asked to rate the managerial complexities of the project. Finally, there is a subjective assessment as to the overall complexity of the project. This allows any unassessed aspects of complexity to be measured and provides a coherent picture of project complexity.

Two qualified and independent Nigerian engineers were then contracted to assess each project in the OPEN data set along these margins. The process of aggregation between engineers used in this project aimed to build a consensus. The first engineer coded indicators for the entire data set. The codings of the first engineer were then provided to the second engineer who then constructed his own codings with reference to the codings of the first. The aim was to anchor the coding of the second engineer in that of the first but give him freedom to disagree where he felt the coding was incorrect. Other methods would have been to have them code independently and average the two data sets or to have them work together. We decided our approach was a balance between consensus and subjectivity.

The two engineers were provided with project details and documents and asked to code a value for each indicator. The documents only contained information available *before* implementation such that there was no bias from the coding being done after the projects were implemented.

Table A4 provides descriptive statistics for all 16 indicators from which the complexity index is constructed, as well as how each is correlated with the other indicators. Aggregate complexity is a subjective assessment of the overall complexity of the projects by the two engineers, that includes 'all factors that might influence the difficulty of implementing the project, not only those assessed [by the other indicators]'. We asked the engineers to take the distribution of complexity in the OPEN data set as a whole, with the least complex project in the data having an aggregate complexity of zero and the most complex project having an aggregate complexity of 100, and place each project within this distribution.

We undertook a number of measures to check the complexity of the OPEN indicators coded by the engineers. First, we inserted 200 randomly chosen repeated projects into the data set provided to the engineers. Since the project characteristics of the original and repeat projects are identical, we would expect that the codings of the two sets of projects would be similar. Reassuringly, we find that in general the original and duplicate projects are coded in similar ways. We compare the differences between these two sets by looking at group and paired means, and distributional tests for each variable. The differences are only statistically significant at conventional levels in a few cases, and the magnitude of the differences are relatively small. For example, the only variable that is statistically significantly different below the 10% level in the mean-comparison t-test relates to raw material storage. Here, despite a standard deviation of 0.2 in the originals, the difference is 0.07 between the originals and the duplicates.

Second, we looked at the similarity of the codings of the two engineers. We find that the second engineer's codings are not dramatically different from the first engineer's efforts. Whilst there are a small number of differences, they are relatively small and rarely significant, indicating that the re-coding left the overall picture relatively stable.

Finally, over a year after he had completed the prompted codings, we asked the second engineer to re-code a sub-sample of projects from scratch, this time without prompting. The differences between these independent codings and the consensus data we rely on are again relatively minor. It seems that once he had become accustomed to the broad parameters of the coding framework, the second engineer's coding was not dissimilar to the consensus generated by the two engineers working one after the other.

We therefore have evidence of similar projects within the data set being coded in a similar way, of the two engineers coding in similar ways both when prompted and unprompted, and when there were deviations, of the deviations not being particularly quantitatively large. Taken together these checks reassure us that the complexity measures pick up meaningful variation across projects, rather than merely picking up noise that should have led to the multiple reports (either across engineers or over time) being uncorrelated.

A.2 The Assignment of Projects to Organizations

A central econometric concern highlighted in Section 3.5 is that the assignment of projects to organizations might correlate to the management practices in place. For example, projects for which there is concerted political pressure to complete might be allocated to organizations that provide more autonomy to lower-tier bureaucrats, all else equal. To investigate the issue we use a conditional logit model to directly estimate the likelihood of project i being assigned to organization n conditional on the management practices for bureaucrats in place in the organization, and other project and organizational characteristics exploited in our analysis.

To do so we first reshape our data as follows: for each project we created a binary variable with 63 values corresponding to our 63 organizations. The variable, denoted D_{in}, takes the value one for the organization at which that project is actually assigned, and zero otherwise. Thus, the data-set is at the project-organization pair level (in), with a total of $4721 \times 63 = 297,423$ project-organization paired observations. To each observation, we attach the relevant organization-level characteristics used in our analysis (that were denoted OC_n in (1)), such as our management indices, capital controls and organizational averages of bureaucrat characteristics. We then also consider whether specific project-organization interactions, denoted Z_{in}, correlate with the assignment of projects to organizations. We estimate a conditional logit specification for $\mathrm{Prob}(D_{in} = 1)$, based on both sets of characteristics;

$$prob[D_{in} = 1] = \frac{\exp(\beta' OC_n + \gamma' Z_{in})}{\sum_n \exp(\beta' OC_n + \gamma' Z_{in})}. \tag{6}$$

Note that in this modelling framework project characteristics play no role as these do not vary within a given project i over the organizations n it could potentially have been assigned to.

We run two sets of specifications. The first takes the perspective that each project could have been assigned to *any* of our 63 organizations. The second takes the perspective that projects can only be implemented by organizations of the same sector. Thus, health projects could only be implemented by health sector organizations for example. When we impose this restriction on the permissible project-organization pairs, we lose 847 projects as there is only one organization of that sector in our data, and there are $44,429$ potential within sector project-organization pairs. In all specifications we cluster standard errors by organization as there are likely to be unobserved characteristics of organizations that determine project assignments.

Table A5 presents the results. Column 1 utilizes the entire set of project-organization combinations and uses only our management scores in the regression. Unconditional on other organization characteristics, neither management practice related to autonomy or performance-based incentives significantly predicts the assignment of projects to organizations. When we restrict the sample so that each project can only feasibly be assigned to organizations in the same sector, Column 2 shows the coefficients on each management practice remain insignificantly different from zero. Column 3 extends our unconditional specification to include all the organizational controls utilized in our baseline specification in Table 4 (capital, general and noise), as well as the full set of orga-

nizational controls that we use elsewhere in the paper (in Tables 5, 6 and 7). The coefficients on the management practices remain insignificantly different from zero at the usual levels. Moreover, we find no evidence that any of these other organizational characteristics predict the assignment of a given project to that particular organization rather than other organizations it could feasibly have been assigned to.

In Column 4 we additionally control for a series of interactions between project characteristics (scale, complexity) and organizational characteristics (total staff, total budget). Some of these project-organization interactions do predict the assignment of projects. As is intuitive, we find that the interactions between the number of staff at an organization and the project budget, and the organization's total budget and the project complexity, both are positive and significant predictors of project assignment. Over and above these interactions, we continue to find no impact of management practices on project assignment even once we allow for specific matched pairs to be assigned in this way.

Finally, in Column 6 we re-estimate this complete specification but further restrict the feasible set of organizations a project could be assigned to. More precisely, we assume projects can only potentially be assigned to organizations in the same sector that are observed being tasked to implement a project of the same complexity. We again find no evidence that management practices correlate to project assignment using this notion of feasible assignments.

Overall, these results suggest our results are not reflecting the non-random selection of projects to organizations based on their management practices. While there is no doubt some complex bargaining process between Parliament, civil service organizations and other stakeholders that determined the assignment of projects to locations and organizations, on the margin, this assignment is uncorrelated with the management practices in place in implementing organizations.

A.3   Robustness Checks

We conduct a range of robustness checks on the core result in our analysis, shown in Column 4 of Table 4: higher levels of CS-autonomy are associated with significantly higher quality projects, and higher levels of CS-performance are associated with significantly lower quality projects. Both coefficients of interest are significant at the 1% significance level, and we can reject the null that these two impacts of management practices have equal and opposite sized impacts on project quality: public service delivery is more sensitive to CS-autonomy than to performance.

The baseline results in Table 4 used our continuous measure of project completion rates (from zero to one) as the dependent variable. However, an alternative approach is to define a threshold of completion that would deem the project usable. To do so we consider all potential thresholds from 1% to 100% in increments of 1% and then estimate a specification analogous to (1) where y_{ijn} is defined as a dummy variable equal to one if the project completion rate is above the given threshold $p\%$, and zero otherwise. For any given threshold p the coefficients of interest are denoted γ_{1p} and γ_{2p}. Figure A2 then plots each pair of $(\widehat{\gamma}_{1p}, \widehat{\gamma}_{2p})$ estimates, for each threshold and their associated 95% confidence interval.

Two points are of note. First, at the extreme left of the figure where we consider a 1% threshold, we are essentially using a linear probability model to assess the relationship between management practices in civil service organizations and whether projects are *started* in some way. Here we find marginal impacts of each type of management practice that are similar to those documented earlier for the average completion rate.[50] Second, we cannot reject the null that the sign and significance of the coefficients are the same for every possible definition of project completion.

Taken together, the results imply that managerial incentives along both margins have similar impacts on the extensive margin of public service delivery (namely whether projects are started at all) and the intensive margins of project completion (namely the extent to which projects are completed). This uniformity of the impact of management incentives alleviates some concerns related to the second econometric concern highlighted in Section 3.6, that organizations with particular management practices in place might especially lobby for projects with the intention of not ever starting them.

The second robustness check considers alternative constructions of the CS- management practice indices. As described in Section 3.3, following BVR, we aggregated responses to individuals questions to construct our indices of management practices giving equal weight to all questions. A natural alternative is to cluster the variables into the various management topics described in Table A3b (such as facilities and targeting practices) and weight each *topic* (rather than each variable) equally. We re-construct our CS-autonomy and CS-performance measures along these lines and reestimate our preferred specification (1). The result, in Column 1 of Table A6 is qualitatively in line with our baseline results, although the absolute magnitude of each measure of public sector management is *larger*: a one standard deviation increase in CS-autonomy corresponds to a significantly higher project completion rate of 19%, and a one standard deviation increase in CS-performance corresponds to a significantly lower project completion rate of 13%.

Although our survey of management practices was tailored to our context, the second related concern relates to whether our findings are in part driven by the divergence in the underlying questions asked on management practices in our survey and that of BVR. We address this in two ways. First, we reconstruct our CS-based indices only using those questions on management practices that were also asked in BVR. As Table A3b shows, this has little consequence for the CS-performance measure, although the CS-autonomy measure is now largely based on topics related to staffing, targeting and flexibility; the new topics we designed related to facilities, skills and culture are omitted from the CS-autonomy index. The result in Column 2 of Table A6 shows that our main findings hold up with this more narrowly defined CS-autonomy measure.

Third, using our original broadly defined CS- measures, we can additionally control for the BVR-based measures of autonomy and performance. The result in Column 3 shows that the sign and significance of the CS-autonomy and CS-performance is very similar to our baseline

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[50]The result needs to be interpreted carefully. Figure 1B shows that there is not continuous mass in project completion rates over the [0,1] interval: hence we do not expect the marginal impact of the each management practice to be sensitive to marginal changes in threshold p where there is little mass in project completion rates. This explains why the marginal impacts shown in Figure A2 jump at a small number of points.

estimates. The BVR-autonomy measure also has significant positive impacts, and the BVR-performance measure has no impact. It is natural that the BVR performance z-score coefficient becomes less significant when the CS scores are included given how highly correlated it is with the CS performance score.

The next robustness check addresses the concern that different management practices might be spread across the country in a way that is correlated with characteristics of the organization's local geographies. Indeed, it is well understood that the characteristics of local populations interplay with them being able to solve collective action problems, and thus are an important driver of public goods provision [Banerjee *et al.* 2007]. To check the robustness of our findings to such issues, Column 4 additionally controls for a wide variety of state-level controls for each project and finds almost no change in the coefficients of interest. In short, local area characteristics do not seem to be driving our results.[51]

Columns 5 and 6 split the sample into projects that are located in the Northern and Southern regions of Nigeria respectively, that characterizes the first order cultural divide in Nigeria. We find the impacts of performance-based incentives remain as those in the baseline specification, and while the sign of management practices related to autonomy remains positive for both regions, it is only precisely estimated for projects located in Southern regions. Column 7 probes the issue further by re-estimating our baseline specification but also including a dummy for whether the implementing organization is itself located in the North or South: we find results very much in line with the baseline estimates.

The analysis has so far estimated (1) using OLS. The next robustness check estimates this specification using a fractional regression model that accounts for the dependent variable being a continuous variable between zero and one. To do so, we utilize Papke and Wooldridge's [1996] fractional logit model in which the conditional expectation function is modelled as a logistic function that can take all values in the unit interval. The interpretation of the marginal effects are the same as in the binary logit model and evaluated at sample averages, the partial effects are approximately comparable to the coefficients from a linear regression. The result in Column 5 of Table A6 shows the prior results to be robust to this alternative estimation model.

The series of robustness checks detailed in Table A7 all verify the robustness of our main finding to alterative samples of organizations and projects. Column 1 excludes those projects implemented by the largest organization in terms of total expenditures. Column 2 excludes projects implemented by the largest organization in terms of total expenditures. Columns 3 and 4 remove the 10 smallest organizations by expenditures and number of projects respectively. Columns 5 and 6 exclude organizations at the top and bottom of the CS-autonomy and CS-performance management scales respectively. In each cut of the data, the core results remain remarkably stable, so that our findings do not appear to be drive by outlier or specific organizations, as is intuitive given the scatterplot in Figure A1.

The final set of specifications examine subsamples based on project types. As boreholes are

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[51]The sample drops slightly in this specification because the state in which the project is located (or should have been located for those projects that are never started) is missing for around 450 projects.

the largest project group, we estimate the core specification for boreholes only (obviously omitting project fixed effects but conditional on the other controls in (1)). The final two specifications break down the project types listed in Table 1 into two groups: those related to construction projects (borehole, building, electrification, dam, road and canal) and those related to non-construction projects. We find that for boreholes specifically, and for construction projects more generally, the results closely replicate the baseline findings. Indeed, for construction projects as a whole the point estimates on each management practice index is larger in absolute value than the baseline result in Column 4 of Table 4. For non-construction projects, the results show that CS-autonomy continues to have a positive and significant impact on project completion rates. CS-performance measures continue to have a negative relation to completion rates although this is no longer significantly different from zero. This however might in part be driven by the smaller sample size of non-construction projects, that correspond to 19% of all sample projects.

Our analysis takes the project as the unit of observation. However, we can also average our outcome variables at the organization-level and undertake analysis with the organization as the unit of analysis. We do this in Table A8, where we have 63 observations: one for each organization in our sample. This check also helps address concerns that there are systematic differences in the projects assigned to organizations on the basis of their management practices.

Column 1 reports results from a regression in which the dependant variable is the average proportion of project completion across the organization's OPEN projects, conditional on the two CS- measures and organization characteristics. CS-Autonomy is significant at the 10% level and CS-Performance at the 5% level. As expected, each estimate is less precise than in Table 4 because here we only exploit cross-organizational variation to identify the parameters of interest. Nevertheless, the coefficients are of similar magnitude to those in our benchmark project-level analysis in Table 4. Column 2 uses a dependant variable that weights the proportion completed by the line item share. We find similar results as before. Column 3 shows even stronger results than our benchmark analysis when we use management scores that weight each topic equally, rather than each variable, with both management indices being significant at the 5% level.

The final two columns check whether the management practices in place in an organization correlate to other outcomes apart from project completion rates. These are designed to address the concern that there might be omitted organizational characteristics in (1) that can also drive project completion rates. Two natural checks follow. First, in Column 4 we construct the average complexity of projects assigned to organization n as our dependent variable, and then regress this against our measures of management practice and other organizational characteristics. Neither CS- measure is significantly correlated to the average complexity of projects the organization is tasked to implement. Hence it is not the case that projects appear assigned to organizations based on some interplay between their complexity and the management practices in place. Second, in Column 5 we use the log of the organization's aggregate budget as our dependent variable: again we find no correlation between the management practices in place and the resources provided to an organization, that might otherwise have indicated it was easier for the organization to complete projects assigned to it.

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Table 1: Descriptive Evidence on Project Types

Project Type	(1) Number of Projects [proportion]	(2) Number of Implementing Organizations	(3) Median Budget Allocation (Thousands of US Dollars)	(4) Budget Allocation (Millions of Nigerian Naira) [standard dev.]	(5) Proportion Never Started	(6) Proportion Completed	(7) Proportion Completed Conditional on Being Started	(8) Proportion Fully Completed	(9) Proportion With Satisfactory Quality
Borehole	1348 [0.29]	18	29	9.57 [51.8]	0.44	0.47	0.84	0.37	0.85
Building	806 [0.17]	32	120	23.6 [30.2]	0.37	0.50	0.79	0.34	0.81
Electrification	751 [0.16]	2	93	18.9 [23.3]	0.14	0.56	0.65	0.25	0.87
Dam	624 [0.13]	14	18	14.9 [30.9]	0.79	0.15	0.74	0.10	0.50
Procurement	345 [0.07]	41	87	55.9 [208]	0.30	0.58	0.83	0.47	0.85
Road	217 [0.05]	4	167	52.5 [323]	0.12	0.52	0.59	0.22	0.79
Training	189 [0.04]	26	80	51.1 [246]	0.20	0.60	0.74	0.42	0.84
Financial project	157 [0.03]	8	17	53.1 [391]	0.38	0.49	0.79	0.35	0.84
Research	122 [0.03]	21	67	43.9 [115]	0.11	0.63	0.72	0.52	0.99
Advocacy	86 [0.02]	23	49	12.7 [21.1]	0.24	0.61	0.80	0.47	0.94
Canal	76 [0.02]	12	347	81 [123]	0.70	0.14	0.45	0.05	0.92

Notes: The "project type" classification refers to the primary classification for each project. Other project classifications exist. The median budget allocation in Column 3 is in thousands of US Dollar (assuming an exchange rate of US$1: Naira 150). The budget allocation in Column 4 is in millions of Nigerian Naira. The sample of projects covers those which have a positive budget allocation and for which the proportion completed evaluation variable and management scores are available. The project quality variable in Column 9 is not available for all projects. Standard deviations are in parentheses. Figures are rounded to two decimal places where relevant.

Table 2: Descriptive Evidence on Largest Civil Service Implementing Organizations

Civil Service Organization	(1) Number of Projects	(2) Number of Unique Project Types	(3) Budget Allocation (Millions of Nigerian Naira)	(4) Proportion Never Started	(5) Proportion Completed	(6) Proportion Completed Conditional on Being Started	(7) Proportion Fully Completed	(8) Proportion With Satisfactory Quality
Federal Ministry of Agriculture and Rural Development	797	9	21,608	0.54	0.29	0.63	0.14	0.76
Federal Ministry of Power and Steel	750	1	73,519	0.14	0.56	0.25	0.65	0.87
Federal Ministry of Water Resources	520	4	63,871	0.95	0.04	0.77	0.03	0.69
National Primary Health Care Development	447	4	8,405	0.19	0.64	0.79	0.42	0.75
Sokoto Rima River Basin Development Authority	277	2	3,515	0.22	0.66	0.85	0.51	0.76
Upper Benue River Basin Development Authority	169	3	1,923	0.11	0.89	1.00	0.89	0.25
Ogun/Oshun River Basin Development Authority	165	4	3,339	0.55	0.32	0.71	0.24	0.89
Chad Basin River Basin Development Authority	148	3	2,367	0.43	0.56	1.00	0.56	1.00
Lower Benue River Basin Development Authority	143	3	2,446	0.45	0.42	0.77	0.17	0.86
Nigerian Agricultural Cooperative and Rural Development Bank	133	2	1,170	0.42	0.46	0.80	0.34	0.81

Notes: The sample covers the ten largest civil service organizations ranked by number of projects from our overall sample of projects. The "project type" classification refers to the primary classification for each project. Other project classifications exist. The budget allocation in Column 3 is in millions of Nigerian Naira. The sample of projects covers those which have a positive budget allocation and for which the proportion completed evaluation variable and management scores are available. The project quality variable in Column 8 is not available for all projects. Standard deviations are in parentheses. Figures are rounded to two decimal places where relevant.

Table 3: Descriptive Evidence on Civil Servant Management Practice z-scores

| | (1) Mean | (2) Standard Deviation | Pairwise Correlations | | |
			(3) CS-Performance	(4) CS-Autonomy	(5) BVR-Autonomy
CS-Autonomy	0.00	0.29	0.49		
CS-Performance	0.00	0.49			
BVR-Autonomy	0.00	0.45	0.52	0.64	
BVR-Performance	0.00	0.48	0.89	0.47	0.42
Observations (organizations)	63	63	63	63	63

Notes: The CS-Autonomy and CS-Performance z-scores are those created from the full set of variables available in the Civil Servants Survey data set. The BVR-Autonomy and BVR-Performance z-scores are those created from that set of variables that directly correspond to questions in Bloom and Van Reenen [2007]. Columns 3 to 5 report pairwise correlations between the column variable and the row variable. Figures are rounded to two decimal places where relevant.

Table 4: Management Practices and Public Sector Service Delivery

Standard Errors: Clustered by Organization

OLS Estimates

	Project Completion Rates					Project Quality			
	(1) Unconditional	(2) Organization Controls	(3) Project Controls	(4) Project Type Fixed Effects	(5) Interaction	(6) Baseline, Quality Sample	(7) Quality	(8) Quality-Adjusted Completion Rate	(9) Interaction
CS-Autonomy	0.47***	0.41***	0.39***	0.48***	0.49***	0.26***	0.31***	0.41***	0.31***
	(0.08)	(0.14)	(0.13)	(0.10)	(0.11)	(0.10)	(0.07)	(0.12)	(0.07)
CS-Performance	-0.12	-0.16***	-0.16***	-0.25***	-0.25***	-0.10***	-0.16***	-0.13***	-0.17***
	(0.08)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)	(0.04)	(0.05)
CS-Autonomy x CS-Performance					0.05				0.17
					(0.10)				(0.16)
H$_0$: CS-Autonomy = - CS-Performance [p-value]	[0.01]	[0.07]	[0.07]	[0.03]	[0.03]	[0.08]	[0.05]	[0.02]	[0.05]
Organization Controls (capital, general, noise)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Project Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	None	None	None	Project Type	Project Type	Project Type	Project Type	Project Type	Project Type
Observations (clusters)	4721 (63)	4721 (63)	4721 (63)	4721 (63)	4721 (63)	2206 (51)	2206 (51)	2206 (51)	2206 (51)

Notes: *** denotes significance at 1%, ** at 5%, and * at 10% level. Standard errors are in parentheses, and are clustered by organization throughout. All columns report OLS estimates. The dependent variable in Columns 1 to 6 is the proportion of the project completed (that is a continuous measure between zero and one). The dependent variable in Columns 7 and 9 is a dummy variable that takes the value one if project quality is reported as satisfactory or higher, and zero otherwise. The dependent variable in Column 8 is a product of the proportion completed variable and the dummy variable for quality. The sample of projects in Columns 6 to 9 is limited to those for which project completion and quality data is available. Project Type fixed effects relate to whether the primary classification of the project is as a financial, training, advocacy, procurement, research, electrification, borehole, dam, building, canal or road project. Project controls comprise project-level controls for the project budget, whether the project is new or a rehabilitation, and an assessment of its aggregate complexity by Nigerian engineers. Capital controls comprise organization-level controls for the logs of number of employees, total budget, and capital budget. General controls comprise organization-level controls for the share of the workforce with degrees, and the share of the workforce with postgraduate qualifications. Noise controls are four interviewer dummies, indicators of the seniority, gender, and tenure of the managers who responded, the day of the week the interview was conducted, the time of day the interview was conducted, a dummy variable indicating whether the interview was conducted during Ramadan, the duration of the interview, and an indicator of the reliability of the information as coded by the interviewer. Note that no quality information is available for organizations surveyed on a Saturday, and thus the dummy variable indicating a survey took place on a Saturday is omitted in Columns 6 and 7. Total and capital budget figures are an average of organization budget figures for the years 2006-10. At the foot of the table we report the p-value on the null that the coefficients on CS-Autonomy and CS-Performance are of equal and opposite magnitude. Figures are rounded to two decimal places.

Table 5: Heterogeneous Impacts of Management Practices Related to Autonomy

Dependent Variable: Proportion Project Completed
All Interaction Terms are in Deviation From Mean
Standard Errors Clustered by Organization in Columns 1 to 3; Robust in Columns 4 and 5
OLS Estimates

	(1) Baseline	(2) Project Budget Share	(3) Project Complexity	(4) Span of Control	(5) Proportion of Staff Graduates
CS-Autonomy	0.47***	0.47***	0.46***	0.54***	0.48***
	(0.11)	(0.11)	(0.12)	(0.06)	(0.06)
CS-Performance	-0.27***	-0.27***	-0.27***	-0.27***	-0.31***
	(0.07)	(0.07)	(0.07)	(0.04)	(0.05)
CS-Autonomy x Project Budget Share		0.003			
		(0.07)			
CS-Autonomy x Aggregate Complexity			-0.12		
			(0.43)		
CS-Autonomy x Span of Control				0.15*	
				(0.08)	
CS-Autonomy x Proportion of Staff Graduates					-1.10*
					(0.61)
Log Project Budget Share	-0.04*	-0.04*	-0.04*	-0.04***	-0.04***
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)
Aggregate Complexity	0.07	0.07	0.04	0.07	0.06
	(0.12)	(0.12)	(0.17)	(0.05)	(0.05)
Span of Control	0.02	0.02	0.02	0.01	0.02
	(0.05)	(0.05)	(0.05)	(0.03)	(0.03)
Proportion of Staff Graduates	-0.79**	-0.79**	-0.78**	-0.77***	0.42***
	(0.32)	(0.34)	(0.32)	(0.17)	(0.14)
H$_0$: CS-Autonomy = - CS-Performance [p-value]	[0.16]	[0.16]	[0.21]	[0.00]	[0.01]
Organization Controls (capital, general, noise)	Yes	Yes	Yes	Yes	Yes
Project Controls	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Project Type	Project Type	Project Type	Project Type	Project Type
Observations	4721 (63)	4721 (63)	4721 (63)	4721	4721

Notes: *** denotes significance at 1%, ** at 5%, and * at 10% level. Standard errors are in parentheses, and are clustered by organization in Columns 1 to 3, and are robust in Columns 4 and 5. All columns report OLS estimates. The dependent variable is the proportion of the project completed (that is a continuous measure between zero and one). Project Type fixed effects relate to whether the primary classification of the project is as a financial, training, advocacy, procurement, research, electrification, borehole, dam, building, canal or road project. Project controls comprise project-level controls for the project budget and whether the project is new or a rehabilitation. Capital controls comprise organization-level controls for the logs of number of employees, total budget, and capital budget. General controls comprise organization-level controls for the share of the workforce with degrees, and the proprtion of the staff that are graduates. Noise controls are four interviewer dummies, indicators of the seniority, gender, and tenure of the managers who responded, the day of the week the interview was conducted, the time of day the interview was conducted, a dummy variable indicating whether the interview was conducted during Ramadan, the duration of the interview, and an indicator of the reliability of the information as coded by the interviewer. Total and capital budget figures are an average of organization budget figures for the years 2006-10. In Column 2 the log project budget share is measured in Nigerian Naira and refers to the budget of the project as a share of the organization's total budget. In Column 3 the aggregate complexity is a project-level subjective assessment by Nigerian engineers of the relative difficulty of the project within the population of OPEN projects. In Column 4 the span of control is an organizational-average of the number of managers at the organization divided by the number of non-managers. All interactions are measured in deviations from the mean of the variable being interacted with. At the foot of the table we report the p-value on the null that the coefficients on CS-Autonomy and CS-Performance are of equal and opposite magnitude. Figures are rounded to two decimal places.

Table 6: Heterogeneous Impacts of Management Practices Related to Performance-Based Incentives

Dependent Variable: Proportion Project Completed
All Interaction Terms are in Deviation From Mean
Standard Errors Clustered by Organization in Columns 1 to 3; Robust in Column 4
OLS Estimates

	(1) Baseline	(2) Project Complexity	(3) Non-modal Project	(4) Multi-Principals
CS-Autonomy	0.48***	0.47***	0.48***	0.46***
	(0.10)	(0.10)	(0.10)	(0.06)
CS-Performance	-0.25***	-0.27***	-0.22***	-0.23***
	(0.07)	(0.07)	(0.07)	(0.04)
CS-Performance x Aggregate Complexity		-0.35***		
		(0.12)		
CS-Performance x Non-modal Project Type			-0.10	
			(0.07)	
CS-Performance x Managers per Non-manager				-0.08*
				(0.04)
Aggregate Complexity	0.06	0.03	0.07	0.07
	(0.12)	(0.11)	(0.13)	(0.05)
Managers per Non-manager	-0.01	0.00	-0.01	0.00
	(0.06)	(0.06)	(0.06)	(0.03)
Project of Non-modal Type for Organization			-0.01	
			(0.04)	
H₀: CS-Autonomy = - CS-Performance [p-value]	[0.07]	[0.11]	[0.04]	[0.00]
Organization Controls (capital, general, noise)	Yes	Yes	Yes	Yes
Project Controls	Yes	Yes	Yes	Yes
Fixed Effects	Project Type	Project Type	Project Type	Project Type
Observations	4721 (63)	4721 (63)	4721 (63)	4721

Notes: *** denotes significance at 1%, ** at 5%, and * at 10% level. Standard errors are in parentheses, and are clustered by organization in Columns 1 to 3, and are robust in Column 4. All columns report OLS estimates. The dependent variable is the proportion of the project completed (that is a continuous measure between zero and one). Project Type fixed effects relate to whether the primary classification of the project is as a financial, training, advocacy, procurement, research, electrification, borehole, dam, building, canal or road project. Project controls comprise project-level controls for the project budget and whether the project is new or a rehabilitation. Capital controls comprise organization-level controls for the logs of number of employees, total budget, and capital budget. General controls comprise organization-level controls for the share of the workforce with degrees, and the share of the workforce with postgraduate qualifications. Noise controls are four interviewer dummies, indicators of the seniority, gender, and tenure of the managers who responded, the day of the week the interview was conducted, the time of day the interview was conducted, a dummy variable indicating whether the interview was conducted during Ramadan, the duration of the interview, and an indicator of the reliability of the information as coded by the interviewer. Total and capital budget figures are an average of organization budget figures for the years 2006-10. In Column 2 the aggregate complexity is a project-level subjective assessment by Nigerian engineers of the relative difficulty of the project within the population of OPEN projects. In Column 3 the non-modal project type is a binary indicator as to whether the project is of a different project type (as defined above) as the modal project type at the organisation. In Column 4 the managers-per-nonmanager variable is an organizational-average of the number of managers at the organization divided by the number of non-managers. All interactions are measured in deviations from the mean of the variable being interacted with. At the foot of the table we report the p-value on the null that the coefficients on CS-Autonomy and CS-Performance are of equal and opposite magnitude. Figures are rounded to two decimal places.

Table 7: Management Practices and the Characteristics of Bureaucrats

Dependent Variable: Proportion Project Completed
All Interaction Terms are in Deviation From Mean
Robust Standard Errors

OLS Estimates	Tenure at Organization		Intrinsic Motivation		Observe Corrupt Practices	
	(1) Senior Bureaucrats	(2) Lower-tier Bureaucrats	(3) Senior Bureaucrats	(4) Lower-tier Bureaucrats	(5) Senior Bureaucrats	(6) Lower-tier Bureaucrats
CS-Autonomy	0.45***	0.46***	0.55***	0.50***	0.12	0.21***
	(0.06)	(0.06)	(0.05)	(0.06)	(0.08)	(0.07)
CS-Performance	-0.18***	-0.19***	-0.23***	-0.25***	-0.26***	-0.31***
	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)
CS-Autonomy x Tenure of Senior Bureaucrats	0.04**					
	(0.02)					
CS-Performance x Tenure of Senior Bureaucrats	-0.03***					
	(0.01)					
CS-Autonomy x Tenure of Low-tier Bureaucrats		0.08***				
		(0.02)				
CS-Performance x Tenure of Low-tier Bureaucrats		-0.05***				
		(0.01)				
Tenure of Senior Bureaucrats	-0.03***	-0.02***				
	(0.01)	(0.01)				
Tenure of Low-tier Bureaucrats	0.01	0.00				
	(0.01)	(0.01)				
CS-Autonomy x Proportion of Senior Bureaucrats Intrinsically Motivated			-1.63***			
			(0.48)			
CS-Performance x Proportion of Senior Bureaucrats Intrinsically Motivated			-0.07			
			(0.32)			
CS-Autonomy x Proportion of Low-tier Bureaucrats Intrinsically Motivated				-0.28		
				(0.48)		
CS-Performance x Proportion of Low-tier Bureaucrats Intrinsically Motivated				0.06		
				(0.29)		
Proportion of Senior Bureaucrats Intrinsically Motivated			0.19	0.15		
			(0.20)	(0.20)		
Proportion of Low-tier Bureaucrats Intrinsically Motivated			-0.34*	-0.26		
			(0.19)	(0.20)		
CS-Autonomy x Percentage of Projects that Senior Bureaucrats Report Observing Corrupt Practices On					0.03***	
					(0.01)	
CS-Performance x Percentage of Projects that Senior Bureaucrats That Report Observing Corrupt Practices					-0.002	
					(0.005)	
CS-Autonomy x Percentage of Projects that Low-tier Bureaucrats Report Observing Corrupt Practices On						0.01**
						(0.01)
CS-Performance x Percentage of Projects that Low-tier Bureaucrats Report Observing Corrupt Practices On						0.00
						(0.00)
Percentage of Projects that Senior Bureaucrats that Report Observing Corrupt Practices On					-0.01***	-0.01***
					(0.002)	(0.002)
Percentage of Projects that Low-tier Bureaucrats that Report Observing Corrupt Practices On					-0.01***	-0.01***
					(0.002)	(0.002)
H0: CS-Autonomy = - CS-Performance [p-value]	[0.00]	[0.00]	[0.00]	[0.00]	[0.06]	[0.15]
Organization Controls (capital, general, noise)	Yes	Yes	Yes	Yes	Yes	Yes
Project Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Project Type	Project Type	Project Type	Project Type	Project Type	Project Type
Observations	4721	4721	4721	4721	4720	4721

Notes: *** denotes significance at 1%, ** at 5%, and * at 10% level. Robust standard errors are in parentheses. All columns report OLS estimates. The dependent variable is the proportion of the project completed (that is a continuous measure between zero and one). Project Type fixed effects relate to whether the primary classification of the project is as a financial, training, advocacy, procurement, research, electrification, borehole, dam, building, canal or road project. Project controls comprise project-level controls for the project budget, whether the project is new or a rehabilitation, and an assessment of its aggregate complexity by Nigerian engineers. Capital controls comprise organization-level controls for the logs of number of employees, total budget, and capital budget. General controls comprise organization-level controls for the share of the workforce with degrees, and the share of the workforce with postgraduate qualifications. Noise controls are four interviewer dummies, indicators of the seniority, gender, and tenure of the managers who responded, the day of the week the interview was conducted, the time of day the interview was conducted, a dummy variable indicating whether the interview was conducted during Ramadan, the duration of the interview, and an indicator of the reliability of the information as coded by the interviewer. Total and capital budget figures are an average of organization budget figures for the years 2006-10. We follow the grading system of the Federal Government by defining senior bureaucrats as those on grade level 12 and above. In Columns 1 and 2, tenure of bureaucrats refers to the number of years they have served in the organization for. This is elicited from the civil servant survey we conducted. In Columns 3 and 4, the proportion of staff intrinsically motivated refers to the fraction of employees at an organization that answered 'The chance to serve Nigeria' to the question 'What most influenced you to take up a career in the service?' in the Civil Servants Survey. The percentage of staff who observed corruption refers to the average proportion of projects officials at an organization stated on which 'I observed others breaking the service rules for their own benefit' in the Civil Servants Survey. In Column 5 when we control for the proportion of projects that senior bureaucrats that report observing corrupt practices on, we lose one organization (that implemented a single project) in which no senior bureaucrat answered the question. All interactions are measured in deviations from the mean of the variable being interacted with. At the foot of the table we report the p-value on the null that the coefficients on CS-Autonomy and CS-Performance are of equal and opposite magnitude. Figures are rounded to two decimal places.

Table 8: Correlates of Management Practices

Dependent Variable: System of Two Equations in Autonomy and Performance Management Scores
Robust Standard Errors
Estimates by Maximum Likelihood to Fit a SUR Model

	CS-Autonomy		CS-Performance	
	(1a) Sector Organizations	(2a) Competition	(1b) Sector Organizations	(2b) Competition
Characteristics of Senior Management				
Average years of schooling	0.24**	0.29***	0.03	0.12
	(0.1)	(0.1)	(0.16)	(0.16)
Average years in the organization	0.01	0.01	0.02	0.02
	(0.01)	(0.01)	(0.01)	(0.02)
Characteristics of Other Bureaucrats				
Average years of schooling	0.06	0.11	0.18	0.26
	(0.07)	(0.08)	(0.15)	(0.14)
Average years in the organization	0.00	0.00	0.01	0.01
	(0.01)	(0.01)	(0.02)	(0.02)
Decentralized Organization [yes=1]	0.04	0.05	-0.32**	-0.29**
	(0.08)	(0.1)	(0.15)	(0.14)
Average Project Completion Rate	0.04	0.02	-0.10	-0.15
	(0.08)	(0.09)	(0.18)	(0.19)
Average Project Budget	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Average Project Complexity	0.00	0.00	0.00	-0.01
	(0.01)	(0.00)	(0.01)	(0.01)
Standard Deviation of Project Complexity	0.00	0.00	0.00	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
Number of Organizations In The Same Sector	0.002**		0.003*	
	(0.00)		(0.00)	
Number of Organizations Implementing Similar Project Types		0.04		0.06
		(0.04)		(0.06)
Correlation of residuals in SURE system	0.44	0.47	0.44	0.47
Observations	63	63	63	63

Notes: *** denotes significance at 1%, ** at 5%, and * at 10% level. Characteristics of management controls include the proportion of managers at an organization who are male, the average level of seniority amongst management, the average years of schooling amongst managers, their average years of service, and their average years at the organization. Characteristics of non-managerial staff controls include the proportion of non-management staff at an organization who are male, the average level of seniority amongst non-management, the average years of schooling amongst non-managers, their average years of service, and their average years at the organization. We follow the grading system of the Federal Government by defining senior bureaucrats as those on grade level 12 and above. Robust standard errors are in parentheses. Columns report maximum likelihood estimates to fit a SUR model for the two dimensions of management practice.

Figure 1A: Major Project Types by Implementing Organization
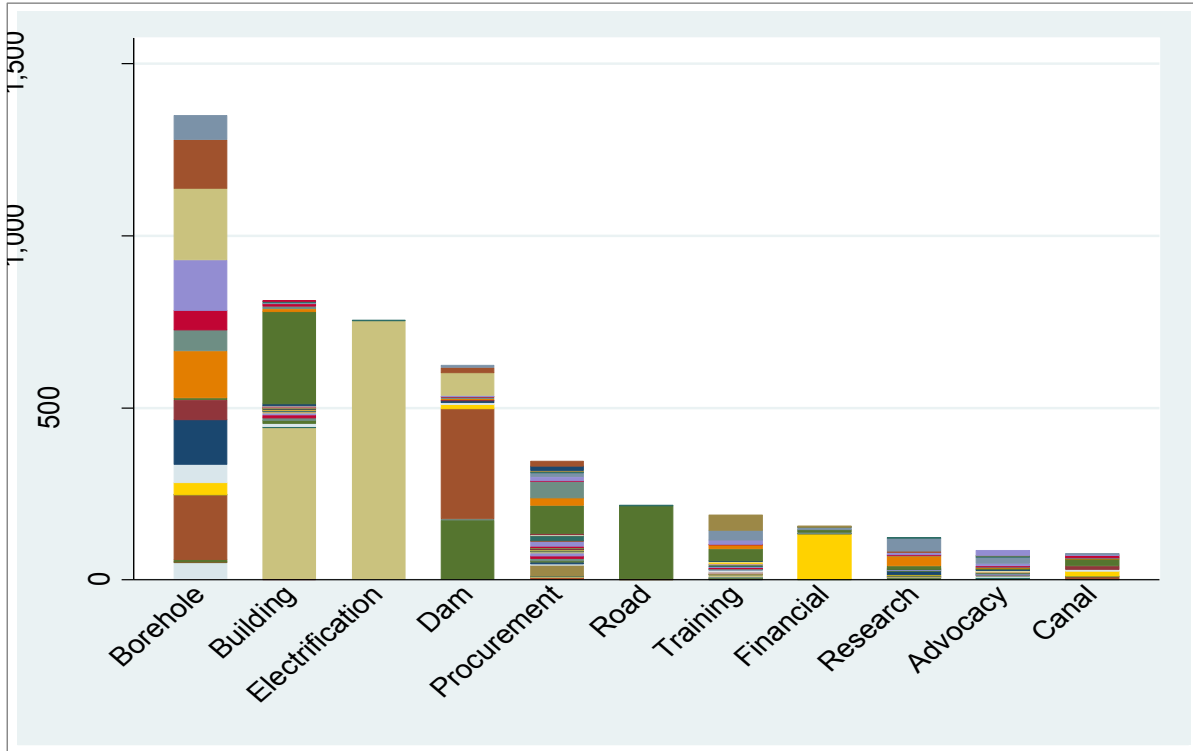
Notes: Each histogram bar represents the total number of projects for the given project type on the x-axis. Each colored band represents the projects at a particular organization (different bands imply different organizations irrespective of whether they are the same color). The sample used to construct the histogram is those projects for which proportion completed evaluation variable and management scores are available. The projects are classified here by their primary classification.

Figure 1B: Proportion Projects Completed
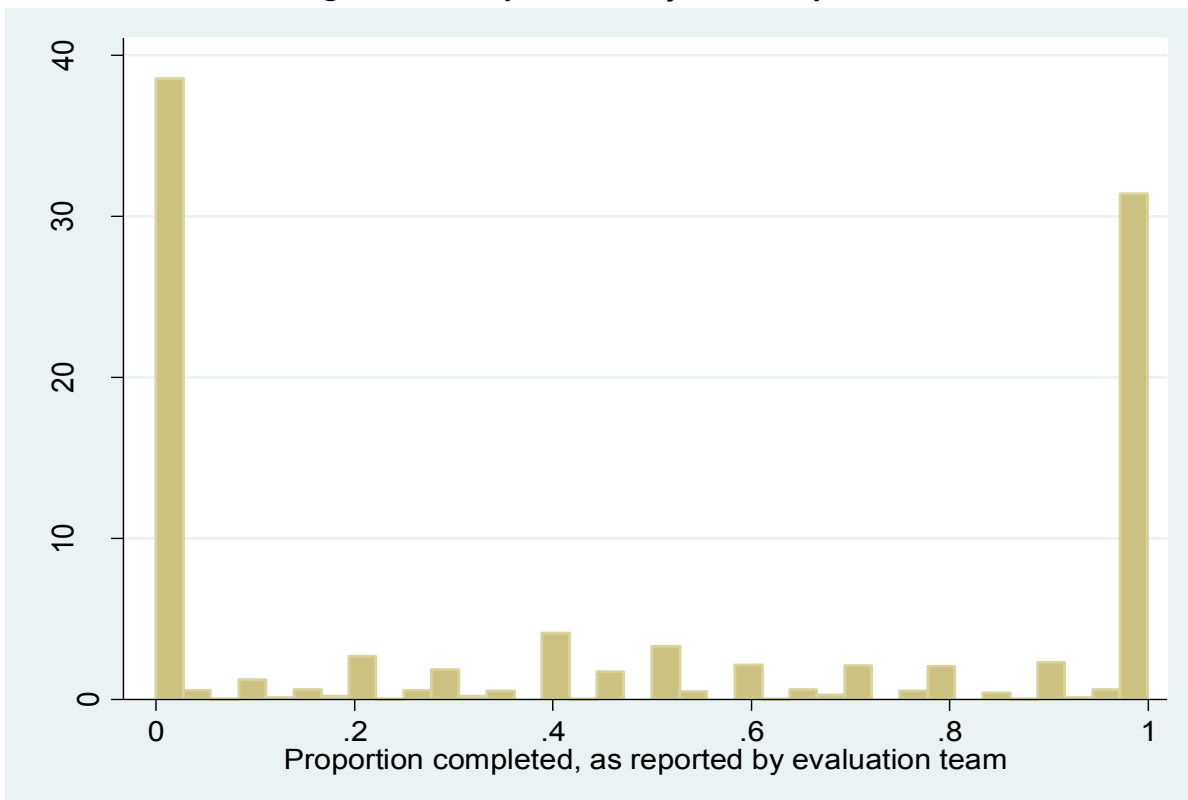
Notes: This is a histogram of the proportion of project completed variable. The sample used to construct the histogram are those projects for which proportion completed evaluation variable and management scores are available.

Figure 2: A Scattergraph of Autonomy and Performance Management Indices

Slope = 0.29
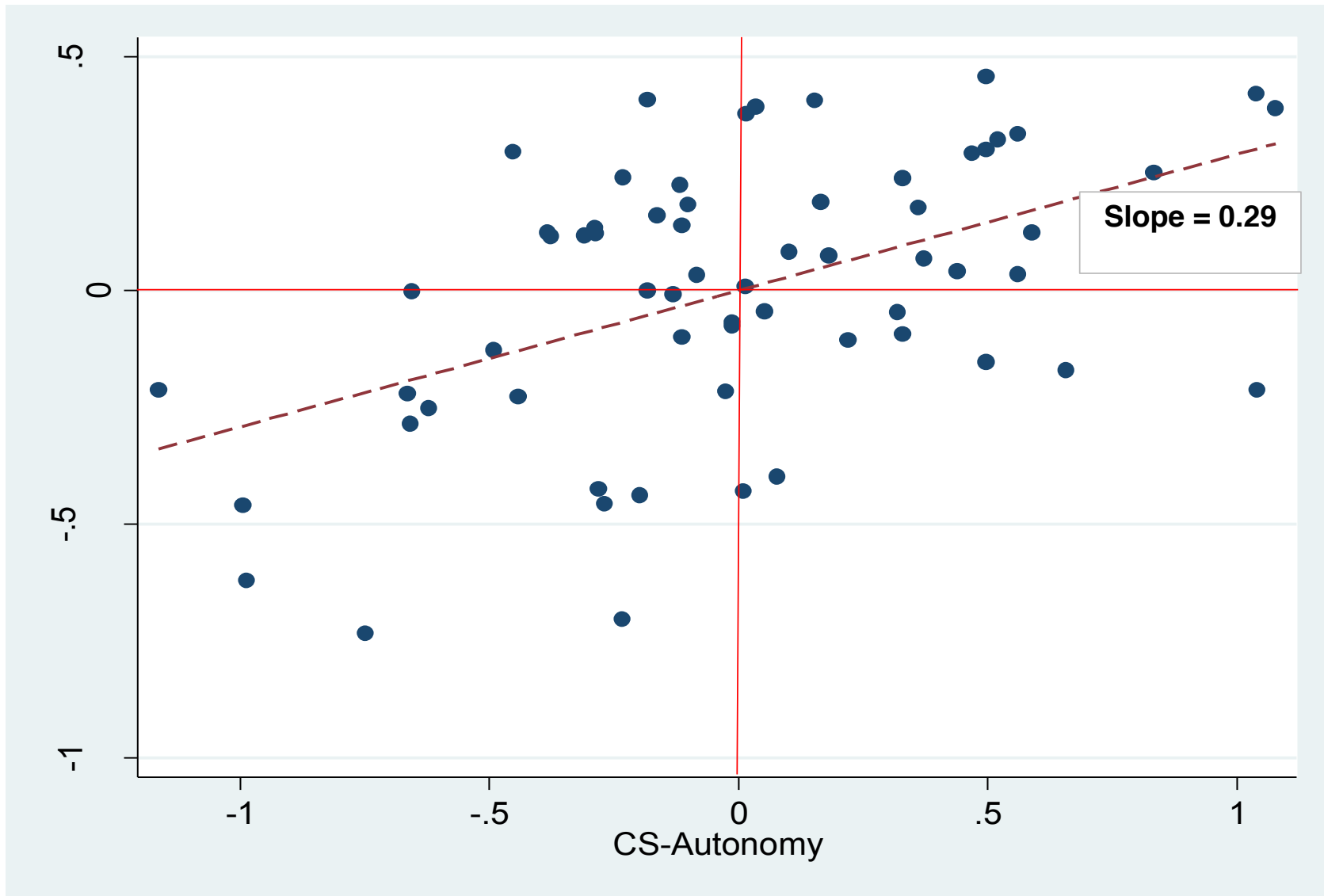
CS-Autonomy

Notes: This figure plots the CS-Performance and CS-Autonomy measures for each of the 63 civil services organizations. The line of best fit is also shown with its estimated slope coefficient and robust standard error.

Table A1: Federal Civil Service Organizations Under Study

Civil Service Organization	Sector	Annual Budget (Nigerian Naira)	Number of Staff	Level of Centralization
Anambra/Imo River Basin Development Authority	Water	3,997,754,366	324	Deconcentrated
Benin Owena River Basin Development Authority	Water	2,645,674,287	333	Deconcentrated
Chad Basin River Basin Development Authority	Water	2,367,202,948	399	Deconcentrated
Cross River River Basin Development Authority	Water	2,823,481,666	318	Deconcentrated
Citizenship and Leadership Training Centre	Youth	526,561,367	601	Deconcentrated
Federal College of Education, Gombe	Education	797,920,817	608	Deconcentrated
Federal College of Education, Gusau	Education	699,751,353	379	Deconcentrated
Federal College of Education, Omuku	Education	883,161,033	699	Deconcentrated
Federal Government Girls College, Gboko	Education	184,954,453	161	Deconcentrated
Federal Government Girls College, Lejja	Education	198,849,199	122	Deconcentrated
Federal Medical Centre, Abeokuta	Health	968,993,918	1,646	Deconcentrated
Federal Medical Centre, Asaba	Health	743,613,444	777	Deconcentrated
Federal Medical Centre, Bayelsa State	Health	753,932,322	725	Deconcentrated
Federal Medical Centre, Bida	Health	620,282,035	709	Deconcentrated
Federal Medical Centre, Ebute Metta	Health	803,799,801	958	Deconcentrated
Federal Medical Centre, Gombe	Health	846,134,510	1,518	Deconcentrated
Federal Medical Centre, Kebbi State	Health	534,014,493	528	Deconcentrated
Federal Medical Centre, Makurdi	Health	1,068,069,009	955	Deconcentrated
Federal Medical Centre, Nasarawa State	Health	685,945,260	785	Deconcentrated
Federal Medical Centre, Owerri	Health	1,306,443,388	1,722	Deconcentrated
Federal Medical Centre, Owo	Health	1,232,965,880	1,119	Deconcentrated
Federal Medical Centre, Umuahia	Health	1,073,612,805	1,306	Deconcentrated
Federal Ministry of Agriculture and Rural Development	Agriculture	21,608,273,948	5,789	Concentrated
Federal Ministry of Education	Education	6,608,286,525	2,776	Concentrated
Federal Ministry of Environment	Environment	3,048,607,224	2,093	Concentrated
Federal Ministry of Federal Capital Territory Administration	Education	70,992,105,263	18,987	Concentrated
Federal Ministry of Health	Health	25,560,932,086	3,871	Concentrated
Federal Ministry of Housing and Urban Development	Housing	8,791,545,032	7,837	Concentrated
Federal Ministry of Intergovernmental Affairs, Youth Development and Special Duties	Youth	1,684,951,838	392	Concentrated
Federal Ministry of Power and Steel	Power	73,518,597,777	580	Concentrated
Federal Ministry of Water Resources	Water	63,870,865,510	740	Concentrated
Federal Ministry of Women Affairs	Women	2,240,154,186	577	Concentrated
Federal Polytechnic, Bida	Education	714,983,605	1,025	Deconcentrated
Federal Polytechnic, Ede	Education	766,681,299	706	Deconcentrated
Federal Polytechnic, Idah	Education	1,146,491,076	987	Deconcentrated
Federal Polytechnic, Nasarawa	Education	964,681,716	810	Deconcentrated
Federal Polytechnic, Nekede	Education	1,365,699,431	1,282	Deconcentrated
Federal Polytechnic, Offa	Education	809,649,565	673	Deconcentrated
Federal Polytechnic, Oko	Education	1,689,959,686	1,627	Deconcentrated
Federal Staff Hospital, Apo-Abuja	Health	365,930,597	471	Deconcentrated
Hadejia-Jama'are River Basin Development Authority	Water	4,913,721,484	589	Deconcentrated
Jos University Teaching Hospital	Health	2,851,339,512	2,261	Deconcentrated
Lower Benue River Basin Development Authority	Water	2,446,071,839	347	Deconcentrated
Lower Niger River Basin Development Authority	Water	2,843,137,139	436	Deconcentrated
Mass Literacy Commission	Education	1,006,021,816	154	Deconcentrated
National Action Committee on Aids	Health	1,883,232,451	243	Deconcentrated
National Arbovirus and Vector Research	Health	45,225,340	207	Deconcentrated
National Board for Technical Education	Education	1,643,525,311	460	Deconcentrated
National Centre for Women Development	Women	214,580,722	135	Deconcentrated
National Commission for Colleges of Education	Education	845,077,581	222	Deconcentrated
National Commission for Nomadic Education	Education	623,979,428	195	Deconcentrated
National Primary Health Care Development	Health	8,405,451,012	646	Deconcentrated
National Tuberculosis and Leprosy Referred Hospital and Training Centre, Zaria	Health	450,095,901	153	Deconcentrated
National Teachers Institute	Education	5,042,088,186	728	Deconcentrated
National Youth Service Corps	Youth	18,208,465,942	103,686	Deconcentrated
Niger Delta River Basin Development Authority	Water	2,790,143,003	406	Deconcentrated
Nigerian Agricultural Cooperative and Rural Development Bank	Agriculture	1,169,714,100	474	Deconcentrated
Ogun/Oshun River Basin Development Authority	Water	3,338,868,111	285	Deconcentrated
Sokoto Rima River Basin Development Authority	Water	3,514,559,986	566	Deconcentrated
Specialist Hospital, Gwagwalada	Health	1,643,021,467	1,275	Deconcentrated
Universal Basic Education Commission	Education	7,582,357,375	393	Deconcentrated
Upper Benue River Basin Development Authority	Water	1,923,339,407	272	Deconcentrated
Upper Niger River Basin Development Authority	Water	3,292,786,122	239	Deconcentrated

Notes: The budget figures are averages for 2006 to 2010. Staff numbers come from administrative data for 2010. In the few cases we do not have the staff numbers explicitly, we estimate them from the personnel expenditures, which have are correlated with staff numbers with a coefficient of over 0.9. Concentrated organizations refer to the central organizing authority for the sector, with a direct line of responsibility to the President and the National Assembly. Decentralized organizations refer to those whose day-to-day running is largely independent of the central authority. They have boards of governors that make decisions over policy and operation. They have a separate budget line to the central ministries and focus on a strict sub-set of the citizenry. Central subsidiaries are organizations with a separate budget line in the national budget and distinct institutional structure, but in which central ministries play a part in the day-to-day running.

Table A2: Representativeness of OPEN Data, by Distribution of Expenditures

	OPEN Expenditures		Federal Government Expenditures			
	OPEN including Works	OPEN excluding Works	Social sector budget	Social capital budget	Social service budget	Service excluding works
Health	0.21	0.22	0.16	0.11	0.18	0.24
Education	0.20	0.21	0.24	0.10	0.14	0.19
Water	0.18	0.19	0.14	0.22	0.16	0.22
Power	0.16	0.17	0.13	0.20	0.14	0.19
Agriculture	0.14	0.15	0.05	0.04	0.05	0.07
Works	0.05	-	0.23	0.30	0.24	-
Women	0.01	0.01	0.00	0.003	0.00	0.01
Youth	0.01	0.01	0.03	0.004	0.05	0.06
Environment	0.01	0.01	0.01	0.005	0.00	0.01
Housing	0.02	0.02	0.01	0.01	0.02	0.02
TOTAL	1.00	1.00	1.00	1.00	1.00	1.00

Notes: All figures are for the sum of sector budgets in 2006 and 2007. The budget figures relating to the OPEN data are summations of capital warrant appropriations modified with project document figures where available rather than budget figures. The other figures are summations of the relevant appropriation-bill backed budgets. Total budget figures relate to the Executive vote only and therefore do not represent total government expenditures. They exclude expenditures by the Ministry of the Federal Capital Territory and the National Poverty Eradication Program in these sectors. 'Social sector organizations' are those that are focused on the provision of social goods and services. 'Social capital budget' refers to the capital budgets of social sector organizations. 'Social service organizations' are those organizations in the social sector that actually deliver social welfare oriented goods and services. OPEN projects cover all of the social sectors in Nigeria. Health expenditures are a sum of the standard expenditures under the central organizing authority for the sector and the National Action Committee on Aids, the most prominent health expenditure envelope that does not fall under the Ministry of Health but rather under the Presidency.

Table A3a: Defining Management Practices Using the BVR Indices

Management Dimension	Topic	Specific Questions Related to this Topic	Comparable to a Question Used in BVR?
BVR Autonomy	**Operations**	Does your organization make efforts to redefine its standard procedures in response to the specific needs and peculiarities of a community?	Yes
		How flexible would you say your organization is in terms of responding to new practices, new techniques, and regulations?	Yes
		At your organization, how efficiently is best practice shared between departments?	Yes
		Given past experience, how effectively would a conflict within your organization be dealt with?	Yes
	Targets	Do you think the most senior staff of your organization talk about attracting and developing talented people?	Yes
		Do you think the most senior staff of your organization then actually goes about attracting and developing talented people?	Yes
		Does your organization have a clear set of targets derived from its mission and goals?	Yes
		How tough are the targets of the organization?	Yes
		Is the burden of achieving the organization's targets evenly distributed across its different departments, or do some groups consistently shoulder a greater burden than others?	Yes
BVR Performance	**Incentives**	If two people both joined your organization five years ago and one was much better at their work than the other, would he/she be promoted through the service faster?	Yes
		Given past experience, if there is a 'top performing' civil servant, does your organization do their best to keep him/her?	Yes
		Given past experience, how would under-performance be tolerated?	Yes
		What percentage of *workers* were rewarded when targets were met?	Yes
		What percentage of *managers/directors* were rewarded when targets were met?	Yes
	Monitoring	Given past experience, what happens if there is a part of your organization that isn't achieving agreed results?	Yes
		When you arrive at work each day, do you and your colleagues know what your organization is trying to achieve on that particular day?	Yes
		In what kind of ways does your organization track how well it is delivering services?	Yes
		If have performance indicators, how often these indicators are collected	Yes
		If have performance indicators, how often these indicators are reviewed by Minister or Permanent Secretary	Yes
		If have performance indicators, how often these indicators are reviewed by non managerial staff	Yes
		Does the organization use performance or quality indicators for tracking the performance of its employees?	Yes
		Can most staff above SGL 7 in your organization make substantive contributions to the policy formulation and implementation process?	Yes
		Can most staff above SGL 15 in your organization make substantive contributions to the policy formulation and implementation process?	Yes

Notes: The final column provides an indicator of which questions arose out of the BVR survey. However, in some cases they do not reflect the BVR questions word for word, as the process of translating them to a public service context required us to change the wording and structure of some of the questions.

Table A3b: Defining Management Practices Using the CS Indices

Management Dimension	Topic	Specific Questions Related to this Topic	Comparable to a Question Used in BVR?
CS-Autonomy	Facilities	During a typical working day (8 hours from 8am to 4pm), how many hours is there electricity (PHCN or generator)?	
		Out of the five [5] working days, how many days is the network (GSM) coverage working for 50% of calls or more?	
		Out of the five [5] working days, how many hours is their internet access good enough to check e-mail?	
		Out of every ten [10] officers above SGL 7, how many have access to a computer (desktop or laptop)?	
		Out of every ten [10] officers above SGL 7, how many have access to a vehicle (privately owned or otherwise) that can be used for work?	
	Skills	Out of every ten [10] officers above SGL 7, how many can use a computer to write a memo?	
		Out of every ten [10] officers above SGL 7, how many can use a computer to create a PowerPoint presentation?	
		Out of every ten [10] officers above SGL 7, how many can use a computer to create an Excel spreadsheet?	
		On which topics have trainings been performed at your organization in the last five [5] years? Technical trainings.	
		On which topics have trainings been performed at your organization in the last five [5] years? Laws and regulations.	
		On which topics have trainings been performed at your organization in the last five [5] years? Legal rights of the public.	
		On which topics have trainings been performed at your organization in the last five [5] years? Good relations with the public.	
		On which topics have trainings been performed at your organization in the last five [5] years? Ethics.	
		On which topics have trainings been performed at your organization in the last five [5] years? What to do with presents.	
		Out of every ten [10] officers above SGL 7 at your organization, how many have had some form of training over the last five [5] years?	
	Staffing	Do you think the most senior staff of your organization talk about attracting and developing talented people?	Yes
		Do you think the most senior staff of your organization then actually goes about attracting and developing talented people?	Yes
		If two people both joined your organization five years ago and one was much better at their work than the other, would he/she be promoted through the service faster?	Yes
		Given past experience, if there is a 'top performing' civil servant, does your organization do their best to keep him/her?	Yes
		Is the burden of achieving the organization's targets evenly distributed across its different departments, or do some groups consistently shoulder a greater burden than others?	Yes
		How do you feel the number of staff in your organization relates to the activities undertaken there?	
		What percentage of staff is doing most of the work at your organization?	
		Thinking about all the projects that your organization has been involved in since your appointment here, would you say that senior staff try to use the right staff for the right job?	
	Targeting	Does your organization have a clear set of targets derived from its mission and goals?	Yes
		How tough are the targets of the organization?	Yes
		When you arrive at work each day, do you and your colleagues know what your organization is trying to achieve on that particular day?	Yes
	Flexibility	Does your organization make efforts to redefine its standard procedures in response to the specific needs and peculiarities of a community?	Yes
		How flexible would you say your organization is in terms of responding to new practices, new techniques, and regulations?	Yes
		At your organization, how efficiently is best practice shared between departments?	Yes
		Given past experience, how effectively would a conflict within your organization be dealt with?	Yes
	Roles	Can most staff above SGL 7 in your organization make substantive contributions to the policy formulation and implementation process?	Yes
		Can most staff above SGL 15 in your organization make substantive contributions to the policy formulation and implementation process?	Yes
		To what extent do the employees in this organization have the ability to determine how they carry out the assignments in their daily work?	
	Culture	How effectively would you say your organization is in making the bulk of its staff feel valued?	
		To what extent would you say employees of your organization trust each other?	
		If you think about the way that employees of this organization respond to a standard work challenge, would you say that there is a set of 'shared values' amongst all the staff?	
		Out of every ten [10] officers above SGL 7, how many people from this organization participate in groups, committees and activities with other people from this organization outside of the formal structure of government (for example, in community or social organizations)?	
CS-Performance	Incentives	Given past experience, how would under-performance be tolerated?	Yes
		Given past experience, what happens if there is a part of your organization that isn't achieving agreed results?	Yes
		What percentage of *workers* were rewarded when targets were met?	Yes
		What percentage of *managers/directors* were rewarded when targets were met?	Yes
		Given past experience, are members of this organization disciplined for breaking the Public Service Rules?	
		Given past experience, what would most likely happen to a person in this organization who accepted money or a present from someone who came to them with a problem?	
	Monitoring	In what kind of ways does your organization track how well it is delivering services?	Yes
		If have performance indicators, how often these indicators are collected?	Yes
		If have performance indicators, how often these indicators are reviewed by Minister or Permanent Secretary?	Yes
		If have performance indicators, how often these indicators are reviewed by non managerial staff?	Yes
		Does the organization use performance or quality indicators for tracking the performance of its employees?	Yes
		At your organization, how highly regarded is the collection and use of data in planning and implementing projects?	

Note: The final column provides an indicator of which questions arose out of the BVR survey. However, in some cases they do not reflect the BVR questions word for word, as the process of translating them to a public service context required us to change the wording and structure of some of the questions.

Table A4: Correlation of Subcomponents of the Project Complexity Indicator

	Mean	Standard deviation	Project size	Number of inputs	Number of methods	Interdependencies	Access to raw materials	Storage of raw materials	Requires local labor	Requires skilled labor	Access to construction equipment	Design uncertainty	Implementation uncertainty	Design ambiguity	Implementation ambiguity	Difficulty to manage	Number of agencies involved	Aggregate complexity
Project size	0.27	0.45	1.00															
Number of inputs	6.82	4.13	0.06	1.00														
Number of methods	5.04	2.29	0.33	0.61	1.00													
Interdependencies	0.65	0.48	-0.03	0.13	0.07	1.00												
Access to raw materials	0.25	0.43	-0.11	-0.24	-0.09	0.04	1.00											
Storage of raw materials	0.04	0.21	0.19	-0.05	0.07	0.07	-0.05	1.00										
Requires local labor	0.45	0.50	0.31	-0.03	0.48	0.04	0.23	0.14	1.00									
Requires skilled labor	0.45	0.50	-0.16	-0.02	-0.21	0.53	0.21	-0.03	0.00	1.00								
Access to construction equipment	0.21	0.41	-0.01	-0.24	0.06	0.36	0.62	0.12	0.53	0.53	1.00							
Design uncertainty	0.70	0.46	0.10	0.18	0.12	0.77	-0.08	0.02	0.26	0.45	0.31	1.00						
Implementation uncertainty	0.78	0.41	0.06	0.26	0.20	0.58	-0.16	-0.01	0.35	0.42	0.24	0.78	1.00					
Design ambiguity	0.66	0.47	-0.08	0.08	-0.01	0.84	-0.01	0.08	0.04	0.60	0.35	0.73	0.63	1.00				
Implementation ambiguity	0.65	0.48	0.00	0.06	0.02	0.85	0.02	0.11	0.07	0.56	0.36	0.75	0.58	0.89	1.00			
Difficulty to manage	0.28	0.45	0.15	-0.16	0.24	0.38	0.47	0.19	0.64	0.37	0.81	0.36	0.27	0.43	0.43	1.00		
Number of agencies involved	3.54	0.51	-0.01	0.12	-0.05	0.21	0.11	-0.02	0.25	0.55	0.21	0.39	0.54	0.30	0.26	0.22	1.00	
Aggregate complexity	24.98	17.92	0.36	0.24	0.50	0.25	-0.21	0.16	0.39	-0.09	0.03	0.35	0.37	0.29	0.32	0.33	-0.05	1.00
Observations (projects)	4721	4721	4721	4721	4721	4721	4721	4721	4721	4721	4721	4721	4721	4721	4721	4721	4721	4721

Notes: The sample used is those projects in our core analysis for which we have complexity and project completion data. 'Project size' is a binary variable that aims to gauge the physical size of the project. It takes the value 1 if it is classified as equivalent to a medium scale build or larger. Number of inputs counts the number of distinct product classes the finished project contains. Number of methods counts the number of distinct disciplines or methods involved in implementing the project. 'Interdependencies' is a binary variable reflecting the extent of interdependencies between the activities involved in the project. It takes a value of 1 if the project is classified as highly interdependent. 'Access to raw materials' is a binary variable that takes the value 1 if raw materials could not be sourced within the state of implementation. 'Storage of raw materials' is a binary variable that takes the value 1 if some of the raw materials could not be easily stored or transported. 'Requires local labor' is a binary variable that takes the value 1 if local labor was useful or critical. 'Requires skilled labor' is a binary variable that takes the value 1 if specialized skills were necessary and difficult to obtain. 'Access to construction equipment' is a binary variable that takes the value 1 if the equipment required is difficult to obtain, heavy duty, or difficult to transport to the site. 'Design uncertainty' is a binary variable that takes on the value 1 if the design of the project is context specific. 'Implementation uncertainty' is a binary variable that takes on the value 1 if there are substantial risks involved in implementation. 'Design ambiguity' is a binary variable that takes on the value 1 if there is a risk of redesign late on in the project. 'Implementation ambiguity' is a binary variable that takes on the value 1 if the technical risks of the project cannot be fully understood at implementation. 'Difficulty to manage' is a binary variable that takes the value 1 if the project is seen have elements that require project management skills of above average level. 'Number of agencies involved' is simply a count of the estimated number of agencies involved in the project cycle. 'Aggregate complexity' is a subjective assessment as to the overall complexity of the project by the coding engineers. This variable is an assessment of the interaction of the other variables as well as any unassessed aspects of complexity and provides a coherent picture of the complexity of the projects by a specialist. The variables 'interdependencies', 'access to raw materials', 'requires local labor', 'requires skilled labor', 'access to construction equipment', 'design uncertainty', 'implementation uncertainty', 'design ambiguity', 'implementation ambiguity' and 'difficulty to manage' are binary variables reflecting the variation in these previously categorical variables. The descriptives are defined for projects for which proportion completed is not missing and we have management scores. Figures are rounded to two decimal places.

Table A5: Management Practices and the Assignment of Projects to Organizations

Dependent Variable: Binary Variable Indicating Organization Implementing Project
Standard Errors: Clustered by Organization
Conditional Logit Model

	(1) Unconstrained Pairs	(2) Feasible Pairs	(3) Organization Controls	(4) Project Interactions	(5) Feasible Pairs by Complexity
CS-Autonomy	-0.78	0.81	2.03	2.34	2.58
	(1.08)	(1.01)	(1.64)	(1.69)	(1.77)
CS-Performance	-0.36	-0.82	-0.94	-1.11	-0.92
	(0.61)	(0.81)	(0.78)	(0.78)	(0.82)
Senior Bureaucrat's Span of Control			-0.08	-0.02	0.20
			(0.30)	(0.31)	(0.31)
Tenure of Senior Bureaucrats			0.03	0.05	0.02
			(0.16)	(0.16)	(0.18)
Tenure of Low-tier Bureaucrats			0.05	0.03	-0.03
			(0.09)	(0.09)	(0.09)
Proportion of Senior Bureaucrats That Report Being Intrinsically Motivated			-4.67	-4.53	-5.11
			(4.46)	(4.42)	(4.17)
Proportion of Low-tier Bureaucrats That Report Being Intrinsically Motivated			3.91	3.37	0.29
			(3.38)	(3.21)	(3.13)
Percentage of Projects that Senior Bureaucrats that Report Observing Corrupt Practices On			-0.04	-0.03	-0.02
			(0.03)	(0.03)	(0.03)
Percentage of Projects that Low-tier Bureaucrats that Report Observing Corrupt Practices On			0.02	0.02	0.02
			(0.04)	(0.04)	(0.04)
H₀: CS-Autonomy = - CS-Performance [p-value]	[0.07]	[0.98]	[0.37]	[0.34]	[0.22]
Organization Controls (capital, general, noise)	No	No	Yes	Yes	Yes
Interactions of Project and Organizational Characteristics	No	No	No	Yes	Yes
Project-Organization Paired Observations (clusters)	297423 (63)	44429 (59)	43844 (58)	43844 (58)	33370 (58)

Notes: *** denotes significance at 1%, ** at 5%, and * at 10% level. Standard errors are in parentheses, and are clustered by organization throughout. All columns report conditional logit estimates. The data is set up as follows. For each project, we associate a binary variable with 63 values corresponding to the 63 organizations in the core analysis of the paper. This variable takes the value one if the project is implemented at that organization, and zero otherwise. Thus, for each of our 4721 projects, we have 63 'project-organization' observations. These 297,423 observations are what makes up the 'unrestricted pairs' specification in Column 1. The 'feasible pairs' specification in Columns 2 to 4 restricts the set of organizations associated with a project to only those in the same sector. Those 847 projects implemented at the only organization in the sector drop out in this specification, leaving us with 44,429 project-organization observations. In Column 5 we restrict the feasible pairs further by assuming projects can only potentially be assigned to organizations in the same sector that are observed being tasked to implement at least one project of similar or greater complexity. Capital controls comprise organization-level controls for the logs of number of employees, total budget, and capital budget. General controls comprise organization-level controls for the share of the workforce with degrees, and the share of the workforce with postgraduate qualifications. Noise controls are four interviewer dummies, indicators of the seniority, gender, and tenure of the managers who responded, the day of the week the interview was conducted, the time of day the interview was conducted, a dummy variable indicating whether the interview was conducted during Ramadan, the duration of the interview, and an indicator of the reliability of the information as coded by the interviewer. Total and capital budget figures are an average of organization budget figures for the years 2006-10. We follow the grading system of the Federal Government by defining senior bureaucrats as those on grade level 12 and above. The proportion of staff intrinsically motivated refers to the fraction of employees at an organization that answered 'The chance to serve Nigeria' to the question 'What most influenced you to take up a career in the service?' in the Civil Servants Survey. The percentage of staff who observed corruption refers to the average proportion of projects officials at an organization stated on which 'I observed others breaking the service rules for their own benefit' in the Civil Servants Survey. At the foot of the table we report the p-value on the null that the coefficients on CS-Autonomy and CS-Performance are of equal and opposite magnitude. Figures are rounded to two decimal places.

Table A6: Robustness Checks I - BVR Measures, State Controls and Estimation Method

Dependent Variable: Proportion Project Completed
Standard Errors: Clustered by Organization
OLS Estimates in Columns 1 to 7, Fractional Regression Estimate in Column 8

	(1) Weighted Topics in CS Indices	(2) Overlapping CS- and BVR-Measures	(3) CS + BVR	(4) State-level Controls	(5) Northern Projects	(6) Southern Projects	(7) Organizational Location	(8) Fractional Regression
CS-Autonomy	0.63***	0.23***	0.33***	0.44***	0.29	1.15***	0.37***	2.74***
	(0.1)	(0.07)	(0.12)	(0.11)	(0.33)	(0.19)	(0.13)	(0.54)
CS-Performance	-0.26***	-0.23***	-0.18*	-0.25***	-0.25***	-0.62***	-0.22***	-1.62***
	(0.05)	(0.07)	(0.10)	(0.05)	(0.09)	(0.19)	(0.06)	(0.30)
BVR-Autonomy			0.16**					
			(0.08)					
BVR-Performance			-0.11					
			(0.11)					
H₀: CS-Autonomy = - CS-Performance [p-value]	[0.00]	[0.94]	[0.29]	[0.05]	[0.90]	[0.00]	[0.22]	[0.03]
H₀: CS M-Autonomy = BVR M-Autonomy [p-value]	-	-	[0.34]	-	-	-	-	-
Organization Controls (capital, general, noise)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Project Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State Controls	No	No	No	Yes	No	No	No	No
Fixed Effects	Project Type	Project Type	Project Type	Project Type	Project Type	Project Type	Project Type	Project Type
Observations	4721 (63)	4721 (63)	4721 (63)	4269 (63)	2381 (37)	1563 (29)	3327 (57)	4721 (63)

Notes: *** denotes significance at 1%, ** at 5%, and * at 10% level. Standard errors are in parentheses, and are clustered by organization throughout. Columns 1 to 7 report OLS estimates. Column 8 reports estimates from a fractional regression model. The dependent variable is the proportion of the project completed (that is a continuous measure between zero and one). In Column 1 we construct CS-Autonomy and CS-Performance measures by weighting each topic (rather than each variable) equally. In Column 2 we reconstruct our CS-based indices only using those questions on management practices that were also asked in BVR. In Column 4, "State Controls" comprise 'poverty controls', the proportion of households in a state who have difficulty meeting their food needs and the proportion of households that self-classify as poor; 'educational controls', literacy rates for adults and youth, and primary and secondary net enrollment and completion rates; and 'infrastructure controls', indicators of access to secure tenure, safe water, safe sanitation, improved waste disposal, medical services, vaccinations, electricity, computers, mobile phones and credit facilities, as well as the unemployment rate for over 15s. Column 5 restricts our specification to those projects for which we have location data and that are implemented in Northern Nigeria. Column 6 restricts our specification to those projects for which we have location data and that are implemented in Southern Nigeria. In Column 7 we include a dummy for whether the project was implemented by an organization based in a Northern state or one based in a Southern state. Project Type fixed effects relate to whether the primary classification of the project is as a financial, training, advocacy, procurement, research, electrification, borehole, dam, building, canal or road project. Project controls comprise project-level controls for the project budget, whether the project is new or a rehabilitation, and an assessment of its aggregate complexity by Nigerian engineers. Capital controls comprise organization-level controls for the logs of number of employees, total budget, and capital budget. General controls comprise organization-level controls for the share of the workforce with degrees, and the share of the workforce with postgraduate qualifications. Noise controls are four interviewer dummies, indicators of the seniority, gender, and tenure of the managers who responded, the day of the week the interview was conducted, the time of day the interview was conducted, a dummy variable indicating whether the interview was conducted during Ramadan, the duration of the interview, and an indicator of the reliability of the information as coded by the interviewer. Total and capital budget figures are an average of organization budget figures for the years 2006-10. At the foot of the table we report the p-value on the null that the coefficients on CS-Autonomy and CS-Performance are of equal and opposite magnitude. We also report the p-value on the null that the CS-Autonomy and BVR-Autonomy coefficients are equal. Figures are rounded to two decimal places.

Table A7: Robustness Checks II - Organization and Project Based Samples

Dependent Variable: Proportion Project Completed
Standard Errors: Clustered by Organization
OLS Estimates

	(1) Largest Org. by Total Exp.	(2) Org. With Most Projects	(3) Ten Orgs. with Smallest Total Exp.	(4) Ten Orgs. with Smallest No. of Projects	(5) Orgs. Below 5% or Above 95% of CS-Autonomy Scale	(6) Orgs. Below 5% or Above 95% of CS-Performance Scale	(7) Boreholes	(8) Construction Projects	(9) Non-Construction Projects
CS-Autonomy	0.49***	0.34***	0.53***	0.48***	0.44***	0.42***	0.65***	0.80***	0.38***
	(0.1)	(0.12)	(0.13)	(0.11)	(0.15)	(0.1)	(0.12)	(0.18)	(0.12)
CS-Performance	-0.27***	-0.21***	-0.27***	-0.24***	-0.30***	-0.28***	-0.28***	-0.33***	-0.10
	(0.05)	(0.06)	(0.05)	(0.05)	(0.09)	(0.06)	(0.06)	(0.10)	(0.09)
H0: CS-Autonomy = - CS-Performance [p-value]	[0.02]	[0.26]	[0.04]	[0.02]	[0.36]	[0.17]	[0.01]	[0.00]	[0.01]
Organization Controls (capital, general, noise)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Project Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Project Type	Project Type	Project Type	Project Type	Project Type	Project Type	None	Project Type	Project Type
Observations	4201 (62)	3924 (62)	4601 (53)	4711 (53)	4348 (48)	4193 (57)	1348 (18)	3822 (45)	899 (49)

Notes: *** denotes significance at 1%, ** at 5%, and * at 10% level. Standard errors are in parentheses, and are clustered by organization throughout. All columns report OLS estimates. The dependent variable is the proportion of the project completed (that is a continuous measure between zero and one). Column 1 excludes those projects implemented by the largest organization in terms of total expenditures. Column 2 excludes projects implemented by the largest organization in terms of total expenditures. Columns 3 and 4 remove the 10 smallest organizations by expenditures and number of projects respectively. Columns 5 and 6 exclude organizations at the top and bottom of the CS-autonomy and CS-performance management scales respectively. Column 7 includes only borehole projects (and so does not include project fixed effects). Column 8 includes only construction projects (borehole, building, electrification, dam, road and canal) and Column 9 includes only non-construction projects. Project Type fixed effects relate to whether the primary classification of the project is as a financial, training, advocacy, procurement, research, electrification, borehole, dam, building, canal or road project. Project controls comprise project-level controls for the project budget, whether the project is new or a rehabilitation, and an assessment of its aggregate complexity by Nigerian engineers. Capital controls comprise organization-level controls for the logs of number of employees, total budget, and capital budget. General controls comprise organization-level controls for the share of the workforce with degrees, and the share of the workforce with postgraduate qualifications. Noise controls are four interviewer dummies, indicators of the seniority, gender, and tenure of the managers who responded, the day of the week the interview was conducted, the time of day the interview was conducted, a dummy variable indicating whether the interview was conducted during Ramadan, the duration of the interview, and an indicator of the reliability of the information as coded by the interviewer. Total and capital budget figures are an average of organization budget figures for the years 2006-10. At the foot of the table we report the p-value on the null that the coefficients on CS-Autonomy and CS-Performance are of equal and opposite magnitude. Figures are rounded to two decimal places.

Table A8: Management Practices and Public Sector Service Delivery at the Organization Level

Dependent Variable Cols 1-3: Average Proportion Project Completed [at the organization level]
(weighted by project budget share in Column 2)
Dependent Variable Col 4: Average Project Complexity [at the organization level]
Dependent Variable Col 5: Organization Total Budget
Robust Standard Errors
OLS Estimates

	(1) Organization Controls	(2) Weighted By Line Item Share	(3) Topic-based Management Score	(4) Project Complexity	(5) Log Organizational Budget
CS-Autonomy	0.27*	0.27*	0.38**	-5.79	0.15
	(0.16)	(0.15)	(0.18)	(5.55)	(0.23)
CS-Performance	-0.19**	-0.19**	-0.22**	-0.42	0.11
	(0.09)	(0.09)	(0.09)	(3.14)	(0.13)
H₀: CS-Autonomy = - CS-Performance [p-value]	[0.57]	[0.59]	[0.30]	[0.23]	[0.18]
Organization Controls (capital, general, noise)	Yes	Yes	Yes	Yes	Yes
Observations	63	63	63	63	63

Notes: *** denotes significance at 1%, ** at 5%, and * at 10% level. Robust standard errors are in parentheses. All columns report OLS estimates. The dependent variable in columns 1 to 3 is a measure of project completion as measured at the organization level. In Columns 1 and 3 it is the unweighted proportion completed of all OPEN projects at the organization. In Column 2 it is the weighted proportion completed of all OPEN projects at the organization, where each project is weighted by its budget allocation as a share of the organization's total allocation. In Column 3 the CS- management scores are based on first clustered questions into management 'topics' (such as facilities and targeting practices) and weighting such that each topic (rather than each question) has an equal weighting. The dependent variable in Column 4 is the average complexity of projects assigned to the organization. The dependent variable in Column 5 is the log of the average total organizational budget, averaged over 2006 to 2010. In Columns 1 to 4, capital controls comprise organization-level controls for the logs of number of employees, total budget, and capital budget. In Column 5, we drop total organizational budget as a control as the log of organizational budget is the dependent variable. General controls comprise organization-level controls for the share of the workforce with degrees, and the share of the workforce with postgraduate qualifications. Noise controls are four interviewer dummies, indicators of the seniority, gender, and tenure of the managers who responded, the day of the week the interview was conducted, the time of day the interview was conducted, a dummy variable indicating whether the interview was conducted during Ramadan, the duration of the interview, and an indicator of the reliability of the information as coded by the interviewer. Total and capital budget figures are an average of organization budget figures for the years 2006-10. At the foot of the table we report the p-value on the null that the coefficients on CS-Autonomy and CS-Performance are of equal and opposite magnitude. Figures are rounded to two decimal places.

Table A9: Decomposing the Impacts of Management Practices

**Dependent Variable: Proportion Project Completed**
**Standard Errors: Clustered by Organization**
OLS Estimates

	(1) Baseline	(2) Autonomy Components	(3 Performance Components
CS-Autonomy	0.48***		0.50***
	(0.10)		(0.10)
CS-Performance	-0.25***	-0.29***	
	(0.05)	(0.05)	
Facilities		0.08**	
		(0.03)	
Skills		0.11**	
		(0.04)	
Staffing		0.11*	
		(0.06)	
Targeting		0.04	
		(0.04)	
Flexibility		0.18***	
		(0.04)	
Roles		0.32***	
		(0.05)	
Culture		0.00	
		(0.03)	
Performance Incentives			-0.13***
			(0.05)
Monitoring			-0.21***
			(0.05)
H$_0$: CS-Autonomy = - CS-Performance [p-value]	[0.03]		
H$_0$: CS-Autonomy Components Equal [p-value]		[0.00]	
H$_0$: CS-Performance Components Equal [p-value]			[0.24]
Organization Controls (capital, general, noise)	Yes	Yes	Yes
Project Controls	Yes	Yes	Yes
Fixed Effects	Project Type	Project Type	Project Type
Observations (clusters)	4721 (63)	4721 (63)	4721 (63)

Notes: *** denotes significance at 1%, ** at 5%, and * at 10% level. Standard errors are in parentheses, and are clustered by organization throughout. All columns report OLS estimates. The dependent variable in all columns is the proportion of the project completed (that is a continuous measure between zero and one). All of the index component variables in the table are z-scores which are centered at 0. The variable 'facilities' measures the quality of infrastructure at an organization and the equipment available to staff. The variable 'skills' measures the skills and training opportunities embodied in the staff body. The variable 'staffing' measures the effective utilization of that body of staff. The variable 'targeting' examines the extent of use of targets. The variable 'flexibility' measures the extent to which the organization is able to respond to best practice and project peculiarities. The variable 'roles' measures the extent to which staff can play a role in defining the direction of the organization. The variable 'culture' measures whether the organization inculcates a productive work culture. Together these components make up our autonomy variable. The variable 'monitoring' focuses on the tracking of performance of individuals and projects. The variable 'performance' examines the use of incentives both to reward success and punish failure. Project Type fixed effects relate to whether the primary classification of the project is as a financial, training, advocacy, procurement, research, electrification, borehole, dam, building, canal or road project. Project controls comprise project-level controls for the project budget, whether the project is new or a rehabilitation, and an assessment of its aggregate complexity by Nigerian engineers. Capital controls comprise organization-level controls for the logs of number of employees, total budget, and capital budget. General controls comprise organization-level controls for the share of the workforce with degrees, and the share of the workforce with postgraduate qualifications. Noise controls are four interviewer dummies, indicators of the seniority, gender, and tenure of the managers who responded, the day of the week the interview was conducted, the time of day the interview was conducted, a dummy variable indicating whether the interview was conducted during Ramadan, the duration of the interview, and an indicator of the reliability of the information as coded by the interviewer. Total and capital budget figures are an average of organization budget figures for the years 2006-10. Figures are rounded to two decimal places.

Figure A1: Area of Covariances in Which Coefficients are Underestimated in Absolute Terms
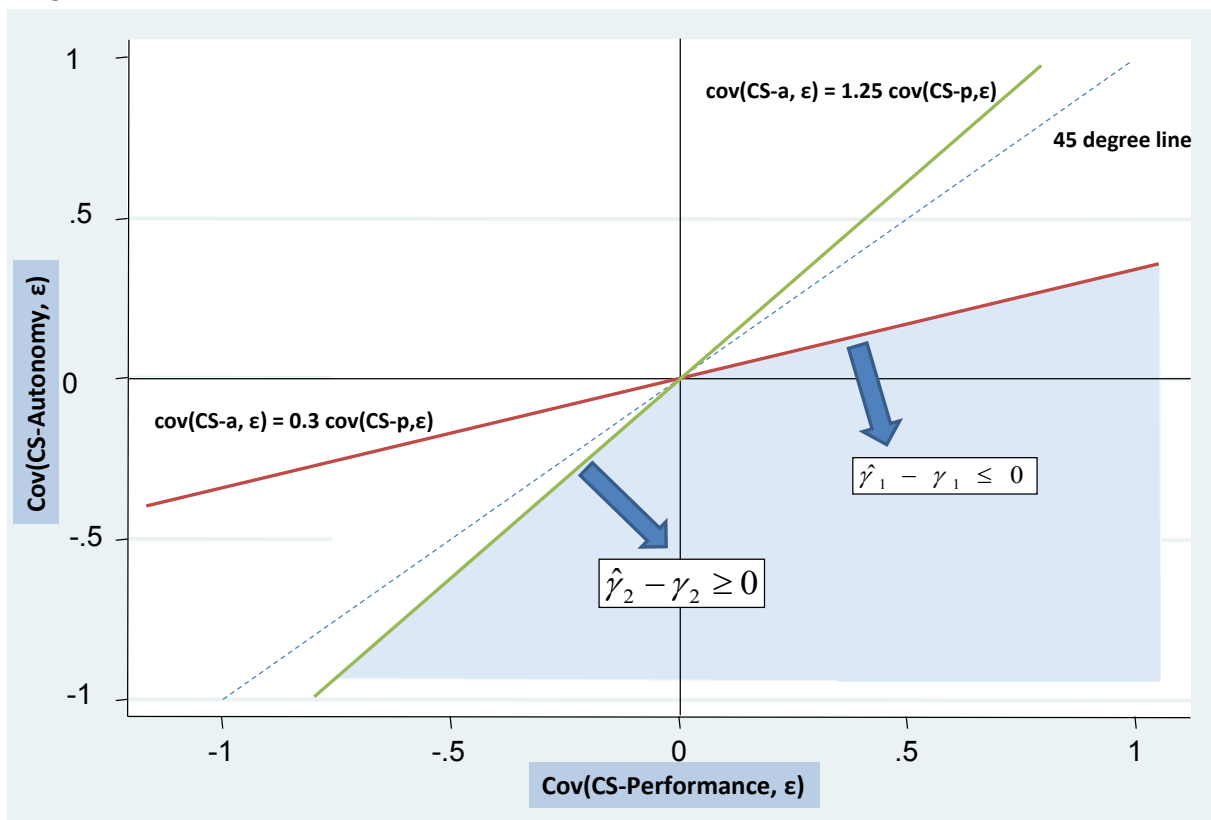
Figure A2: Impact of Management Practices For Different Thresholds of Project Success
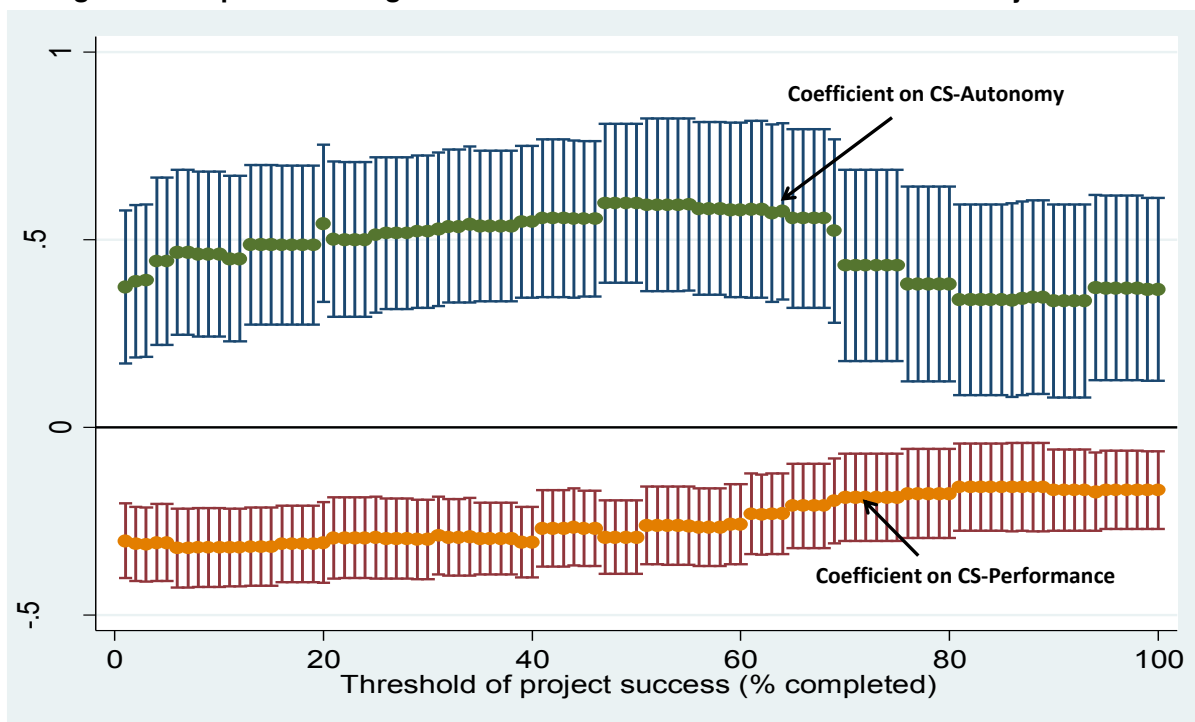
Notes: We define a threshold completion rate of p% and then consider all potential thresholds from 1% to 100% in increments of 1%. We then use this to define a dummy variable for our main empirical specification, where the outcome is a dummy variable equal to one if the project completion rate is above the threshold p%, and zero otherwise. For any given threshold p the coefficients of interest on CS-Autonomy and CS-Performance are shown above and their associated 95% confidence interval.

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