

The Political Economy of Unfinished Development Projects: Corruption, Clientelism, or Collective Choice?

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Abstract

Development projects like schools and boreholes are popular with politicians and voters alike, yet many developing countries are littered with half-finished projects that were abandoned mid-construction. This highly visible phenomenon has received little theoretical or empirical attention. I examine three plausible explanations: corruption, clientelism, and dynamically inconsistent collective choice. Using an original database of over 14,000 small development projects in Ghana, I estimate that approximately one-third of projects that start are never completed, consuming nearly one-fifth of all local government capital spending. I find evidence that supports the theory that unfinished projects are an inefficient outcome of failed intertemporal bargaining among local political actors, but is inconsistent with corruption and clientelism as major causes of non-completion. Fiscal institutions can increase completion rates by mitigating the operational consequences of these distributive pressures. These findings have implications for the political economy of public good provision, the design of inter-governmental transfers and aid delivery, and the development of state capacity.

1 Introduction

The provision of basic social infrastructure, such as schools, clinics, and latrines, is a crucial function of government in developing countries. These politically popular, locally targeted, and highly visible projects are also exactly the type of public goods that politicians seek to deliver in theories of pork barrel politics, tactical redistribution, and credit claiming. Yet it is anecdotally common for governments in developing countries to start work on such projects but never actually complete them, leaving behind half-finished projects of no value to users and voters. Though widely remarked upon and substantively important, the extent and causes of this phenomenon have received surprisingly little attention.¹ Viewed through the lens of distributive politics that has guided many studies on the political economy of public good provision in developing countries, non-completion is also theoretically

¹In the only large-sample study of project completion (to my knowledge), Rasul and Rogger (2016) estimate that 25 percent of government projects in Nigeria that start are fully completed within the budget year. Samuels (2002, 852) refers in passing to “the literally thousands of unfinished pork-barrel projects that dot the Brazilian countryside” but does not attempt to quantify this. A mainly OECD-focused literature on mega-project delivery documents the frequency of delays, cost overruns, and benefit shortfalls (e.g. Flyvbjerg 2014), but does not examine non-completion *per se* or the type of small, technically simple, and relatively inexpensive projects discussed in this paper.

puzzling: facing strong political incentives to deliver projects, why would governments use scarce resources to build only the bottom half of a school?

I suggest three plausible explanations for the phenomenon of project non-completion. First, non-completion may be due to corruption, either for private gain or to finance political activities (Samuels 2002, Olken 2007, Pande 2007). In this view, projects go unfinished because someone stole the money. Second, non-completion could arise in theories of clientelism in which it may be sometimes rational for politicians to deliberately leave projects unfinished to increase voters' incentives to reelect them (Robinson and Torvik 2005). In the clientelism view, projects go unfinished because it was strategically optimal for the incumbent to leave them unfinished. Third, non-completion could be the result of dynamically inconsistent collective choice processes over project distribution, in which political actors' inability to sustain intertemporal bargains among each other leads to erratic project implementation. The idea that collective choices over locally targeted projects can lead to inefficient government expenditure has a long tradition in public choice theory (Riker and Brams 1973, Weingast and Marshall 1988), but has received significantly less attention in developing country contexts and with respect to the impact of these political bargaining processes on project-level outcomes.

I examine project completion empirically using an original dataset of over 14,000 small development projects that were started in Ghana from 2011-13, primarily by local governments. This dataset was compiled from administrative records that I collected, digitized, and coded, and comprises (to my knowledge) the largest and most comprehensive dataset on project delivery in any developing country. I estimate that approximately one-third of these projects are never finished, consuming nearly 20 percent of all local government capital expenditure.²

In addition to the fiscal waste, the economic and social opportunity costs of non-completion are enormous: I estimate that the money spent on non-completed projects by local governments alone would be enough to fully construct 667 additional three-room schools serving over 73,000 children, *every year*.³ The political opportunity costs are also potentially substantial: delivering infrastructure projects has been shown to win votes for the incumbent in Ghanaian elections (Briggs 2012, Weghorst and Lindberg 2013, Harding 2015), citizens and media often refer to unfinished projects in nega-

²Although not directly comparable, this estimate of the fiscal costs of implementation failure is of similar magnitude to Olken's (2007) estimate of resource loss from corruption in road building (24 percent) and Finan and Mazzocco's (2016) estimate of the percentage of public expenditure that is misallocated due to political distortions (26 percent).

³Based on an average class size of 36.6, as reported in the World Bank's EdStats database for the most recent year available, 2011.

Figure 1: Unfinished projects



tive performance evaluations of government (Ghana News Agency 2014), and elections in Ghana are often narrowly decided, with the 2008 election being decided by just 40,586 votes (Whitfield 2009). These political costs may help explain why even the president (Joy News 2014) and members of Parliament (Citi FM 2014) have complained publicly about project non-completion.

I identify and test observable implications of the corruption, clientelism, and collective choice theories in the context of decentralized public good provision in Ghana. Despite the literature's overwhelming focus on corruption and clientelism as causes of inefficient public investment in developing countries, I find considerable evidence that is inconsistent with either of these factors being significant causes of project non-completion.

I do, however, find support for the hypothesis that failures of collective choice are a major cause of project non-completion. I identify collective choice failures through a cross-sectional difference-in-difference approach that compares the completion rates of projects in the same district that are selected and implemented by the same local politicians and bureaucrats, but are funded through two different mechanisms: a lump sum intergovernmental transfer from the central government, and another lump sum intergovernmental transfer funded mainly by donors. Projects funded through the latter source are less susceptible to time inconsistency in district-level collective choice due to an exogenously imposed funding rule that places districts at risk of losing future transfers if they fail to complete ongoing projects before starting new ones. Even after controlling for district-year, project type, contractor, and within-district community fixed effects, the aid-funded projects are significantly more likely to be completed than the government-funded projects. Consistent with the observable implications of the collective choice theory of non-completion, this gap is largest in districts whose partisan and ethnic characteristics make it difficult for local political actors to sustain

intertemporal bargains over project distribution, and disappears entirely in districts that are politically and ethnically homogenous.

This paper contributes to the literature on the political economy of public good provision in several ways. Numerous empirical studies of distributive politics in developing countries take *either* input-based measures of expenditure choice and allocation (e.g. Keefer and Khemani 2009, Banful 2011, Jablonski 2014) *or* output- or outcome-based measures of access or service quality (e.g. Franck and Rainer 2012, Kramon and Posner 2013, Hodler and Raschky 2014) and assume they reflect the revealed tactical targeting strategies of incumbent parties and politicians.⁴ Yet this assumption only holds if the determinants of project implementation are orthogonal to the determinants of project distribution - an extremely strong assumption that is contradicted by this study's results. Policy implementation thus has distributive consequences, yet it is absent from the foundational theoretical models of this literature (Cox and McCubbins 1986, Lindbeck and Weibull 1987, Dixit and Londregan 1996). These findings suggest a need for further theoretical work to model policy choice and policy implementation as distinct, but not independent, political and administrative processes.

My findings are also closely related to recent work by Hodler and Raschky (2014) and Burgess *et al* (2015), who find that greater constraints on the executive are associated with reduced ethnic favoritism in public good provision. Whereas these papers examine the effects of longitudinal institutional change on public good provision, I demonstrate that different institutional rules can lead to different (and significantly improved) outcomes even when applied simultaneously to the same set of political actors. The article also connects to the recent literature in American politics that examines how administrative agencies mediate the workings of distributive politics (Bertelli and Grose 2009, Gordon 2011, Ting 2012), and provides the first project-level evidence that the source of public funds matters for expenditure outcomes (Fisman and Gatti 2002, Gadenne 2015).

Finally, this paper builds on Bandiera, Prat, and Valletti's (2009) distinction between active waste (which creates utility for the decision-maker) and passive waste (which does not), and their finding that the latter is quantitatively more important in procurement in Italy. Although I do not make

⁴Burgess *et al* (2015) use both an input-based measure of expenditure and an output-based measure of physical completion as alternative dependent variables, and report that Kenyan districts that are coethnic with the president receive twice as much expenditure as non-coethnic districts but five times more roads (by length). Although they do not investigate the discrepancy between these two measures, it is substantial and consistent with the idea that project implementation may be affected by the same factors that determine distribution.

precisely the same comparison, their emphasis on the non-instrumentality of much inefficient expenditure is similar to my argument that project non-completion is not well explained by corruption or clientelism (forms of active waste) but can be explained, at least in part, as the dynamically inconsistent outcome of a collective choice process.

The remainder of this article proceeds as follows. I first provide some background on decentralized public good provision in Ghana, then discuss three plausible theoretical explanations for the non-completion of development projects and their observable implications. I then introduce the infrastructure project dataset, examine each of these predictions empirically through descriptive statistics and regression analysis, and address potential objections. I conclude with a brief discussion of interpretation and implications.

2 Background: decentralized public good provision in Ghana

Ghana's districts are an ideal setting in which to examine the political economy of project delivery empirically.⁵ As in many countries, since the 1980s Ghana has progressively decentralized responsibility for delivering a range of public goods, including facilities for basic education, sanitation, primary care clinics, marketplaces, and housing and offices for district staff. While districts are statutorily restricted to relatively small projects, total local government expenditure on capital projects is nonetheless substantial: GHS 317 million (equivalent to just over US \$135 million) in 2013, or 42.5 percent of their total revenue.⁶

All districts are headed by a District Chief Executive (DCE) who is appointed by the President and presides over a directly elected district assembly, in which 70 percent of members are elected from geographically defined single-member electoral areas and 30 percent are appointed by the President.⁷ DCEs do not have a fixed term and so would expect to serve until their party

⁵Depending on their size, Ghana's local government units are known and classified variously as district, municipal, and metropolitan assemblies. These legal and administrative distinctions are not relevant for this study, so for brevity I refer to them generically as districts.

⁶Author's calculations from Ministry of Local Government and Rural Development (MLGRD) budget data. Schedule 3 of the Public Procurement Act (2003, Act 663) fixes this threshold at GHS 200,000, or approximately USD 85,000. Calculations based on an exchange rate of USD 1 = GHS 2.35, as at 31 December, 2013.

⁷For brevity I refer generically to DCEs, even though they are formally known as Municipal or Metropolitan Chief Executives (MCEs) in those assembly types.

loses power or they are removed.⁸ Although district assembly elections are formally non-partisan, district assemblies and DCEs are widely perceived in Ghana as politicized, partisan actors.⁹ Assembly members are elected to four-year terms in elections that occur simultaneously nationwide; these took place in 2010, so the composition of assemblies was constant throughout this paper’s study period of 2011-2013. District bureaucracies are composed of professional public servants, and the hiring and transfer of personnel is decided centrally.

National elections are closely contested by two dominant parties, the National Democratic Congress (NDC, which won elections in 2008 and 2012) and the National Patriotic Party (NPP). The President is elected by national popular vote, so there is a strong incentive for the incumbent to try to deliver public goods in order to win votes and increase partisan turnout across all districts. Public goods provision is highly salient and voters have been shown to reward the delivery of visible public goods (Briggs 2012, Weghorst and Lindberg 2013, Harding 2015). Yet voters and politicians alike frequently complain about projects being abandoned mid-construction. Unfinished projects are widely reported on by the media (e.g. Ghana News Agency 2014), and action against them has been pledged both by Parliament (Citi FM 2014) and the President (Joy News 2014).

Project selection decisions are made jointly by DCEs and assemblies in an annual budgeting process, and districts’ limited resources mean that only a fraction of communities can receive projects in any given year.¹⁰ While the DCE has a significant amount of formal and informal agenda-setting power over this process, not least as Chair of the influential Executive Committee of the assembly. Political negotiations over expenditure priorities is ongoing throughout the year: while the implementation of the budget is formally

⁸DCEs have some degree of downward accountability to assemblies, only weakly in a formal sense (through a requirement that their appointment be approved by a two-thirds majority of the assembly) but more strongly through informal means such as the threat of protest, which can lead to removal by the President.

⁹For example, political parties often lend informal support to candidates during district assembly elections (GNA 2015a), DCEs are often accused of unduly politicizing their roles (e.g. Today 2015), and a nationwide study by Ghana’s National Commission on Civic Education found that 68.6 percent of respondents believed that district assemblies were partisan in their operation (NCCE 2015).

¹⁰For example, Kwabre East District Assembly spent GHS 1.36 million on capital projects in 2013 (just above the national median), and was comprised of 42 geographically distinct settlements represented by 31 elected assembly members. In the same year, the mean cost for a six-room classroom block (the modal project type) was GHS 169,909. Even if the district spent its infrastructure budget entirely on classroom blocks, it could still only deliver eight of them within the year – roughly two-thirds of its assembly members and over four-fifths of its communities would not receive anything.

the responsibility of the DCE and the district bureaucracy, agreed budgets are often not strictly implemented and assembly members can continue to influence budget execution and project implementation through periodic assembly meetings during the year, as well as through informal lobbying and protests.

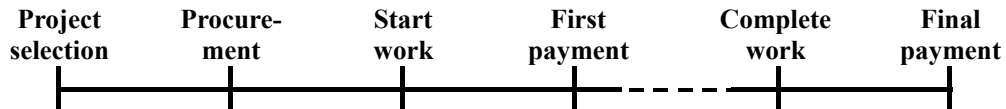
Districts' capital expenditures are funded primarily through intergovernmental transfers, as is typically the case for local governments in developing countries (Gadenne and Singhal 2014). The two largest transfers are the District Assemblies Common Fund (DACF) and District Development Facility (DDF), both of which are periodic, lump sum, formula-based transfers to districts (similar to block grants in a federal system).¹¹ The DACF is funded entirely by the central government, while the DDF is funded by a multi-donor pool with the central government also contributing 30 percent co-financing. (For ease of exposition, I will refer to DACF projects as "government-funded" and DDF projects as "donor-funded" henceforth.) Whereas there are no restrictions with respect to expenditure allocation across government-funded projects, under the donor-funded transfer program districts are required to budget to complete existing projects before starting new ones. Otherwise, the two fund sources are operationally almost identical: in both cases project selection, procurement, and implementation are entirely conducted at the district level, by the same politicians and bureaucrats and through the same planning and budgeting process. Both are restricted to spending on capital investments rather than recurrent expenditures or private transfers, both are financially audited by the same central government auditors as part of the routine annual district audit process, and both are administered by small central government secretariats to which annual budgets and reports are submitted but which play no direct role in implementation.

I also examine a third major source of project funding, the Ghana Edu-

¹¹The DACF allocation formula is set each year by Parliament. While there is evidence that this formula has previously been manipulated to target funds to favored constituencies (Banful 2011), the magnitude of the effect is small and in any case should affect the absolute number of projects completed by districts, not the completion rate. The DDF allocation formula is based in part on an annual assessment of compliance with statutory regulations and administrative processes. Districts that perform better receive incrementally higher allocations, while districts that do not meet the minimum requirements do not receive funds for investment in that year's allocation. However, failure to meet minimum requirements has been rare after first year (prior to this sample) and the disbursements are made with a two-year lag from the assessment year, and as with the DACF any cross-district differences in quantity of funds received should affect the level rather than rate of project completion. For both fund sources, funds are disbursed to all districts simultaneously so these delays affect all districts equally, and there is no evidence of any differential delay in releases or manipulation thereof.

cation Trust Fund (“centralized projects” henceforth), under which districts propose a list of projects from which a central government committee selects some to fund. Unlike the government- and donor-funded transfers, for centralized projects resources are not transferred directly to districts but are used centrally to pay contractors directly for work done in the districts.

Figure 2: Stylized timeline of an infrastructure project



Although most studies of the political economy of public good provision abstract from the actual process of implementation, the mechanics of project delivery are non-trivial. Figure 2 presents a stylized timeline of the construction of a typical small public infrastructure project. After project selection the project undergoes some sort of procurement process and a private firm is contracted to construct it. These first two stages are usually the focus of studies of distributive politics (project selection) and of corruption (procurement). The contractor begins work on the project, and after completing the first stage requests partial payment from the government, which then inspects the work completed and, if satisfactory, makes payment. This cycle then repeats itself: the contractor completes the project and requests full payment, and once the government has inspected the work and made full payment the project is handed over to the government and can be put into use.¹² In a purely mechanical sense, a project can be left incomplete either because the contractor failed to complete one of the stages of physical construction, thus stopping the project, or because the government failed to disburse a payment tranche, thus leading the contractor to pause work. Importantly, the multi-stage nature of project delivery means that, even after making the initial policy choice to start the project, the government must periodically renew its commitment to the project by releasing funds to the contractor, and this has political economy implications.

¹²Although Figure 2 only shows two stages for simplicity, even small projects can have significantly more steps. A typical six-room school in Ghana may be divided into five payment tranches.

3 Corruption, clientelism, or collective choice? Theories and observable implications

The key theoretical question addressed in this article is: conditional on a government having started a project, why would the same government subsequently not finish the project?¹³ This question is not well explained by existing theories of politically motivated *misallocation* of public expenditure, in which inefficiencies arise due to the tactical targeting of expenditure (Dixit and Londregan 1996, Golden and Min 2013, Finan and Mazzocco 2016) or over- or under-spending on infrastructure relative to private transfers (Besley and Coate 1998, Keefer 2007, Robinson and Verdier 2013). Similarly, although corruption has been the overwhelming focus of studies of the implementation of public good provision in developing countries (Olken and Pande 2012; Banerjee, Hanna, and Mullainathan 2013) and the allocation of infrastructure contracts to political supporters has been widely remarked (Samuels 2002, Luna 2015), corruption in infrastructure project delivery need not lead to non-completion of the project. Indeed, when corruption takes the common form of inflated contract values or sub-standard quality (Olken 2007, World Bank 2011), contractors may actually have *stronger* incentives to complete projects in order to reap their excess rents.

This section outlines three plausible explanations to the above question. Each of these theories of non-completion is plausible *a priori*, so I also identify observable implications of each theory that can be examined empirically in the context of decentralized public good provision in Ghana.

First, non-completion could be caused by a specific form of corruption: projects could be left incomplete if contracts were given to favored contractors who are paid for the work but placed under little pressure to complete it. This would enable the contractors to keep as profit (or pay as kickbacks) the cost savings from not completing the project.¹⁴ While this type of corruption

¹³Electoral alternation or regime change is a widely recognized cause of project non-completion and changes in policy direction more generally, but I focus on how non-completion might occur without any regime change. I also abstract from considerations of the identity or capacity of politicians and bureaucrats, the technical complexity of projects, and other environmental shocks. These factors are either fully controlled for in my empirical research design or are not salient features of the implementation of the types of small and technically simple construction projects I discuss.

¹⁴Corruption in the form of aggregate diversion of funds (as opposed to project-specific embezzlement) in the form documented by, for instance, Reinikka and Svensson (2004), seems less plausible as a driver of project non-completion. Even if (say) half of a district's total funds were diverted from the infrastructure budget, it is not clear why reelection-seeking incumbents would not spend the remaining half of the budget on fully completing half as many projects as could have been completed with the full budget. This form of

on the “quantity” margin has not been previously examined empirically - as opposed to the quality and price margins that the existing literature has focused on - it does have a clear empirical implication: financial expenditure on non-completed projects should be greater than the physical progress of construction on these projects. In effect, this test is equivalent to Olken’s (2007) well-known indicator of “missing expenditures”, albeit where the “missing” expenditure is on the quantity rather than the quality margin.

Second, building on the logic underlying theories of clientelism as a two-way credibility problem (Robinson and Torvik 2005, Robinson and Verdier 2013), politicians may deliberately leave projects incomplete before elections due to voters’ inability to credibly commit to reward projects with votes.¹⁵ If credit-claiming dynamics make the incumbent more likely than a challenger to complete a project started by the incumbent, starting (but not finishing) a project would increase nearby voters’ incentives to vote for the incumbent, and so immediately before an election incomplete projects may actually be more desirable from the incumbent’s point of view than completed projects.

This clientelism-based theory of non-completion has several observable implications. First, project non-completion should vary significantly across the electoral cycle. Since Ghana held a presidential election in December 2012, the clientelism theory would imply a lower completion rate in the election year (2012) than in pre- or post-election years.¹⁶ A second implication

corruption should therefore reduce the absolute number of projects completed rather than the completion *rate*, especially when project funds are drawn from a general pool and are not earmarked for specific projects, as is the case in my empirical setting. Similarly, the explanation that unfinished projects are simply used by politicians as a way to direct private transfers to communities in the form of labor income seems implausible as a general explanation of project non-completion. Labor is a relatively small share of most capital projects, and a politician could deliver these private benefits by seeing a project through to completion and also reap the additional political benefits of having provided a useful local public good. Even if politicians were motivated not primarily by the use value of the project itself, but rather by the pecuniary gains to private individuals from public projects, it is unclear why a politician would opt to only partially implement such a project when completing it would entail even more such payments.

¹⁵Project completion is not the focus of the models in Robinson and Torvik (2005) and Robinson and Verdier (2013), which focus on inefficient project selection and public sector employment as patronage, respectively. However, the common thread between these two models and the clientelism-based theory of project non-completion is that politicians may sometimes find it rational to make apparently inefficient public expenditure choices in order to “tie the continuation utility of a voter to their political success” (Robinson and Verdier 2013, 261).

¹⁶An alternative view of project completion as driven by electoral cycles would predict that politicians would instead try to complete projects in election years so that its completion is fresher in voters’ memories. However this would only explain why project completion was delayed until an election year, not why projects were left incomplete in-

is that the degree of physical progress on started projects is likely to be low, since the project start itself is what creates the desired voting incentives (from the incumbent’s point of view) and further expenditure on the project does not enhance these incentives. Third, if the ruling party views project non-completion as an effective political strategy and instructs its district-level representatives accordingly, at least in certain districts and communities, then the completion patterns of government-funded projects in these districts and communities should be mirrored by the completion patterns of centralized projects, which are executed by the central government, under the direct control of the incumbent. (I specify this last prediction more formally in Section 5.)

A third plausible explanation is that unfinished projects are the inefficient outcome of a collective choice process among multiple political actors whose preferences and incentives may not be perfectly aligned with those of the incumbent executive. This view of unfinished projects as a dynamically inconsistent collective choice outcome shares the clientelism theory’s emphasis on the distributive politics of project delivery, but does not share the assumption that project delivery decisions are the choice of a unitary, rational incumbent constrained only by periodic elections.

In the context of local government in Ghana, the executive is constrained in its decisionmaking over project selection and delivery both formally and informally. Most obviously, project distribution is subject to votes and lobbying by district assembly members, local politicians who have strong electoral incentives to bring projects to their own electoral areas but little incentive to support expenditure on projects in other areas in the district. This situation closely approximates the canonical scenario of legislative logrolling over pork-barrel projects, in which the dynamics of bargaining and coalition formation - you vote for my project, I vote for your project - take center stage (Tullock 1970). And while political coalition formation and logrolling in legislatures is the most obvious and theoretically well-explored example of executives having to share decision-making over expenditure with other political actors, constraints on incumbents’ ability to make tactical targeting decisions may also be informal and exist even in the absence of a formal legislative process, for example in the form of political brokers (such as chiefs) and interest groups, of public opinion and norms of fairness, or of the threat of protest and (in extreme cases) of violence.¹⁷

definitely.

¹⁷This view of the executive as (at least sometimes) constrained in its targeting of expenditure is supported empirically by Hodler and Raschky (2014) and Burgess *et al*’s (2015) finding that generalized constraints on the executive (Polity2 and Polity IV scores, respectively) reduce ethnic favoritism in public resource distribution.

Collective choice over project distribution thus requires the formation of coalitions through bargaining among local political actors, each of who cares more about some projects than others. Yet forming stable support coalitions is challenging due to actors' inability to credibly commit to uphold these bargains. Again, these dynamics are most clearly illustrated by the case of logrolling in legislatures over pork-barrel projects: since not all votes occur simultaneously and not all projects can be implemented simultaneously - non-simultaneous exchange and non-contemporaneous benefit flows, in Weingast and Marshall's (1988) terms - maintaining logrolling coalitions requires intertemporal bargaining amongst coalition members.¹⁸ These bargains are non-contractible, however, so individual members who have just received a project have an incentive to renege *ex post* on their promises to support projects in other members' areas; knowing this, members have little incentive to sacrifice their own immediate self-interest (having a project started in their area) in order to sustain a coalition and finish the project of another coalition member. These commitment failures make coalitions inherently unstable, as any structure of actor preferences that enables bargaining also enables voting cycles, making any existing coalition vulnerable to an alternative proposal (Riker and Brams 1973).

In the context of development projects that are implemented in several stages and which require government to expend funds at several points in time after the initial project selection - as illustrated by Figure 2 - it is straightforward to see how instability in the support coalitions among local political actors could lead projects to be interrupted mid-construction, if the coalition that initiated a project shifts or changes its collective expenditure priorities before the project is completed.¹⁹ These shifting collective expenditure priorities lead the government to fail to make a payment tranche to the con-

¹⁸For simplicity and to match my empirical context I focus on the case of single-member electoral districts. While a large literature examines how variation in electoral representation, the number of districts, and other legislative institutions affects incentives for pork-barreling (Weingast, Shepsle, and Johnsen 1981; Baron and Ferejohn 1989; Primo and Snyder 2010), exploring the effects of variation in legislative institutions is beyond the scope of this paper.

¹⁹Intertemporal bargaining problems are likely to be especially severe in contexts where the demand for projects is much greater than the resources available - as is frequently the case with basic social infrastructure provision in poor countries - and so projects can only be delivered to a minority of constituencies at any given period. Resource scarcity also renders difficult one of the traditional responses to coalition instability, the formation of universal or oversized coalitions (Weingast, Shepsle, and Johnsen 1981). Since projects (unlike transfers or budget allocations) are non-fungible there is a limit to which they can be sub-divided to spread benefits more widely, and simultaneous implementation of too many projects will have the same effect as coalition instability: projects will be interrupted mid-construction.

tractor, which stops progress on the project. If the government subsequently does make this payment in a reasonably timely fashion, the interruption may be temporary and result only in delayed completion, but if the government never makes the payment or makes it only after a long delay the project will remain incomplete indefinitely.²⁰ The idea that unstable political support coalitions can affect project implementation is well established in the case study literature in public administration, albeit in a different context and with different consequences, with Pressman and Wildavsky noting in their classic study of urban development projects in Oakland: “Agreements were reached, eroded, and remade. The frequent calls for coordination. . . reflected the inability of the machinery for implementation to move fast enough to capture the agreements while they lasted” (1984 [1973], 92).

What would be the observable implications of this collective choice theory of project non-completion? The dynamics of legislative logrolling cannot be examined directly in my empirical case, as much of the bargaining is informal and there is no data on proceedings and voting in district assemblies in Ghana (as is the case with local-level governance in many developing countries). I instead identify the impact of collective choice failures indirectly, by using a proxy measure of the differential ease of sustaining intertemporal bargains across districts. A large literature argues that the problems of the durability and enforceability of legislative bargains can be stabilized by legislative institutions that enable agenda-setting and facilitate enforcement through rewards or punishments (Weingast and Marshall 1988, Baron and Ferejohn 1989) and by strong parties that can internalize the externalities created by the voting behavior of self-interested individual legislators and provide campaign support that makes them less reliant on the personal vote (Primo and Snyder 2010).

In the Ghanaian context, the executive is more likely to be able to stabilize local project support coalitions in districts that are politically aligned with the ruling party, due to two asymmetries in the structure of district governance in Ghana: in every district 30 percent of all assembly members are appointed by the President to at-large seats, and the DCE is always ap-

²⁰Mid-implementation interruptions typically increase the cost of completing the project due to interest costs, physical decay in exposed works, and eventual relocation of the contractor’s staff and plant. For example, Flyvbjerg, Holm, and Buhl (2004) examine transportation projects in OECD countries and estimate that each year of delay is associated with a 4.6 percent cost increase; in developing countries with higher inflation and interest rates and weaker legal systems, this figure would presumably be even larger. Since the contract sums of small development projects are typically not indexed to inflation or exchange rates, these cost increases can render further work on contracts unprofitable after even relatively short delays.

pointed by the President. Whereas the electoral incentives (and thus project distribution preferences) of elected assembly members are divided between bringing projects to their own electoral area and supporting projects in other areas that would be electorally beneficial to their party²¹, the incentives of the appointed assembly members are simply to support whatever projects will be electorally beneficial for the incumbent. Appointed assembly members can thus act as a stabilizing force for project support coalitions of elected members, but have stronger incentives to do so when these coalitions are of members of their own party. Similarly, DCEs can use their powers of *ex ante* agenda-setting and *ex post* implementation of assembly decisions to try to ensure that started projects get finished, but their incentives to do so are much stronger when these projects benefit the ruling party - projects which incumbent-leaning assemblies are more likely to have started in the first place. Since DCEs also have a great deal of control over many non-project aspects of expenditure, they can use these as rewards or punishments to induce cooperation from assembly members. Not only are they likely to be more willing to do so with respect to members of their own party, but they may also be better able to commit to doing so, and qualitative interviews with district assembly members in Nathan (2016) indicate that DCEs do use their formal and informal powers to ensure the completion of projects located in the electoral areas of their co-partisans.²² All else equal, then, we would expect project completion to be increasing in the district's partisan alignment with the ruling party, as measured by the ruling party's vote share in the previous presidential election (since district-level elections are formally non-partisan).²³

However, a simple test of this prediction using cross-district variation in partisan vote shares and project completion is open to bias due to the

²¹This would be the case if assembly members derive utility from their party being in power, either due to ideology or preferential access to public resources.

²²"For example, one NPP assembly member described how requests for funding for projects in her [electoral area] result in consistent delays because the DCE is 'appointed by the government in power. The person is only willing to help those who are on their ticket, those who are on their side. . . So when you write to request for something, they will tell you follow up, follow up, because your party is not in power. . . ' " (Nathan 2016, 8)

²³The effect of ruling party vote share could, in theory, be non-linear, if the opposition party is numerically dominant enough in some districts to form stable coalitions that are not only in the majority but are also strong enough to bargain effectively with the appointed DCE. However since only 70 percent of assembly members are elected, the opposition would need to win over 95 percent of elected assembly seats to reach the two-thirds threshold of the assembly that is necessary to block or revoke a DCE's appointment. In practice this is unlikely, since there were no districts in which the opposition party received more than an 88 percent vote share in the 2008 presidential elections.

Table 1: Observable implications of theories of non-completion

Theory	Observable implications
Corruption	• Non-completion associated with “missing expenditures”, i.e. payments to contractors greater than what would be expected given physical progress
Clientelism	• Completion rates vary across electoral cycle; lower in 2012 than 2011 or 2013 • Level of physical progress on incomplete projects typically low • Effect of district partisan alignment on government-funded project completion rates similar to its effect on centralized projects
Collective choice	• Non-completion associated with underpayment rather than missing expenditures, i.e. physical progress greater than payment to contractor • Completion rate difference between donor- and government-funded projects decreasing in ruling party vote share in district • Completion rate difference between donor- and government-funded projects unrelated to ruling party vote share in district

potential endogeneity of voting patterns and public good performance that plagues much of the empirical distributive politics literature (Larcinese, Snyder, and Testa 2012) and to unobservable confounds more generally. Instead, I exploit *within*-district variation in the completion of projects from different fund sources. As discussed above, the donor-funded transfer program’s rule that districts must budget to finish ongoing projects before starting new ones makes donor-funded projects less vulnerable than government-funded projects to collective choice failures, by increasing non-recipient assembly members’ incentives to vote against their short term interests to complete ongoing projects. For the purpose of theory-testing, I therefore view the within-district difference between donor- and government-funded project completion rates as an indicator of the impact of collective choice failures on project completion.²⁴ This funding rule is likely to have the strongest effect in districts where sustaining intertemporal bargains is the most difficult, i.e. in districts that are politically aligned with the opposition party.

²⁴The assumption is not that donor-funded projects are immune from the same collective choice problems as government-funded projects, but rather that the project finishing rule reduces the impact of these problems on project completion. To the extent that the enforcement of this rule is ineffective or is imperfectly monitored and enforced, my empirical analysis will actually underestimate the true impact of collective choice problems on non-completion.

A prediction of the collective choice theory that is less open to bias is therefore that the *difference* in completion rates between donor- and government-funded projects should be decreasing in the district’s partisan alignment with the ruling party. Relying on within- rather than across-district variation in completion rates allows me to control for the observable and unobservable characteristics of districts, as well as for the politicians and bureaucrats selecting and implementing the projects, thus eliminating concerns about endogeneity and unobservable district characteristics. Similarly, if project non-completion is caused by *district-level* collective choice failures, as proxied by ruling party vote share, then the delivery of centralized projects should be unaffected by it, so the difference in completion rates between donor-funded and centralized projects should be unrelated to the district’s partisan alignment with the ruling party. A final observable implication of the collective choice theory is that the “missing expenditures” measure described above should be negative, reflecting underpayment to contractors for work done, as projects are interrupted mid-construction by non-payment due to shifting collective expenditure priorities.

4 Data

To measure the completion of infrastructure projects, I collected, digitized, and coded all available district Annual Progress Reports (APRs) for the years 2011-13. These reports are written annually by each district’s bureaucracy and submitted to the central government. Each report includes a table listing basic information about projects that were ongoing or active during the calendar year (Appendix A). However, APRs were not available for all district-years, and some reports had insufficient information on infrastructure projects; altogether it was possible to locate 479 out of a potential 602 APRs (79.6 percent), of which 407 (67.6 percent) had sufficient information to be entered into the database.²⁵ After cleaning and removing non-infrastructure projects, this yielded a database of 14,246 project-year observations, which is the core dataset used in this study’s analysis.²⁶

Tracking the progress of projects across years is challenging, since many projects do not have commencement dates reported, few districts make use of unique project identification numbers, data is censored before 2011 and after 2013, and many incomplete projects attrite out of the dataset. I use

²⁵Project completion rates are balanced across districts’ reporting completeness, as are a wide range of district characteristics (Appendix B).

²⁶For brevity I refer to these as “projects”, though the number of unique projects is smaller since some projects appear in the database for more than one year.

three alternative methods of tracking projects and take numerous steps to verify that the key results are not being driven by reporting bias, attrition, or double-counting; these are reported in Appendices D, E, and F. Most importantly for my empirical strategy, Appendix D shows that attrition is uncorrelated with project fund source and thus should not bias my main estimates.

All reports were manually double-entered into the database and variables were coded through text-matching from these strings, with manual disambiguation for key variables (see Appendix C). Projects were coded into 17 different basic “types”, such as schools, clinics, and staff housing. The category “schools” was broken down into five sub-categories according to the number of units in each school block, leaving a total of 22 project type categories. Project completion was coded for each observation as a binary variable by combining information from three raw variables. For instance, project completion was coded as 1 for values such as “COMPLETE”, “100%”, or “INSTALLED AND IN USE”, and 0 for values such as “ONGOING”, “90%”, or “LINTEL LEVEL”. I investigated the accuracy of districts’ completion reporting in several ways, including site visits and comparison against smaller datasets on project completion compiled through alternative means, and found no evidence of systematic bias or misreporting of completion status in the reports (see Appendix E for more details).

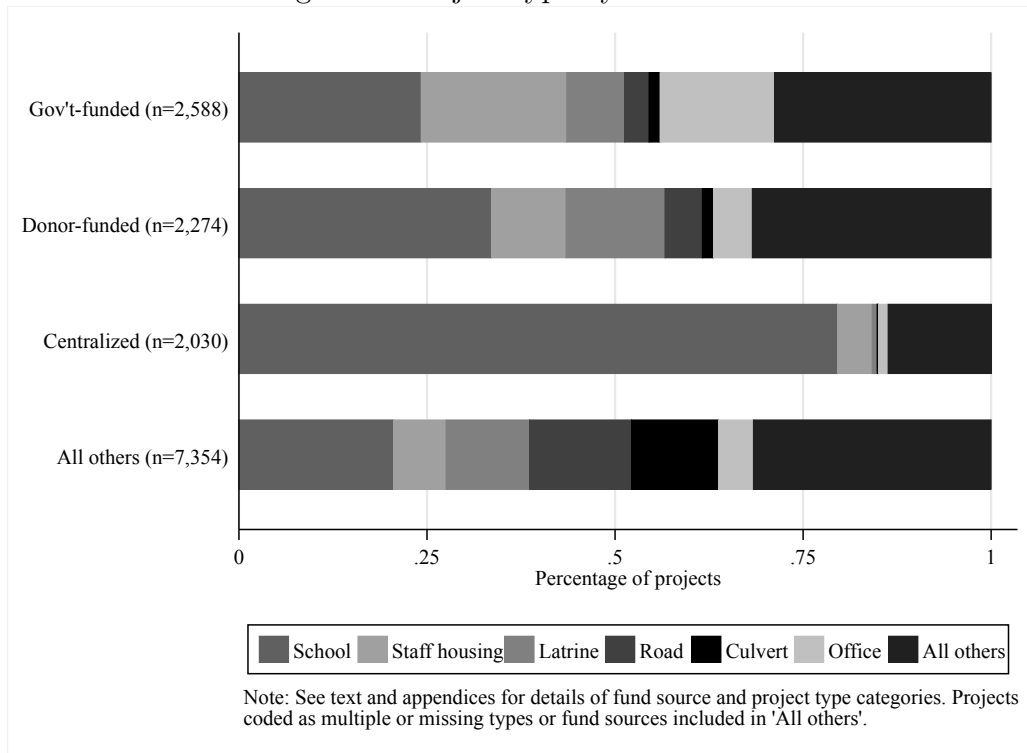
In addition, I draw on various government datasets for standard district-level variables: district budget data is from the Ministry of Local Government and Rural Development, fund disbursement amounts are from the Ghana Audit Service and the annual budget statement, district demographic and socioeconomic characteristics are from the 2010 Population and Housing Census, and voting data is from the Electoral Commission.

5 Analysis

This section presents overall descriptive statistics of project non-completion and its costs, then moves on to examine the empirical predictions of each of the theories of non-completion discussed in Section 3.

Less than half of projects (45.8 percent) were finished within their first year of implementation, and even after three years 35.5 percent remained unfinished. These low completion rates are not due to long completion schedules: the median project had a scheduled duration of five months and 88.8 percent were scheduled to be complete within twelve months. The completion hazard rate decreases monotonically after the first year of a project, so projects that are not finished promptly become decreasingly likely to be

Figure 3: Project type by fund source



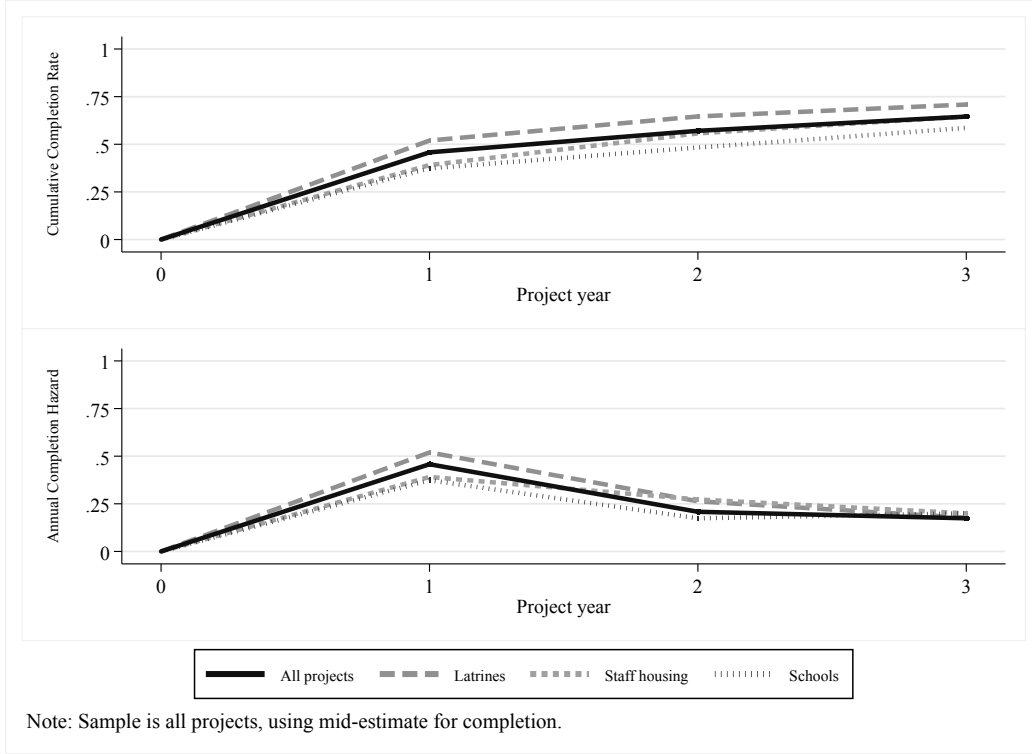
completed.²⁷ These dynamics are consistent across project types, as Figure 4 shows for the three most common types.²⁸ While the availability of only three years of data makes it impossible to conclusively say how many projects left incomplete after three years will never be completed, examining the completion dates of completed projects reveals that just 2.9 percent of completed projects took more than three years to complete; extrapolating this rate out from the observed three-year completion rate implies that 33.5 percent of all projects are never completed.²⁹

²⁷Tracking project completion across years is complicated by attrition and missing data; I discuss my methodology for doing this in Appendix 4. I also present upper- and lower-bound estimates for these completion rates under alternative sets of assumptions, which produce quantitatively different estimates but preserve these qualitative patterns.

²⁸It is noteworthy that project incompleteness is an issue even for types of projects, such as staff housing and office buildings, for which the staff of the districts are themselves the direct beneficiaries.

²⁹Assuming that the past distribution of project completion times reflects the time-to-completion profile of projects started in a given year, if 64.5 percent of all projects were completed in three years or less and 2.9 percent of completed projects were completed in more than three years, then the percentage of projects ever completed is given by $0.645 + 0.029 * (0.645 + 0.029) = 0.665$.

Figure 4: Project completion by project year



Most incomplete projects have had a significant amount of work done on them – 60 percent, for the median. It is thus not the case that the phenomenon of unfinished projects is due merely to costless signaling by politicians, as most projects have progressed far beyond “sod-cutting” ceremonies. Yet after their first year, over half of projects see zero or near-zero physical progress.³⁰ A similar bifurcation of project outcomes is evident when examining delays: the median completed project was delayed by just one month, 81.0 percent were finished in less than twelve months, and just 10.7 percent were delayed by a year or more. The median incomplete project, however, is twelve months past its expected completion date – a 200 percent delay – and there is a long tail of over a quarter of incomplete projects that are more than two years past their planned completion date.

The total cost to society of unfinished projects is economically significant, whether measured in terms of the direct fiscal cost to government, the opportunity cost of foregone public goods, or the financial costs of non-payment to contractors. If 33.5 percent of projects are never finished and expenditure on

³⁰Reported progress is precisely zero for 32.7 percent of projects, but is 10 percent or less for 55.0 percent.

these averages 55.5 of the contract value, a back-of-the-envelope calculation suggests that 18.6 percent of total local government capital expenditure – nearly one-fifth – is spent on projects which will never be finished. Scaling this percentage by the total capital expenditure of Ghana’s local governments in 2013 of USD 135 million implies that annual spending on projects abandoned mid-construction is approximately USD 25.1 million.³¹ If this wasted expenditure were to be spent entirely on new three-room school buildings, it would be enough to fully construct 667 additional schools per year, so the social opportunity cost of non-completion is also substantial.³² Finally, contractors also bear substantial costs of underpayment for work done (discussed in more detail below) which imply an additional annual economic cost of USD 12.7 million borne by contractors.³³

Turning to the observable implication of the corruption theory of non-completion, I construct a two-sided analog to Olken’s (2007) missing expenditures measure by subtracting the percentage of physical construction that has been completed on a project from the percentage of the contract’s value that has been paid by the district to the contractor. Positive values indicate missing expenditures in Olken’s sense, consistent with corruption in procurement - either through kickbacks or by selecting politically connected contractors who are paid but not put under pressure to finish projects.³⁴

Instead, Figure 5 shows that *underpayment* of contractors for work they *have* done is empirically far more common than overpayment.³⁵ For incom-

³¹Calculations based on an exchange rate of USD 1 = GHS 2.35, as at 31 December, 2013. These figures are indicative, since the expenditure on these projects would have spanned the period 2011-13 and thus could have been somewhat higher or lower depending on exchange rates fluctuations, the temporal incidence of expenditures, and changes in aggregate spending. The set of project fund sources included in the overall local government capital expenditure figures is slightly different than the set of fund sources included in the APR database; performing these calculations instead on DACF and DDF projects only and using release data from the Ghana Audit Service’s report on DACF and other statutory funds for 2013 leads to a slightly lower figure for fiscal waste of 16.3 percent. However, this excludes projects delivered by local governments through other fund sources. Including expenditure on unfinished projects by the central government, including the GETFund, would increase the costs of project non-completion even further (although I do not attempt to quantify them here).

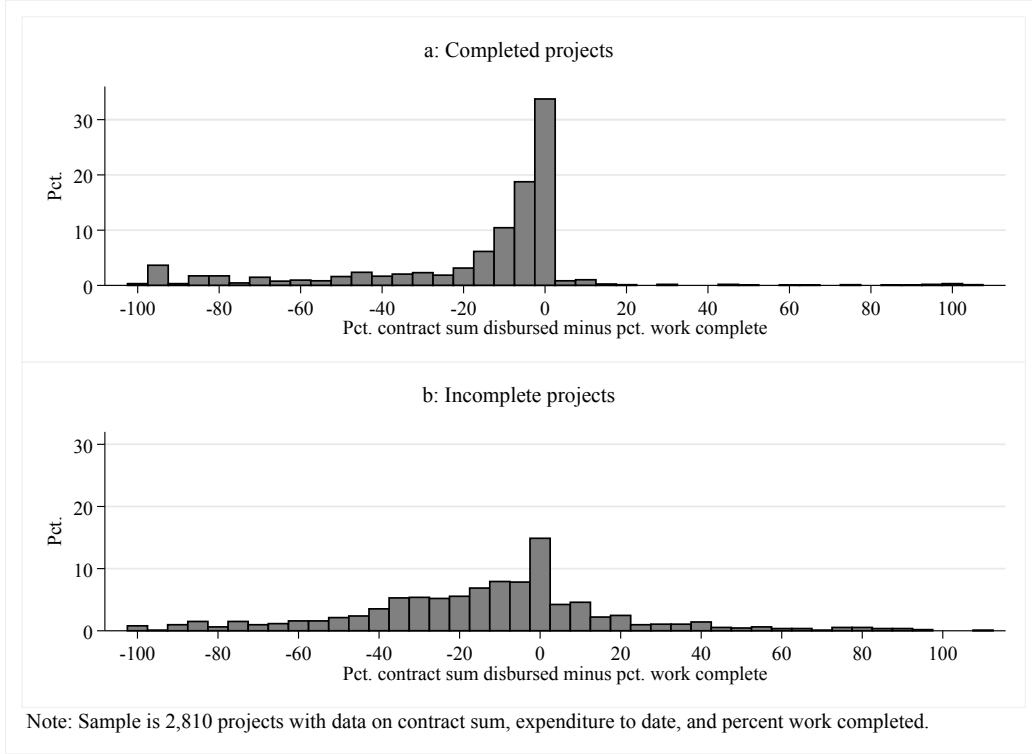
³²Based on the mean contract sum of a new three-room classroom block in 2013 of GHS 88,389.09, or USD 37,612.38

³³The average physical completion percentage of projects that are unfinished after their third year is 64.9 percent, or 9.4 percentage points greater than the percent of the budget disbursed. Scaling this by total local government infrastructure expenditure implies an annual underpayment of USD 12.7 million.

³⁴Positive values may also be due to factors other than corruption, such as project cost overruns, so this measure likely overstates the amount of expenditures that are diverted.

³⁵The observed differences between over- and underpayment are far too great to be

Figure 5: Missing expenditures and underpayment for completed work



plete projects, underpayment by 10 percent or more is over *three* times more frequent than overpayment by 10 percent or more, and for completed projects underpayment is over *sixteen* times more common than overpayment. This is the opposite of what would be observed if corruption on projects were a significant driver of non-completion, but is consistent with project interruptions driven by unstable collective choice over resource use: projects start, the contractor does part of the work, but at some point during construction the government's collective priorities shift and the government thus fails to make a payment for work done, so construction stops.³⁶

explained by normal time lags in processing payment. Districts usually have a contractual period of a few weeks or months after contractors have submitted payment requests in which to inspect work and make payment. However, there is no correlation between the over/underpayment measure and the month of project completion (not shown) – since both financial and physical status is reported at the end of the year, this correlation would be positive if underpayment were primarily a short-term phenomenon. Thus, negative values really do seem to be measuring severely delayed payment or non-payment rather than normal lags in processing payment.

³⁶This is consistent with the frequent complaints of contractors in Ghana about delayed payment and non-payment for work by Government (Abotsi 2013), but is not strictly

A key observable implication of the clientelism theory of non-completion is that project completion rates would vary across the electoral cycle, and be lower in the election year (2012). Empirically, however, completion rates remain roughly constant across years. Figure 6 shows that there is no statistically significant variation in completion rates across years for government- or donor-funded projects. Completion rates are actually slightly higher in the election year for centralized projects for which the central government is responsible for implementation, suggesting that - if anything - the incumbent views completing projects just prior to elections as more electorally beneficial than leaving them unfinished. While electoral cycles could affect project completion in other contexts, particularly if the incumbent loses, in this case the phenomenon of unfinished projects is remarkably consistent across the electoral cycle.

Before turning to the empirical predictions that rely on differences in completion patterns across fund sources, it is useful to note that completion rates do vary significantly across fund sources. Figure 7 shows that after three years 78.5 percent of donor-funded projects are completed, compared to 64.0 percent of government-funded projects and just 44.8 percent of centralized projects. The same pattern emerges even when restricting the sample to specific project types, such as school buildings, and the analysis below shows that these differences persist even after controlling for an even wider range of project characteristics.

To test the observable implications of the collective choice explanation for project non-completion, I estimate a linear probability model (LPM) of the form:

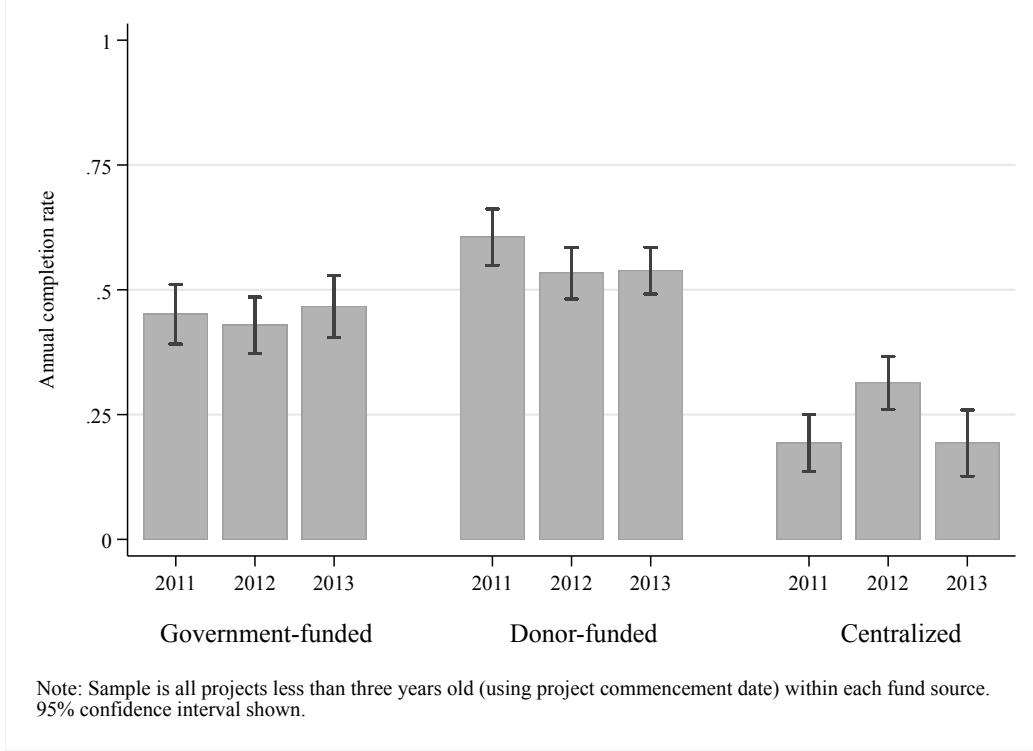
$$y_{i,j,k,t} = \mathbf{FS}_{i,j,k,t}\beta + \mathbf{FS}_{i,j,k,t} * V_k * \tau + \mathbf{P}_{i,j,k,t}\gamma + \lambda_j + \delta_{k,t} + \varepsilon_{i,j,k,t}$$

where $y_{i,j,k,t}$ is a binary indicator of completion of project i of type j in district-year k, t ³⁷, $\mathbf{FS}_{i,j,k,t}$ is a vector of fund source indicator variables

inconsistent with qualitative reports of procurement contracts being used by local-level politicians in Ghana as a source of patronage and campaign finance (Luna 2015). Corruption in procurement may well occur, but it appears to be either unrelated to project completion, instead operating perhaps on the quality margin, through inflated prices, or through favoritism in contractor selection. It is also possible that corruption does occasionally lead to project non-completion on a small number of projects; however, these findings show that it is empirically much less common than the phenomenon of underpayment and would explain at most a small fraction of non-completion.

³⁷Due to left and right censoring in the data as well as missing district-year observations, I am forced to use the annual completion rate - whether a project was completed during a calendar year - rather than the total completion rate - whether the project was ever

Figure 6: Completion rates consistent across electoral cycle

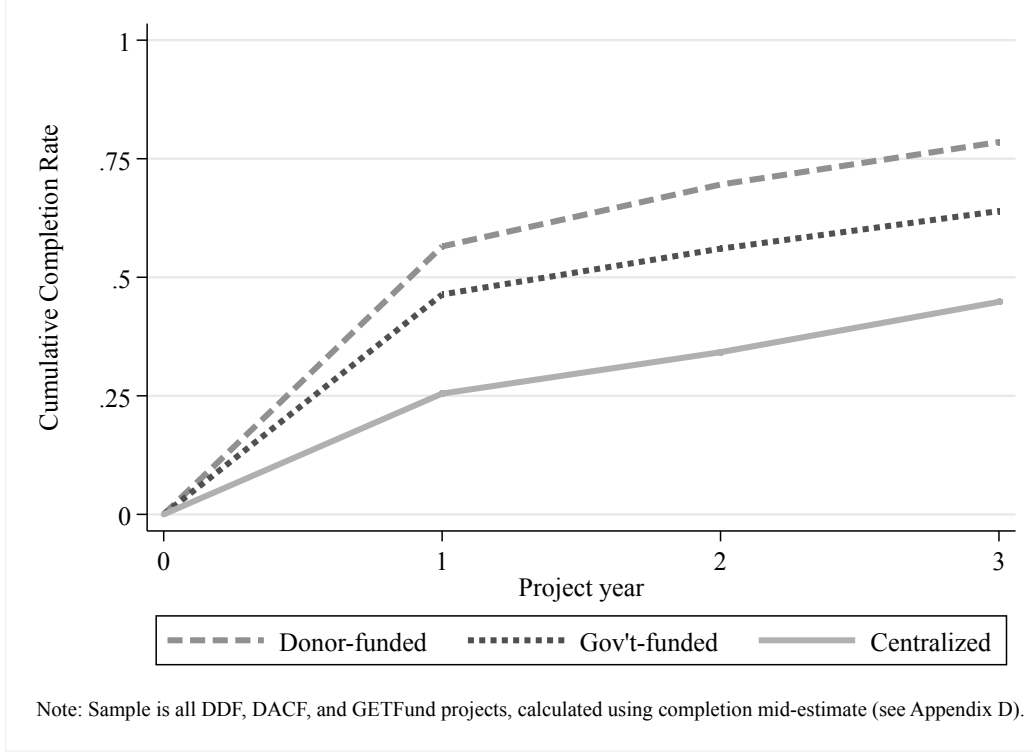


(government-funded and centralized, with donor-funded the omitted category), V_k is the vote share in the district of the ruling party during the study period (the National Democratic Congress, NDC) from the first round of the 2008 presidential elections³⁸, $\mathbf{P}_{i,j,k,t}$ is a vector of project characteristics

finished. This could lead to biased estimates if, for example, donor-funded projects were more likely than government-funded projects to be finished in their first year, but less likely to be finished overall. This is not the case, however. For projects started in 2011 where it is possible to calculate both annual and three-year completion rates, the two measures are highly correlated and there are no observed instances of any major fund source having a higher annual completion rate but lower three-year completion rate than another subgroup. In my estimates I control for project year where possible using the imperfect data available, and in Appendix E I show that the main results are robust to restricting the sample to first-year projects only. I estimate the model using LPM due to the large number of fixed effects variables used (thousands, when adding location or contractor fixed effects) which make estimation by logit or probit impractical and potentially biased. Where possible, however, estimating the model as a logit or probit produces qualitatively similar results.

³⁸Note that V_k is not included by itself in the model because it is time invariant and is thus absorbed by the district-year fixed effects. The ruling party's vote share from the 2008 presidential elections was chosen because these elections preceded the entire sample period

Figure 7: Project completion by fund source



including construction type (i.e. greenfield projects vs. maintenance/repair) and years since project start, λ_j is a vector of project type fixed effects, $\delta_{k,t}$ is a vector of district-year fixed effects, $\varepsilon_{i,j,k,t}$ is an error term, and β , γ , and τ are vectors of parameters to be estimated.

The parameters τ are of primary analytical interest. The parameter $\tau^{Gov't}$ represents the marginal effect of partisan voteshare on government-funded project completion relative to the marginal effect on donor-funded project completion. A $\tau^{Gov't}$ that is significantly greater than zero is consistent with the observable implication of local-level collective choice failure in project completion. The identifying assumption is that any correlation between the within-district donor-government completion rate gap and the district's partisan alignment is driven only by the collective choice mechanism

of 2011-13 and thus serve as an indicator of the underlying affiliation of the district, as opposed to the results of the December 2012 elections which could have been endogenous to project delivery in 2011-12. Ghana has a strongly two-party dominant system: the NDC and NPP were the top two parties in every constituency nationwide in the 2008 election and there were only a small number of constituencies where any third party obtained a significant number of votes, so using ruling party vote share is essentially identical to other measures, such as the winning margin or margin between the NDC and the NPP.

discussed above, so there could be other factors causing differences between the overall completion rates of donor- and government-funded projects without biasing my analysis so long as these other factors are uncorrelated with district vote share V_k . Selection of projects into fund sources on unobservable project characteristics is the major concern with this assumption's validity, but I show below that such selection effects appear to generate, if anything, a downward bias on $\tau^{Gov't}$ and thus understate the true effect. In turn, the parameter $\tau^{Central}$ shows the marginal effect of district partisan voteshare on centralized project completion relative to its effect on donor-funded project completion; as discussed above, I interpret this as a revealed measure of whether the government-funded non-completion patterns reflect a deliberate clientelistic strategy by the incumbent.

Table 2: Interaction of project fund source and partisan vote share

	(1)	(2)	(3)	(4)	(5)
Gov't-funded	-0.110 (0.024)	-0.229 (0.062)	-0.214 (0.059)	-0.214 (0.077)	-0.215 (0.089)
Centralized			-0.215 (0.071)	-0.254 (0.081)	-0.071 (0.144)
Gov't-funded * NDC vote share		0.258 (0.122)	0.238 (0.115)	0.257 (0.145)	0.344 (0.176)
Centralized * NDC vote share			-0.069 (0.127)	-0.016 (0.152)	-0.137 (0.250)
Project type FE	Yes	Yes	Yes	Yes	Yes
District-Year FE	Yes	Yes	Yes	No	Yes
Community FE	No	No	No	Yes	No
Contractor FE	No	No	No	No	Yes
District-Year groups	327	327	338		186
Community groups				2934	
Contractor groups					2592
R^2	0.373	0.374	0.353	0.727	0.813
N	4563	4563	6460	5483	4655

Note: Dependent variable is project completion. Constant term not shown. Project type FE is over 22 types, with schools grouped by number of classrooms. All specifications include project characteristics (construction type [construction or maintenance] and project year indicators); year indicators included when district-year fixed effects not specified. NDC vote share 2008 is the ruling party's voteshare in the 2008 presidential elections in the district (or its antecedent district, for districts that split in 2012). Huber-White robust standard errors clustered by district-year (or by community and contractor in columns 4 and 5, respectively).

I first estimate the model with no interaction terms on the sample of donor- and government-funded projects only (Column 1 of Table 2), to confirm that the completion rate difference between donor- and government-funded projects remains large and highly significant in this parametric framework.³⁹ Column 2 presents my baseline specification. The coefficient $\tau^{Gov't}$ on the interaction term is statistically significant ($p = 0.035$) and economically important: a one standard-deviation increase in the ruling party's 2008 vote share in the district (16.9 percentage points, from a mean of 49.7) is associated with a 4.36 percentage point decrease in the donor-government completion rate gap.⁴⁰ This is equivalent to closing 39.8 percent of the total gap of 11.0 percentage points. These estimates imply a donor-government completion rate gap of 17.4 percentage points at the 5th percentile of NDC vote share (corresponding to a heavily opposition-supporting district where the NDC received only 21.1 percent of the vote), but in a district at the 95th percentile of NDC vote share (88.9 percent) there is no difference in predicted completion rates between donor- and government-funded projects (0.1 percentage points). This is strong evidence in support of the collective choice theory of non-completion: in districts that are almost homogeneously composed of supporters of the incumbent, the incumbent is better able to use its agenda-setting, implementation, and intra-party enforcement mechanisms to stabilize log-rolling coalitions and avoid leaving projects incomplete.⁴¹

To examine whether the government-funded completion patterns reflect a deliberate strategy of the incumbent, I include centralized projects in the sample and introduce the centralized dummy and interaction into the model (Column 3). The completion patterns of centralized projects with respect to district partisan composition are similar to those of donor-funded projects, and are significantly different from those of government-funded

³⁹These point estimates of the donor-government difference using the annual project completion rate are slightly smaller than the three-year completion differences shown in Figure 7. Conducting the parametric analysis using the annual completion rate thus diminishes the magnitude of the estimated differences between fund sources, so this analysis if anything underestimates the true effects.

⁴⁰I estimate the model using the Stata command `xtreg` rather than `areg`, since `areg` calculates standard errors using an overly conservative degrees-of-freedom adjustment that is unnecessary when fixed effect groups are nested within clusters (Gormley and Matsa 2014). Re-estimating the Column 2 specification with `areg` produces a p-value for $\tau^{Gov't}$ of 0.042. However, for each model I report the R^2 generated by the Stata command `areg`, since the R^2 generated by `xtreg` is for the demeaned dependent variable and is thus somewhat misleading in this context.

⁴¹These results are robust to a wide range of alternate specifications, including restricting the sample to schools only, additional controls for ancillary facilities attached to schools, restricting the sample to projects in their first year only, and including projects from other fund sources in the sample (Appendix F).

projects ($p = 0.017$). This is inconsistent with the clientelism theory that government-funded project completion patterns reflect a deliberate policy of the incumbent, but is consistent with the collective choice theory that the incumbent is constrained in the completion of government-funded projects by local-level collective choice problems that are more severe in opposition-leaning districts. The left panel of Figure 8 presents these results graphically, but with donor-funded projects as the omitted category (represented by the dashed line at zero) for visual clarity.

Even though the district-year and project type fixed effects control for a wide range of observable and unobservable variables that might affect project completion, one objection is that districts might sort projects into fund sources according to some kind of unobserved within-district, community-level heterogeneity that is also correlated with a project's likelihood of completion. This could potentially bias the estimated completion differences between fund sources if, for example, districts were more likely to target donor-funded projects to communities that support the ruling party, which in turn were more likely to be completed. If the extent of this sorting process was somehow positively correlated with district vote shares, this could also bias the estimate of $\tau^{Gov't}$ away from zero. Although my project database lacks geospatial coordinates for projects, for many projects it does report the name of the community or location within the district. I therefore estimate the model again with fixed effects for the 2,934 communities in which projects were executed, so that the estimates rely not on within-district but on within-community variation across fund sources (Column 4). This extremely demanding specification actually increases the point estimate of $\tau^{Gov't}$, and it remains statistically significant ($p = 0.032$). To the extent that there is sorting of projects into fund sources on unobservable community characteristics, then, the baseline specification in Columns 2 and 3 actually *understates* the true impact of collective choice problems on project completion.⁴²

Of course, projects may also be targeted and sorted into fund sources not just across communities within a district, but even within communities - Ichino and Nathan (2013) for example show that ethnic geography at the very local level can matter for vote choice and patronage expectations - and this cannot be excluded without precise geospatial data. However, the increase in $\tau^{Gov't}$ observed between Column 3 and Column 4 suggests that, if anything, adding even more precise geographic controls would increase, not decrease, the magnitude of the estimated effects. A further reason to doubt that sorting across fund sources on within-community heterogeneity is driving the results

⁴²For an explanation of how observed coefficient movements can be informative above the potential extent of selection on unobservables, see Oster (2015).

is that this explanation would require project benefits to be locally excludable even within communities, but as Ichino and Nathan (2013) note, this is typically not the case, especially in rural areas.⁴³

Finally, I estimate the model with both contractor and district-year fixed effects to verify that the results are not biased by the identity of the contractor, as might be the case if projects from different fund sources are targeted towards favored contractors differentially across districts. This specification takes advantage of the fact that some of the 2,592 contractors who implemented these projects did so in multiple districts and/or for multiple fund sources. Once again, $\tau^{Gov't}$ remains large and statistically significant ($p = 0.050$). The stability of these results even after controlling for contractor fixed effects also provides further evidence that the observed patterns of project non-completion are not being driven by theories of corruption and clientelism that focus on rent-seeking behavior in procurement by politicians, bureaucrats, and politically connected contractors.

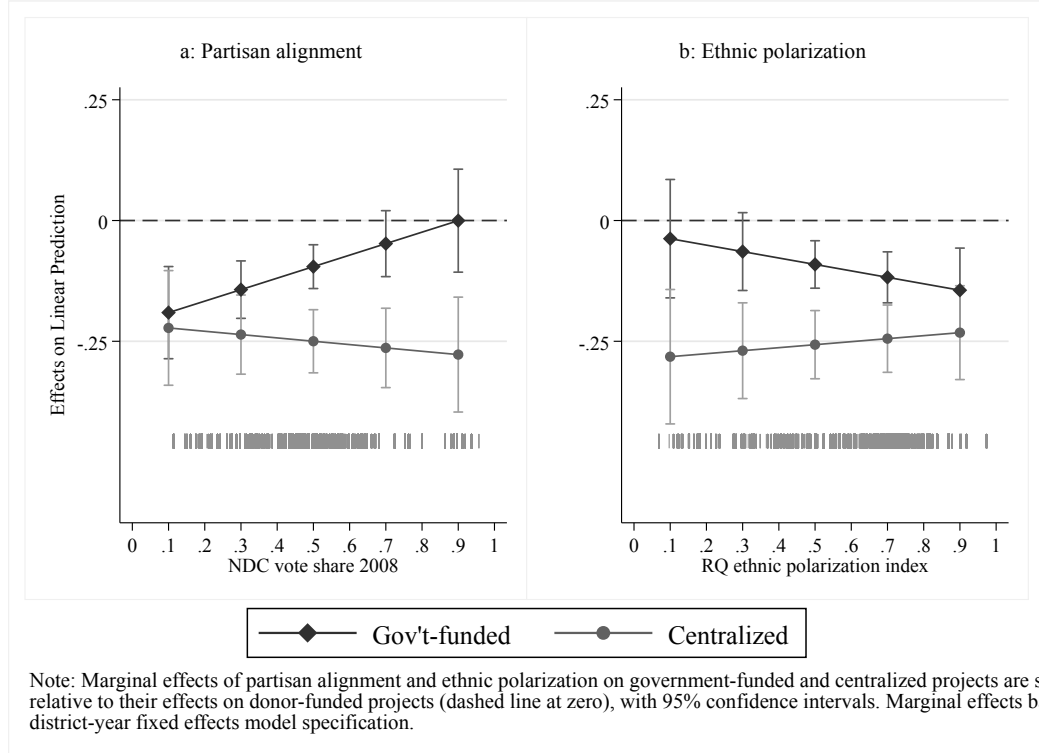
As an alternative test of the collective choice theory of non-completion, I can also use a different proxy for the difficulty of sustaining intertemporal bargains among district-level political actors: ethnic polarization.⁴⁴ If a district is polarized between large rival ethnic groups, then ethnic divisions are likely to be politically salient, which could reduce inter-community trust and increase the salience of distributive grievances, and thus make it more difficult for local political actors to sustain intertemporal bargains over project

⁴³Again this cannot be measured precisely, but to build some intuition on the potential extent of within-community targeting, for the 56 districts that reported at least some project locations and for which three years of APR data are available, the average number of locations is 46.1, giving a mean population per location of 3,350 (based on the 2010 Census). The number of projects (mean population per project) for Metropolitan Assemblies (the most urbanized) in this sub-set is 160.0 (4,610), for Municipal Assemblies is 53.9 (3,031), and for District Assemblies (the most rural) is 38.4 (3,380). However since some locations presumably did not have projects in the period 2011-13 and thus do not appear in the dataset and other projects do not have a reported location, the actual number of locations per district (and thus population per location) is likely to be even higher (lower) than this. While the possibility that infrastructure projects are locally excludable even within these relatively narrow geographic areas cannot be ruled out, it nonetheless seems implausible that sorting of projects into fund sources in order to engage in within-location targeting of projects could lead to differential completion rates across fund sources of the magnitude observed.

⁴⁴Following Montalvo and Reynal-Querol (2005) I use ethnic polarization (calculated following these authors' methodology, using the Ghana Statistical Service's primary ethnic categories and data from the 2010 Population and Housing Census) rather than ethnic fractionalization since the political salience of ethnicity and its ability to be instrumentalized in political conflict may be greater when districts are divided among large rival groups rather than many smaller ones.

distribution.⁴⁵

Figure 8: Marginal effects of partisan alignment and ethnic polarization on government-funded and centralized projects, relative to donor-funded projects



Consistent with this, the right panel of Figure 8 plots the marginal effects of ethnic polarization on government-funded and centralized projects *relative* to the effect of ethnic polarization on donor-funded projects (represented by the dashed line at 0), based on the specification in Table 2 Column 3 with the district RQ ethnic polarization index substituted for NDC vote share as V_k . These interactions between project fund source and ethnic polarization exhibits the same patterns as with district vote share: the gap between donor- and government-funded completion rates is largest in districts where

⁴⁵Within the large literature on ethnicity there is ongoing debate over whether and how ethnicity affects public good provision and political conflict (e.g. Easterly and Levine 1999; Alesina, Baqir, and Easterly 1999; Miguel and Gugerty 2005; Montalvo and Reynal-Querol 2005; Glennerster, Miguel, and Rothenberg 2013; Ichino and Nathan 2013). Rather than weighing in on this debate, I view ethnic diversity as a proxy for more general forms of latent distributive conflict in politics; to the extent it is a weak proxy, this should bias any findings toward zero.

ethnic polarization is high. Likewise, the effect of polarization on centralized projects is similar to that on donor-funded projects, suggesting that these effects are due to local-level collective choice problems, not a deliberate strategy by the incumbent.⁴⁶ These results provide a useful robustness check of the importance of generalized collective choice problems as a cause of non-completion, especially since ethnic polarization and NDC vote share are negatively correlated in the data and the same patterns are thus reproduced based on different components of variation.

This quantitative analysis has presented empirical evidence that is consistent with a number of observable implications of the theory of project non-completion as a dynamically inconsistent collective choice outcome, and is inconsistent with the implications of alternative explanations. While it is not possible to provide direct quantitative evidence of unstable political coalitions and failed intertemporal bargains, there is nonetheless ample qualitative evidence that political actors in Ghana are concerned that government’s ability to efficiently provide public goods is undermined by its inability to simultaneously satisfy all the distributive demands on it. This is perhaps most clearly illustrated in a speech by the President, John Mahama:

“We all have demands on government but we have to be moderate in these demands in order that we do not disrupt the budget and government expenditure. . . As the head of your family, you cannot provide all that your family needs at once. . . Alhassan needs a shoe, Fuseini needs a bicycle, your wife needs a new cloth, and your mother needs a refrigerator. You cannot provide all these at once and so what you have to do is to prioritize. . . The fact that government has not yet provided a certain development that was requested does not mean that government will not provide it.”
(TV3 Network 2015)

The President’s invocation of a familial metaphor to explain the necessity of sequencing project delivery, and his pleading with voters for patience “in order that we do not disrupt the budget and government expenditure”, concisely summarizes both the necessity and difficulty for politicians of intertemporal bargaining over the delivery of public goods, as well as the negative

⁴⁶The differences in the marginal effects of ethnic polarization across fund sources are somewhat less statistically significant ($p = 0.269$ for the donor-government comparison, and $p = 0.072$ for government-centralized) than for the interaction with district vote share, suggesting that ethnic polarization is a weaker proxy for underlying barriers to achieving efficient intertemporal collective choice outcomes in a district. Similarly, using ethnic fractionalization instead of ethnic polarization produces coefficients of the same sign but diminished statistical significance, consistent with the idea that it is the political salience of ethnic diversity rather than diversity itself that is problematic for collective choice.

efficiency consequences of failing to maintain these explicit or implicit agreements. District-level political actors also express similar sentiments about the importance of cooperation and surmounting individual interests. For example in one assembly meeting,

“The DCE asked [assembly members] to see themselves as development partners, and work collectively to advance the interests of the assembly, saying that, the recent negative politicking being portrayed by some Assembly Members in the assembly had helped to divide the house, an issue she complained, had not been healthy to the decision making of the assembly.” (GNA 2015b)

Similarly, “during a meeting of chiefs, elders, opinion leaders and the youth group” on development and infrastructure in the area, one chief in the Great Accra Region “called on the chiefs in the area to stop putting blame on governments for lack of development. He said until they collectively speak with one voice and stop the stomach politics their communities would continue to suffer.” (GNA 2015c) While not articulating the issue in the precise language of collective choice, these local-level political actors’ exhortations for cooperation clearly evidence the concern that their inability to overcome distributional conflicts hampers the efficient provision of development projects in their district. Although these selected qualitative examples are not in themselves strong evidence in favor of the collective choice theory of project non-completion, they do provide a simple plausibility check on the applicability of the theoretical mechanism described - and the striking quantitative results presented above - in this context.

6 Conclusion

This article has provided the most comprehensive evidence to date on the non-completion of small development projects in one country. Although the lack of comparable data for other countries makes it impossible to say how completion rates and dynamics would vary in other countries, the little cross-country evidence on infrastructure delivery that does exist confirms the potentially massive inefficiencies in delivery.⁴⁷ Non-completion is only one such source of expenditure inefficiency, but the lack of existing empirical or theoretical literature on the topic makes it a critical area for further study.

⁴⁷Using country-level data, the International Monetary Fund (2015) finds average efficiency gaps of 27 percent in infrastructure spending, rising to 40 percent for low-income countries.

A second contribution of this article has been to argue that project non-completion is not empirically well explained by theories of corruption or clientelism that view non-completion as an intentional, instrumental outcome - active waste, in Bandiera *et al*'s (2009) terminology. Rather, the evidence is consistent with a view of incomplete projects as the unintended outcome of dynamically inconsistent collective choice processes. The inefficiency of project non-completion arises not because any actor gains from projects being left incomplete, but precisely because all actors want projects completed so much that they cannot sustain efficient intertemporal bargains over project distribution. While much of the political economy literature on the distribution and implementation of public goods has focused on active, instrumental forms of expenditure inefficiency, this paper's findings echo Bandiera *et al*'s (2009) empirical finding that "passive" waste can also be a major source of inefficiency in government expenditure. The non-instrumental nature of non-completion also provides hope that institutional solutions could be especially effective at improving efficiency. Indeed, this article provides direct evidence that projects delivered under different sets of institutional rules are associated with significantly different completion rates - a finding of obvious practical relevance for the design of intergovernmental transfers, aid, and project financing mechanisms. While the lack of empirical evidence on project completion in other countries once again renders the question of whether the same finding would hold in other countries somewhat speculative, the key elements of the collective choice theory of non-completion - constraints on the executive, the potential instability of political coalitions, and non-instantaneous project implementation - exist in varying forms in many contexts.

The idea that distributional considerations can affect project implementation also has important theoretical and methodological implications for studies of distributive politics, in which the implementation of distributive policies has so far not been an explicit consideration. Methodologically, viewing the distribution and implementation of public good provision as distinct, but not independent, processes has implications for the measurement of the impact of distributive policies and for the validity of inferring politicians' intentions based on observed outputs or outcomes. Theoretically, there is a need to better understand how fiscal, bureaucratic, and political institutions mediate the impact of distributive considerations on project implementation, as well as how these dynamics are affected by the *implementation attributes* of different types of expenditure. The delivery of discrete development projects, for instance, may be affected by the (in)stability of political coalitions in a different way than routine services, highly fungible budget allocations, or

direct transfer programs.⁴⁸

More broadly, the idea that institutions can improve efficiency by helping political actors overcome credible commitment problems is also central to theories of the long-term development of state capacity (Besley and Persson 2011), as Acemoglu, Johnson, and Robinson (2005, 428) express concisely: “The inability to commit to how political power will be used in the future means that the impact of economic institutions on efficiency cannot be separated from their effects on distribution.” While this hypothesis has thus far been empirically examined mainly through historical or cross-country studies, this article finds that a similar mechanism can be identified even within a single polity at one moment in time, using micro-level data on specific projects. Further research at the intersection of distributive politics, policy implementation, and political and bureaucratic institutions could shed new light on the practical challenges of public good provision as well as the longer-term relationships between democracy, development, and state capacity.

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⁴⁸This is related to Kramon and Posner’s (2013) recommendation that future studies of distributive politics should take account of the targeting attributes of different types of different types of public goods.

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Appendix A Sample Annual Progress Report

ADANSI SOUTH

Progress Report

No	Project detail	Location	Funding source	Contractor	Original Tractum	Revised Tractum	Payment to date	Date actual	Date expected completion	Date actual completion	Status	Remarks
ADS0001	construction of 6 unit classroom block	AWOROSO	Get Fund	ESSIL CONSTRUCTION	156,969.67	149,900.00		05-Aug-10	25-Aug-10	12-May-11	20	On-going
ADS0002	construction of 6 unit classroom block	KOJO MANKRONG	Get Fund	FESAGE ENTERPRISE	157,575.83	149,900.00		05-Aug-10	26-Aug-10	19-May-11	20	On-going
ADS0003	construction of 6 unit classroom block	EDWINASE	Get Fund	SUE ENGINEERING	158,250.95	149,900.00		05-Aug-10	25-Aug-10	26-May-11	20	On-going
ADS0004	construction of 3 unit classroom block (HIS)	SUBRISO	DDF	V FORGHAN LTD	59,947.36		59,947.36	18-Nov-10	29-Nov-10	19-May-11	100	completed
ADS0005	construction of 20 seater vault toilet chamber	WURVIE	DDF	FALSRON CONSTRUCTION WORKS	52,847.95		52,035.46	18-Nov-10	23-Nov-10	17-May-11	100	completed
ADS0006	construction of 3 unit classroom block	NORANSA	DDF	HAF-AWELL WORKS	60,077.05		60,077.49	18-Nov-10	30-Nov-10	24-May-11	100	completed
ADS0007	construction of 3 unit classroom block	ODUMASSE	DDF	ADUOPY CONSTRUCTION & SUPPLY LTD	61,985.00		61,985.00	18-Nov-10	29-Nov-10	18-May-11	100	completed

Appendix B Sample balance

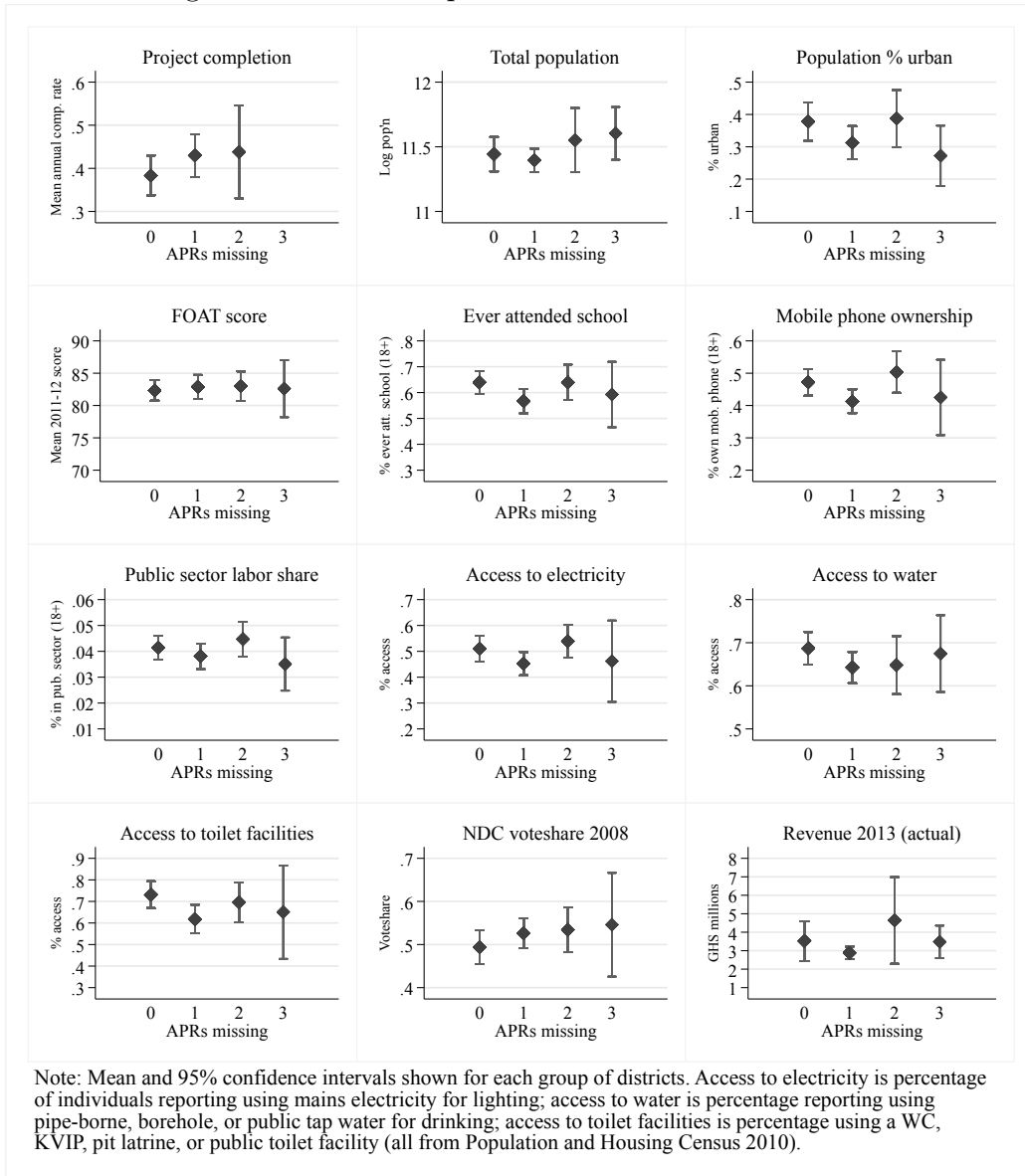
The coverage of the Annual Progress Report (APR) database is remarkably high, given that most had to be located in hard copy in the offices of the National Development Planning Commission (NDPC) in Accra or of the Regional Coordinating Councils (RCCs) in the ten regional capitals. Altogether 479 APRs were located. The maximum notional number of APRs for the period 2011-13 would be 602: 170 for 2011, 216 each for 2012 and 2013. Of these, 407 APRs contained project tables with sufficient information to be entered into the database. The final database thus covers 67.6 percent of possible district-year observations. Nevertheless, there are concerns that reporting could be correlated with other variables of interest, such as project completion rates.

As this Appendix shows, however, there is little evidence that reporting completeness is correlated with district characteristics. Figure A1 below plots the unweighted means and 95 percent confidence intervals of a wide range of variables, by the number of APRs that are missing for each district. The most important balancing test is for average annual project completion, this study's main dependent variable. Although it is not possible to calculate this for districts with all three APRs missing, there is no statistically significant difference in average completion rates across districts with different levels of reporting completeness; indeed districts with more incomplete reporting have, if anything, slightly higher completion rates, although this difference is not statistically significant. This alleviates the concern that estimated national project completion rates may be biased upwards due to reporting incompleteness.

The sample also appears to be balanced across the other variables reported in Figure A1. In addition to a wide range of demographic, social, and economic variables drawn from the 2010 Population and Housing Census, this includes: districts' scores on the Functional and Organizational Assessment Tool (FOAT) evaluation undertaken to assess districts' compliance with a set of procedural requirements as part of the allocation and disbursement procedure for DDF funds; the vote share in the district of the National Democratic Congress (NDC), which was the ruling party during the sample period, from the 2008 presidential elections; and budget size, as measured by the total revenue of the district in 2013. There are no apparent patterns across reporting completeness in any of the variables examined, so there is no evidence that the sample coverage of the APR database is biased.

Due to the inconsistent reporting formats used by districts in producing their APRs, many observations are missing important variables, thus restricting the effective sample for certain types of analysis. Table A1 gives

Figure A1: APR sample balance on selected variables



an indication of this for a selected number of variables. Although this affects the types of analysis that can be done on the data, there is no indication that the missing variables are anything other than a result of districts' use of different formats.

Table A1: Coverage of key variables in dataset

Variable	Non-missing		Variable	Non-missing	
	Obs.	Pct.		Obs.	Pct.
Project title	14,246	100.0%	Contract sum	9,869	69.3%
Completion status	13,339	93.6%	Commencement date	5,518	38.7%
Fund source	11,226	78.8%	Completion date (expected)	5,061	35.5%
Location	11,326	79.5%	Completion date (actual)	1,424	10.0%
Contractor	9,319	65.4%	Expenditure to date	6,224	43.7%

Note: See Appendix C for full variable descriptions. Percentages are as percent of total (n=14,246).

Appendix C Variable coding

All APR database variables were coded algorithmically from text strings by defining a set of word or phrases corresponding to values; the particularities of this process for each variable, along with other relevant data and coding notes, are detailed below. Project numbers and statistics in this appendix are given at the point of coding, and thus may differ from those in the final database from which repeat observations and non-infrastructure projects have been excluded.

Fund source Project fund source was constructed from APR entries for project’s fund source for nearly all observations, although in a small number of cases (178, or 1.1 percent) there was no dedicated entry for fund source but fund sources were named in the project title. These were combined, and then coded into fund source categories according to a set of text strings commonly occurring in the data – e.g. for DACF, these were “DACF”, “COMMON FUND”, “D A C F”, and “CF”. All projects where the fund source was listed as the district itself were coded as using internally generated funds (IGF), together with those where IGF was directly identified as the fund source. A small number of projects (143) were funded by the local Member of Parliament (MP) using the small portion allocation of the DACF which is disbursed to them as a constituency development fund; these were coded under “Other” rather than DACF because they are selected and implemented separately. All projects with more than one identifiable fund source (about 3 percent) were coded as “Multiple”.

Project type Project type was constructed using sets of commonly used text strings in the project title to first group projects into sixteen types of infrastructure projects:

- Agriculture: dams, irrigation, dug-outs;

- Borehole: boreholes, wells;
- Clinic: clinics, health centres, hospitals, wards;
- Construction – other: abattoirs, computer centers, libraries, taxi ranks, lorry parks, community centers, sports stadiums, light industrial areas, warehouses;
- Culvert: culverts, drains, ditches, gutters;
- Electricity: electrification, substations;
- Latrine: latrines, Kumasi ventilated improved pits (KVIPs), toilets, water closets;
- Market: market stalls, stores, sheds, meat shops;
- Office: administration blocks, assembly/town/council halls, courts, police stations, fire stations;
- Road: roads (paved, graveled, or dirt), bridges, spot improvements, speed humps, paving works;
- School: classroom blocks, kindergartens, nurseries, early childhood development centres;
- School – other: dormitories, dining halls, hostels, school feeding kitchens;
- Staff housing: bungalows, guest houses, accommodation blocks, residences, quarters;
- Streetlights
- Waste management: refuse dumps, rubbish storage; and
- Water: water systems, water harvesting, water supply, reservoirs and storage, pipe-borne water works, water distribution.

In addition, two categories of non-infrastructure projects were constructed but not included in the analysis:

- Procurement: purchase, supply, distribution, and furnishing (e.g. tractors, desks, computers), acquiring land for projects, equipment of facilities; and

- Services: a wide variety of activities related to service-provision and other non-infrastructure activities, e.g. training, vaccination campaigns, capacity building, tax collection, celebrations, monitoring, public education, sponsoring.

The guiding principle in distinguishing between infrastructure and non-infrastructure projects was that projects involving physical transformation were coded as infrastructure (e.g. building a classroom block), whereas projects consisting only of related activities that did not themselves involve physical transformation (e.g. acquiring land to build a classroom block, supplying a classroom block with textbooks) were coded as non-infrastructure.

This algorithmic coding resulted in unique project types for 74.4 percent of projects, while 12.8 percent were not assigned a type and another 12.8 percent were assigned two or more types. These 5,569 projects were manually inspected and disambiguated if possible, or if the project genuinely straddled two types it was coded as “multiple”.

Finally, the category “school” was sub-divided into six categories according to the size of the classroom block: five categories for 2-, 3-, 4-, 6-, and 12-unit classroom blocks, and a sixth residual category for classroom blocks of indeterminate size, or reported projects which actually involved more than one discrete structure (e.g. construction of two 3-unit classroom blocks). Number of units was coded algorithmically by defining a set of 41 common text string permutations used to denote construction of a single classroom block (e.g. “1NO 3-UNIT [CLASSROOM BLOCK]”, “[CONSTRUCTION] OF 3-UNIT [CLASSROOM BLOCK]”).

Prior to analysis, projects with missing type or coded as “services”, “procurement” were dropped. The project categories used in the analysis therefore comprise the fifteen non-school infrastructure types listed above; six types of schools (five according to classroom block size, and one residual category); and the type “multiple” comprising all projects that could not be manually coded into a unique type.

Construction type Project titles often include a phrase that identifies whether the project constitutes new (greenfield) construction, or repair, maintenance, renovation, or rehabilitation of an existing project that had been completed previously. The former category was coded as projects including the general text string “CONSTRUCTION OF” and abbreviations or misspellings of this; project type-specific construction verbs such as “DRILLING OF”, “PAVING”, and “SPOT IMPROVEMENT”; and strings indicating that the project is a greenfield project in its second or subsequent year, such as “COMPLETION OF”, “CONTINUE”, and “CLADDING”. (The APRs are inconsistent in the extent to which they alter these prefaces for a given

project across years (i.e. whether they change “CONSTRUCTION OF” in the first year of a project to “COMPLETION OF” in its second year), so these were coded together as greenfield projects.) Project titles containing general phrases such as “MAINTENANCE”, “REPAIR”, “RENOVATION”, and “REHABILITATION”, or project type-specific phrases such as “DESILTING”, “RE-ROOFING”, “RESURFACING”, and “RESHAPING” were coded as maintenance/repair/renovation projects. Altogether 76.4 percent of projects were coded as greenfield construction, 11.9 percent as maintenance/repair/renovation, and the remaining 11.6 percent could not be uniquely identified as either type.

Project completion Project completion was coded as a binary variable by combining information from three raw variables, of which one or two are typically reported in each APR: ProjectStatus (e.g. “COMPLETED”, “INSTALLED AND IN USE,” “100 WORK DONE”), Remarks (similar), and PercentWork (on the scale 0-100; 100 coded as complete). Projects were coded as complete if they were at a stage where physical construction work had been completed, regardless of whether they had been formally handed over, furnished, commissioned, and put into use – for example “COMPLETED YET TO BE FURNISHED AND COMMISSIONED” was coded as complete. This yielded a unique completion coding for 91.6 percent of observations; the remainder were disambiguated by visual inspection if possible, and given a missing value if it was impossible to determine the project’s status conclusively.

Although the gap between physical completion and putting the facility into use is of potential interest, physical completion was chosen as a cutoff point for the purposes of the APR database because: 1) the status of post-construction activities like furnishing, commissioning, and use are reported inconsistently in the APRs; and 2) the analytical focus of this paper is on infrastructure project construction, not subsequent service provision using those facilities.

Contractor A total of 6,798 unique contractor names are listed in the APR database for 10,701 infrastructure projects. However, many of these are clearly the same contractor but with different spellings (e.g. “WRKS” for “WORKS”), abbreviations (e.g. “LTD.” for “LIMITED”), or omissions (e.g. dropping “LIMITED” or “INC.”). In order to combine these, contractor names were stripped of these and other generic elements of company names (e.g. “ENTERPRISE”, “TRADING”, “MESSRS.”, “M/S”, “COMPANY”), as well as punctuation marks and spaces. This reduced the number of unique contractor names from 6,798 to 5,113. Using these corrected contractor names rather than the raw names slightly changes the point estimates on fund source regression coefficients, but not the differences between these

coefficients, which are the quantities of interest.

District In mid-2012, 45 of Ghana’s 170 districts were split to create 46 new districts (one district was split into three), leaving a total of 216 districts. The 46 new districts were all entirely contained within a single parent district, so there was no realignment of borders between districts. The 2011 and 2013 APRs thus reflect the 170 and 216 districts, respectively. For 2012 districts reported according to the new (216) district names, although many of the newly created districts did not report as they had only been in existence for approximately six months and were still waiting offices, personnel, etc. This creates some concern about duplications or omissions in the reporting of projects in split districts that started prior to the split, and it is unclear how consistently these matters were handled across districts. However, restricting the sample to districts that did not split in 2012 does not affect any of the results presented above, and the regression results include district-year fixed effects that would capture any disruption caused by these administrative splits, so the potential data concerns created by the district splits do not appear to affect the analysis.

For purposes of project linking and fixed effects, the post-split “parent” district (the one that maintained the existing district capital, political leadership, and the majority of its administrative staff) is treated as the same district as the pre-split combined district, regardless of whether it changed its name, while the new “child” district is treated as a new district.

The other secondary data sources drawn on by this paper differ in whether they report the old 170 or new 216 districts for 2012. This means that in some cases (e.g. with budget data) APR data from a post-split 2012 district is matched to other secondary data from a pre-split 2012 combined district. The 2010 Population and Housing Census initially used the 170 districts but has been recoded to correctly reflect the new 216 districts for the analysis years 2012 and 2013.

Classroom block additional facilities For all classroom blocks for which it was possible to identify the number of units (2, 3, 4, 6, or 12), three indicator variables representing additional facilities included in the project were defined: latrines and toilets (project titles including the strings “LATRINE”, “TOILET”, “KVIP”, etc.); offices/stores/libraries (“OFFICE”, “STORE”, “COMMON ROOM”, “LIBRARY”); and general ancillary facilities (various spellings and abbreviations of “ANCILLARY”). These variables were not coded as mutually exclusive, although it is not common for one project to combine multiple types of ancillary facilities. A residual variable was defined for the 38.0 percent of projects that do not appear to include any of these ancillary facilities.

Appendix D Attrition

Because very few districts assign unique tracking numbers to projects, linking projects across years had to be done manually. For each district for which all three years of data were available, records of projects coded as being in the same location (e.g. village, neighborhood) in different years were visually inspected according to their project title, fund source, completion status, contract sum, and other potentially identifying information, and linked if they were obviously the same project. Conditional on being incomplete in 2011 or 2012, only 33.8 percent of projects could be identified in the following year, indicating a high degree of attrition in reporting and linking. This gives rise to two concerns: first, differential attrition rates across fund sources could bias the within-district estimates of fund source completion rates.⁴⁹ Second, attrition is likely to be correlated with project completion (if bureaucrats stop reporting unfinished projects that have been abandoned) and thus poses a challenge for estimating the overall completion rate.

To investigate the first possibility, I construct an attrition indicator variable equal to one if a project that is incomplete in 2011 or 2012 can be linked to the same project's record in the following year (2012 or 2013, respectively), and zero otherwise. This variable is defined only for projects in districts that have three years of APR data. I then use this as the dependent variable in an attrition probability model, estimated as a linear probability model, where the key variables of interest are fund source indicator variables.

The results are presented in Table A2. Column 1 estimates the model with no controls and indicator variables only for the three major fund sources; Column 2 adds the baseline set of district-year and project type fixed effects, plus project characteristics; and Column 3 estimates the model with community fixed effects. The differences among the coefficients on the three major fund sources are small and are not statistically significant in any of the specifications.

To address the second concern, I estimate three different sets of completion rates, which are almost identical for projects' first year but diverge thereafter:

- *Upper bound.* Projects are classified into years (1-3) according to their reported year of commencement (e.g. a 2012 observation of a project

⁴⁹Attrition rates also vary across districts, and it is possible that districts interpret the reporting mandate in slightly different ways: some may report all projects that were underway in the district, whether or not they were active during the year, while others may only report projects that were active or included in annual budgets. However, this does not pose a major threat to this paper's main analysis, as the district fixed effects would cancel out district-level differences in attrition.

Table A2: Attrition probability by fund source

	(1)	(2)	(3)
Gov't-funded	-0.033 (0.069)	-0.012 (0.046)	-0.010 (0.078)
Centralized	0.019 (0.066)	-0.047 (0.045)	-0.002 (0.115)
Project characteristics	No	Yes	Yes
Project type FE			
District-Year FE			
Community FE			
District-Year groups		71	
Community groups			496
R^2	0	1	1
N	915	915	807

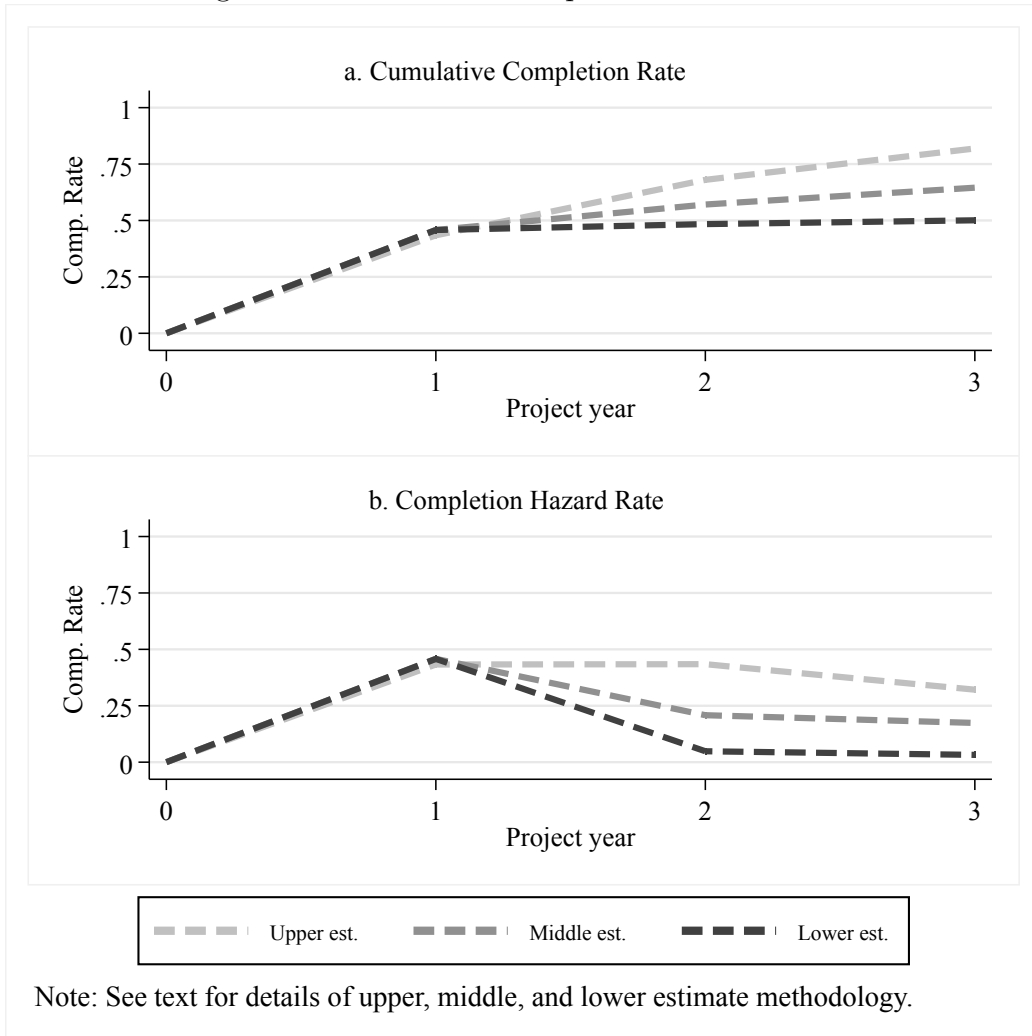
Note: Dependent variable is project attrition. Constant term not shown. Project type FE is over 22 types, with schools grouped by number of classrooms. Project characteristics are construction type (construction or maintenance) and project year indicators. Year indicators included when district-year fixed effects not specified. Huber-White robust standard errors clustered by district-year in columns 1-2 and community in column 3.

that started in 2011 is in its second year). No correction is made for attrition. Sample is all projects with non-missing commencement year.

- *Middle estimate.* Projects are classified into years according to manual linking (see above). Incomplete projects that cannot be traced to the subsequent year are treated as missing in the subsequent year (i.e. no correction is made for attrition). Projects that have not been linked to an observation from previous year are assumed to be in their first year. Sample is all projects from districts for which all three years of data are available. This is the method used in the main body of the paper.
- *Lower bound.* Same as middle estimate, but incomplete projects that cannot be traced to the subsequent year are assumed not to have been finished (i.e. attriting observations are treated as incomplete).

The upper bound estimate will be biased upward if unfinished/abandoned projects are more likely to attrite from the dataset than completed projects, which is probable. Likewise, the lower bound estimate will be biased downward if untraceable projects are actually completed in the subsequent year

Figure A2: Alternative completion rate estimates

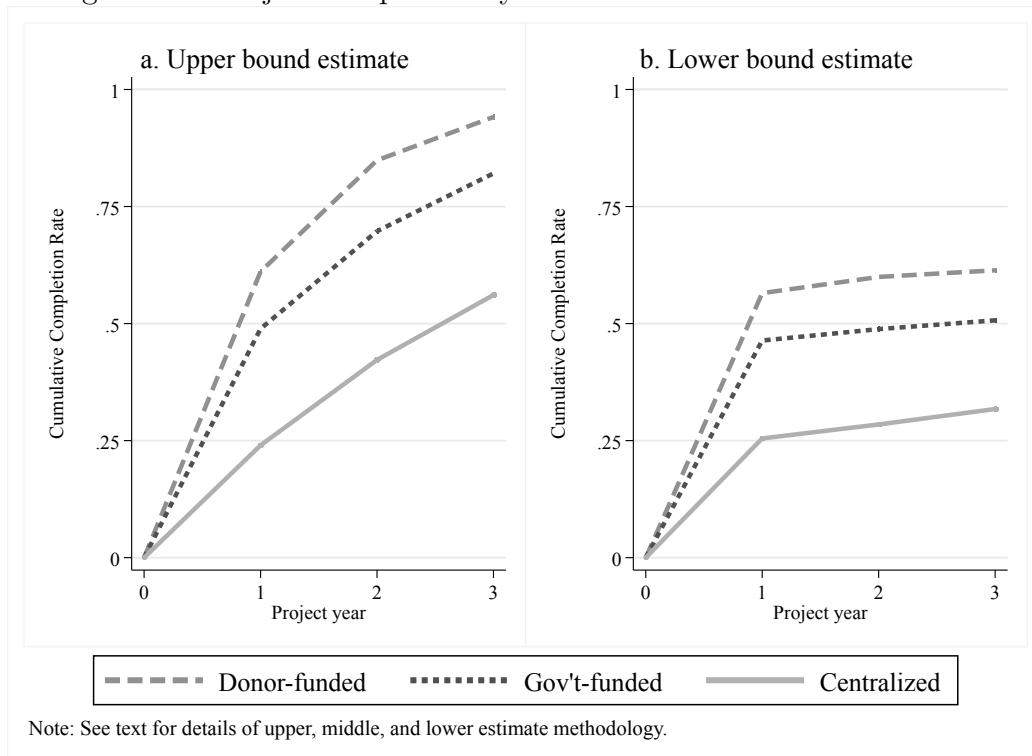


but not reported, or if the projects were completed and reported but not linked by the manual tracing methodology. The middle estimate is situated between these two but may also be biased, although the direction of this bias is unclear a priori. To the extent that the middle and lower estimates incorrectly group projects that are in their second or subsequent years but are appearing in the dataset for the first time as first-year projects, the first-year completion rates may be biased; in practice however this bias appears to be small, as the first-year completion rates are very similar under all three estimates.

Figure A2 presents the three-year completion rates using these different estimation methods. The differences in the second and third years among

the methods are large, although the key qualitative finding (that projects' completion hazard rate decreases after the first year) remains.

Figure A3: Project completion by fund source - alternative estimates



However, Figure A3 shows that the differences across fund sources vary little across the estimation methodologies. This provides further reassurance that the main findings of the paper are not affected by concerns over attrition.

Appendix E Reporting accuracy

Data quality and reporting honesty are most likely to vary at the district level, but since this paper’s analysis focuses mainly on within-district variation, misreporting bias would only be a problem if it were differential across fund sources. District officials would have no incentive to do so, however, since the APRs are not submitted directly to any of the funding institutions and were not being used by these institutions for monitoring purposes. Furthermore, officials have little incentive to lie in these reports: until the compilation of this database, the reports were subject only to a perfunctory check by central government officials and there are no reported instances of any district-level being punished based on information reported in an APR. Scrutiny of district operations is somewhat more intense in terms of financial management due to the Ghana Audit Service’s annual audits, but these are not based on the APRs and if anything provide an incentive for district-level officers *not* to misreport the financial status of projects on APRs.

I also conducted physical site visits to a small sub-sample of projects that had been reported as complete in 2013, spread across four randomly selected districts in two regions. Seventeen of the twenty projects were fully complete, while the remainder were functionally complete but with minor areas of incompleteness (e.g. no windows, untiled floors, holes in roof, some roofing remaining to be done). Sixteen of the projects were in full use; of the remaining four, one was in partial use, one was out of use because of cracks and accessibility issues, and one had not been commissioned yet. The site visits were conducted in October 2014, ten months after the project had been reported as complete; in only one case did people present at the project site report that the project had actually been finished in 2014 rather than 2013. The physical evidence from this limited sample suggests that while construction quality and maintenance may be issues with projects reported as complete, there is little evidence that districts reports of completion status are systematically biased.

In addition, the Ministry of Education maintains its own internal monitoring database of 1,146 GETFund projects, which is compiled by central officials. It reports that of 6-unit classrooms and dormitories started between 2009 and 2013 nationwide, only 36.6 percent had been completed. It is not possible to disaggregate this by year of project commencement, and the date of reporting is not indicated (these figures are based on a database provided by the Ministry of Education in January 2015). In addition, the Ghana Audit Service reports that a June 2013 monitoring effort of 179 school projects in seven regions started in 2010 and 2011 found that 27 percent were complete, despite scheduled completion times of six to twelve months – a sim-

ilar length to most GETFund projects in the APR database (Ghana Audit Service 2014, 290). While these estimates differ slightly in timespan and project coverage, they are in the same range as APR database estimates that GETFund projects have one-year completion rates of 24.0-25.4 percent and three-year completion rates of 32.0-56.1 percent.

Appendix F Robustness

Table A3 presents the results of several robustness checks on the main results. To address the concern that the project type fixed effects do not adequately control for heterogeneity in the physical characteristics of projects, Column 1 restricts the sample to schools, and Column 2 introduces controls for the presence of ancillary facilities attached to the school buildings. The estimated effects remain large and statistically significant.

Table A3: Robustness checks

	(1) Schools	(2) Schools	(3) First-year	(4) All FS
Gov't-funded	-0.424 (0.078)	-0.423 (0.076)	-0.210 (0.133)	-0.105 (0.079)
Centralized	-0.396 (0.086)	-0.377 (0.082)	-0.333 (0.213)	-0.117 (0.082)
Donor-funded				0.125 (0.077)
Gov't-funded * NDC vote share	0.590 (0.167)	0.573 (0.160)	0.252 (0.289)	0.180 (0.153)
Centralized * NDC vote share	0.273 (0.164)	0.291 (0.154)	0.053 (0.512)	-0.082 (0.148)
Donor-funded * NDC vote share				-0.057 (0.152)
Ancillary facilities		-0.108 (0.031)		
Toilet		-0.026 (0.044)		
Office/ store/ library		0.026 (0.028)		
Project type FE	Yes	Yes	Yes	Yes
District-Year FE				
District-Year groups	305	305	147	348
R^2	0.415	0.421	0.518	0.321
N	2815	2815	1110	10501

Note: Dependent variable is project completion. Constant term not shown. Project type FE is over 22 types, with schools grouped by number of classrooms. Project characteristics are construction type (construction or maintenance) and project year indicators. Huber-White robust standard errors clustered by district-year in columns 1-2 and community in column 3.

Another potential concern is that the use of annual project completion rate as dependent variable might be biasing the estimated fund source effects, as could be the case if project completion rates declined over years since project start, if this led latter-year projects from some fund sources to remain in the sample, and if the project-year controls included in the regression did not adequately control for this effect. Column 3 therefore restricts the same to projects that are in their first year of implementation only. The estimated $\tau^{Gov't}$ is almost unchanged, but loses statistical significance at conventional levels because the sample restriction dramatically increases the standard error of the estimate.

Finally, Column 4 estimates the model over the full sample of projects with non-missing fund source, including those that are neither funded by the DACF, nor the DDF, nor the GETFund. The parameters of interest then become the differences between τ^{Donor} and $\tau^{Gov't}$ and between τ^{Donor} and $\tau^{Central}$. The point estimates of these differences are similar to those reported in the baseline specification from Table 2, and they are statistically significant ($p = 0.042$ and $p = 0.033$, respectively).