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The Political Geography of Government Projects: Evidence from +/- 40,000 Projects in Ghana

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Abstract

A large body of work on distributive politics emphasizes that incumbents strategically target spending at voters to achieve electoral ends, with important debates about whether politicians target swing or core voters. Nearly all such work, however, ignores the fact that voters are clustered in space and that much government spending is on club goods that are inherently geographic. These goods, such as schools or clinics, serve communities and cannot be targeted at individual voters; such goods also have spatial externalities because neighboring communities can use them. Our paper has three aims. First, we outline the analytical challenges inherent in taking project locations and their corresponding spatial externalities seriously. Second, we describe some of the empirical challenges associated with attaining project location data, mapping it, combining it with relevant covariates at the appropriate scale and modeling it. Third, we introduce a new dataset that combines over 40,000 projects in Ghana's districts with fine-grained census tract and polling booth data. To the best of our knowledge, this is the largest data set of its kind. In preliminary analysis of a modest portion of the data, we estimate the role of need, partisanship and spatial externalities in shaping which communities receive government projects.

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Contents

1. Introduction 1

2. Distributive Politics in Space 2

3. Project Allocation in Ghana's Districts 4

4. Challenges: Mapping Needs, Partisanship and Projects 6

5. Some Evidence from Ghana's Districts 8

6. Conclusion 11

References 12

1 Introduction

The political economy of public good provision is a widely studied topic, with most studies addressing the question of how incumbents choose to allocate these public goods - typically in the form of projects, such as schools, or the services delivered from these installations. Yet while the foundational models in this field assume that politicians target voters in ideological space (Dixit & Londregan 1996, Stokes 2005), these government projects are located first and foremost in geographical space. Since most public facilities are club goods (i.e., locally non-excludable) they are effectively targeted to geographically defined communities rather than individuals, and so their spatial nature cannot be abstracted away. While a handful of recent studies have begun to explore this by showing that partisan or ethnic segregation can influence distributive outcomes (Ejdemyr *et al*. 2017, Harris & Posner 2017), segregation is only one of many ways in which projects' spatial nature can affect distributive outcomes and targeting strategies. Our goals in this paper are: 1) to lay out the theoretical and methodological challenges inherent in studying the distribution of public projects as a spatial process; and 2) to make a preliminary assessment of their empirical importance in the context of Ghana's districts.

First, projects may be characterized by *spatial externalities*, such as when residents of one community can attend a school built in a neighboring community. In this case, distributive outcomes will depend not just on the characteristics of the target community (as assumed by all distributive politics work to date), but also on the characteristics of neighboring communities. The extent of these spillovers will depend on the geographic catchment area of the project, which is likely to vary across project types and is itself a function of neighboring community characteristics - whether a student will travel from one community to another to attend school will depend on whether there is a school in her home community and on the means of transport. Second, project allocation may exhibit *temporal dependence*, since allocation decisions in one year are not independent of decisions in previous years. This could be true for technical reasons - a community that has received a school previously may not need more - as well as due to political calculations that depend on voter expectation and response functions that are not obvious *a priori* and on which we have little empirical evidence. Finally, contrary to the simplifying assumptions of most theoretical and empirical work in distributive politics, allocation decisions are typically made not be a unitary incumbent but through some sort of collective social choice process (Williams 2017). The analytical challenges of spatial externalities and temporal dependence are compounded in these settings where *social choice processes are unclear* because they are imprecisely specified (due to informal politics or opaque bureaucracies) and/or imperfectly enforced (due to weak institutions or capacity limitations). Such ambiguous processes seem more likely to be prevalent around the world than less ambiguous decision contexts such as the U.S. Congress, where the vast majority of the existing empirical literature on collective choice processes has been concentrated.

These theoretical challenges are complemented by the daunting empirical problem of obtaining adequate data to actually conduct empirical spatial analysis of these issues. Estimating spatial externalities requires a large dataset of project locations and relevant covariates at a fine-grained scale, while studying temporal dependencies requires a panel rather than the cross sections with which most empirical distributive politics studies have been conducted. Furthermore, whereas most existing studies focus on one type of projects (e.g., schools, boreholes) or on projects delivered through one particular funding

mechanism (e.g., constituency funds, donor projects), spatial externalities and temporal dependencies can occur across project types and funding mechanisms, either positively or negatively. At a minimum, then, spatializing distributive politics benefits from data from multiple project types or funding mechanisms, and ideally a comprehensive dataset of all public facilities from all sources. For an empirical literature where obtaining reliable data on just one project type from one fund source - let alone mapping it accurately - has often proved difficult, these data challenges are a tall order.

While our overall objective with this work is to demonstrate how a full treatment of these methodological, theoretical, and empirical issues can advance the study of distributive politics, in this paper our aim is more limited: we aim merely to clearly present these challenges and how we deal with them, and to conduct a highly preliminary and exploratory analysis of a three-district subsample of our data to explore the extent to which citizen need, electoral considerations and spatial externalities relate to likelihood of a community receiving a project. As a general matter, we hypothesize that the location, type, and assigned funding source of projects responds to the spatial distribution of partisan support for the incumbent party in the district. As a result of taking seriously the spatial and temporal externalities inherent in development projects, we also expect to see strong, negative spatial and temporal dependence in project awards. While this empirical exploration only partially responds to the set of theoretical challenges we discuss and is on too small a scale to provide definitive results, we nonetheless hope this exercise will pave the way for more comprehensive work in future, by ourselves and others.

2 Distributive Politics in Space

The standard core voter model of distributive politics suggests that politicians have incentives to focus efforts on core supporters (Cox & McCubbins 1986). Emphasizing the importance of mobilizing voters in democratic elections, this notion has received considerable empirical support in diverse settings (Calvo & Murillo 2004, Bickers & Stein 2000). The theoretical framework can be translated into a setting in which voters of different types - core supporters (co-partisans), swing voters, and opponents of the incumbent - are distributed over space and may be concentrated in particular locations within the district. Incumbents are expected to concentrate their efforts on those locations that have high concentrations of strong co-partisans, and therefore, we expect that locations within districts with a larger share of supporters of the incumbent will be allocated a larger share of the infrastructure and development projects budget. Because of strong party identification and the salience of ethno-regional identity as a political mobilization strategy (Ichino & Nathan 2013), the core voter paradigm is a useful starting point for understanding the allocation of projects across the political geography of Ghana's districts.

Nevertheless, the standard model and related work (Dixit & Londregan 1996, Stokes 2005) have several limitations as they bear on the building of government projects: 1) They place voters in ideological but not geographic space, and therefore implicitly assume that their location or clustering in space does not affect the dynamics of distributive politics; 2) They conceptualize the exchange of transfers for votes at the individual level, despite the fact that much government spending is on local public goods that are not excludable from opposition voters - once a public school is built in one village or neighborhood, all parents are typically free to send their kids irrespective of their voting behavior in the past election; and 3)

they ignore the spatial and temporal spillovers that likely characterize government projects - once a clinic is built in one village or neighborhood, nearby communities typically have access to it. Thus, standard work on distributive politics provides limited insight into government projects that serve hundreds or thousands of voters as a key tool for maintaining and building political support, despite the fact that local voters - be they the urban poor in India or the rural poor in Ghana - often place considerable value on local public goods such as a nearby clinic, clean water and better sanitation. These are not private goods, and their use often extends beyond the specific community where they are placed.

Indeed, for many governments around the world capital projects represent a huge share of government expenditure. In Ghana's districts such projects represent 42.5 percent percentage of total government spending and are forefront in the minds of district voters[1]. As described by Ichino & Nathan (2013), the development projects sought by citizens are targetable local public goods with geographically limited benefit areas; they also vary in their potential political returns by the mix of partisans near the project site.

These projects have two key features with important analytical implications for distributive politics, namely spatial externalities and temporal dependence. The spatial externalities of government projects result from the fact that they can be used by voters of any partisan, ethnic or tribal stripe who are in their catchment area. There is a fairly developed policy literature on how distance to services impact service outcomes (Brinkerhoff *et al.* 2016). Numerous studies of health services utilization and health outcomes, for instance, have found that distance to facilities is an important determinant (Noor et al. 2006, Guagliardo 2004; Malqvist et al. 2010). Similarly, research has shown a link between distance and everything from farmers' use of veterinary services (Woods 2010) to school achievement (Lee et al. 2005). These spatial gradients reflect the fact the the services provided by government projects have catchment areas that extend beyond their immediate locations. And these catchment areas vary both by the nature of services provided and the transportation available to local citizens. A recent, large household survey in rural Ghana, for instance, shows that the average primary school student walks 11 minutes to get to school (the standard deviation is 11 as well). In contrast, the average household walks 24 minutes to the nearest clinic (standard deviation is 27 minutes). From these means and standard deviations, one can get a sense of the outer bound for the spatial externalities to building schools and clinics.

Imagine that politicians are vote maximizers. Given the spatial externalities described above, the allocation choices of government are unlikely to be a response to the characteristics of individual voters or even to the group of voters in a given community; those choices are likely to reflect the electoral characteristics of the broader set of communities that might be serviced by a project. By extension, the building of a project - say a clinic - in one community is likely to result in negative spatial dependence in neighboring communities, whose citizens will walk, ride or drive to the new clinic.

Given that citizen demand for projects is, for all intents and purposes, limitless, but that projects are costly, there is also likely to be negative temporal dependence in project allocation. Resource-constrained district governments will try to spread projects across politically attractive communities, but given that there are more attractive communities than budgetable projects in any given year, decision-makers face an intertemporal choice problem. Though we know very little precise about their discounting, it seems likely

[1] Author's calculations from Ministry of Local Government and Rural Development budget data, based on an exchange rate of USD 1 = GHS 2.35 at 31 December, 2013.

that a community that receives a project in one year is less likely to receive one that following year as district officials target other worthy communities. Thus, we expect negative temporal dependence in project allocation in communities.

While an increasing number of papers use geolocated data to study the politics of public good provision, few grapple with spatial externalities and none (to our knowledge) address the question of temporal dependence. The club good nature of public projects is recognized by a small but growing number of studies that show that the spatial segregation of co-partisans or co-ethnics reduce the extent of favoritism in public good provision or voting patterns (Ichino & Nathan 2013, Ejdemyr *et al*. 2017, Harris & Posner 2017). However, none of these papers attempt to theorize or estimate temporal dependence in project allocation. Similarly, the empirical distributive politics literature has typically been vague about the actual institutional process through which project allocation decisions are made, with many papers using simple measures of co-ethnicity or co-partisanship with the president (Franck & Rainer 2012, Hodler & Raschky 2014, Burgess *et al*. 2015, Kramon & Posner 2013) or local officials (Ejdemyr *et al*. 2017). This inattention to actual project allocation mechanisms is noteworthy, since cases where project allocations actually are taken by a single individual (such as the constituency development funds studied by Harris and Posner (2017)) are comparatively rare and a number of studies have shown that political and bureaucratic institutions mediate distributive outcomes (Bertelli and Grose 2009, (Hodler & Raschky 2014, Burgess *et al*. 2015, Williams 2017).

3 Project Allocation in Ghana's Districts

Any study of distributive politics and political geography must start with a model of distribution grounded in the social choice and institutional processes that determine project allocation. As a generation of research on the U.S. Congress has shown, these institutional details can have large impacts on outcomes (Primo & Snyder 2008, Ansolabehere *et al*. 2003), Larcinese and Snyder 2013). Unfortunately, in the vast majority of contexts worldwide, these allocative processes are somewhat ambiguous. This can be because the relevant institutions and processes are imprecisely specified - as often pertains to project allocations within bureaucracies - or because they are weakly enforced - as is often the case with legislative bodies in developing countries, particularly at the local level. In both cases, informal politics are likely to play a major role, and so the *de facto* social choice processes will not be fully specified by formal institutions. This gap will be further widened to the extent that political decisions and budgets are not perfectly implemented - as is the norm in many polities.

The project allocation process in Ghana illustrates these analytical challenges. District politics in Ghana are embedded in a broader national politics in which two strong parties play an important role in shaping the incentives of politicians, and national politicians are evaluated by voters in no small part by whether they "bring development" to their local areas. The District Chief Executive (DCE), who is nominated by the President and can also be removed by him, is responsible for the day-to-day management of district affairs and is the most important actor in allocating infrastructure projects in the district budget. The DCE's interests are generally aligned with the President's, as the DCE's office and career progression is contingent upon the President's favor and the party's success at the national level. At the same time, the

DCE is also informally accountable to local actors, such as party activists, who have strong expectations of being rewarded with projects, the non-fulfillment of which frequently results in protests that lead to the DCE's removal by the President. DCEs have the initial responsibility for proposing project allocations (specified in the annual budget), as they preside over the District Planning and Coordination Unit in the district bureaucracy which draws up a preliminary list of potential projects. While these are supposedly based on purely technical criteria, interviewees report that these lists are frequently subject to lobbying and to the DCE's political considerations, with the result that the overall project proposal process is very imprecisely specified.

The DCE's proposed project allocations (specified in the annual budget) must be approved by a district assembly (DA) composed of representatives, 70 percent of whom are directly elected from single-member electoral areas within the districts in elections that are not held concurrently with the presidential election, while 30 percent are appointed by the President.[2] As a result, majorities in DAs can be co-partisans or opponents of the DCE: in districts that lean towards the opposition, the majority of the district assembly members are likely to be sympathetic to the opposition, even though the district assembly elections are officially non-partisan. In these opposition-leaning districts, DCEs must additionally be concerned with protests by opposition supporters and party activists, which can lead to the DCE's dismissal by the president. Thus, while DCEs are the most powerful actors in districts, assemblies can serve as an important check on the budgetary and executive authority of DCEs.

While budgets are approved by a simple majority vote, beyond this the legislative institutions are ambiguous and weakly enforced. There is a system of committees which could in principle structure the legislative bargaining process, but extensive qualitative interviews have shown that there are few regularities across districts in how committee appointments are made or how the DCE's project proposals pass through the committee system. Indeed, in Ghana's districts, as in many other local governments in developing countries, the enforcement of these legislative institutions is likely to vary in ways that are potentially endogenous to the distributive outcomes they seek to shape, rendering the social choice process considerably more opaque than (say) in the U.S. Congress.

A final challenge is that agreed budgets may be imperfectly implemented. The DCE has a large degree of discretion in project implementation, and often implement projects outside of the annual budget. This discretion may sometimes be used in beneficial ways - by responding to unexpected circumstances such as natural disasters, for example - but DCEs may also use their control of the bureaucracy and procurement processes to deliver targeted benefits without the approval of the assembly. While DAs do have some formal and informal redress mechanisms, such as voting to cease funding to a specific project or conducting a no-confidence vote, their ability to effectively use these mechanisms is again likely to be endogenous to the distributive outcomes we wish to study. Contexts such as Ghana's districts, where project allocation institutions are imprecisely specified and weakly enforced, pose a significant challenge for theorizing distributive politics.

[2] A President's nominee for DCE must be approved by a two-thirds majority of the assembly.

4 Challenges: Mapping Needs, Partisanship and Projects

Any attempt to assess the role of politics and need in the allocation of government projects needs a lot of geolocated data. Ideally one would have access to geolocated data on the projects themselves, disaggregated census data to measure citizen health, education, etc., as a indication of project need, and very spatially precise data on voting behavior. We bring all such data to bear, but it has required a huge amount of effort. Assembling data on a large range of projects is a considerable practical challenge, especially when using government administrative data which tends to be more comprehensive but less clean than the smaller datasets compiled by donors or NGOs. Our project data is compiled from nearly one thousand annual reports compiled by Ghana's districts indicating the status of all physical projects underway in their district during the year, representing 75 percent of all possible district-year reports for the period 2011-16. With support from Ghana's National Development Planning Commission (NDPC), we gathered these reports in hard and soft copy from the NDPC headquarters and from archives in all ten regional capitals, digitized them using manual double-entry with reconciliation of all errors, and coded the resulting dataset algorithmically with manual disambiguation where necessary. Williams (2017) gives further details on the project data and how we verified the self-reported data, including through project site visits and comparisons to other independent estimates of smaller sub-samples of the data. These projects were then geolocated in collaboration with the Centre for Remote Sensing and Geographic Information Systems (CERSGIS) at the University of Ghana, by comparing district and community names reported by districts to base map data compiled from several sources – a painstaking manual process, since Ghana does not have a unified system of locations or spellings of community names.

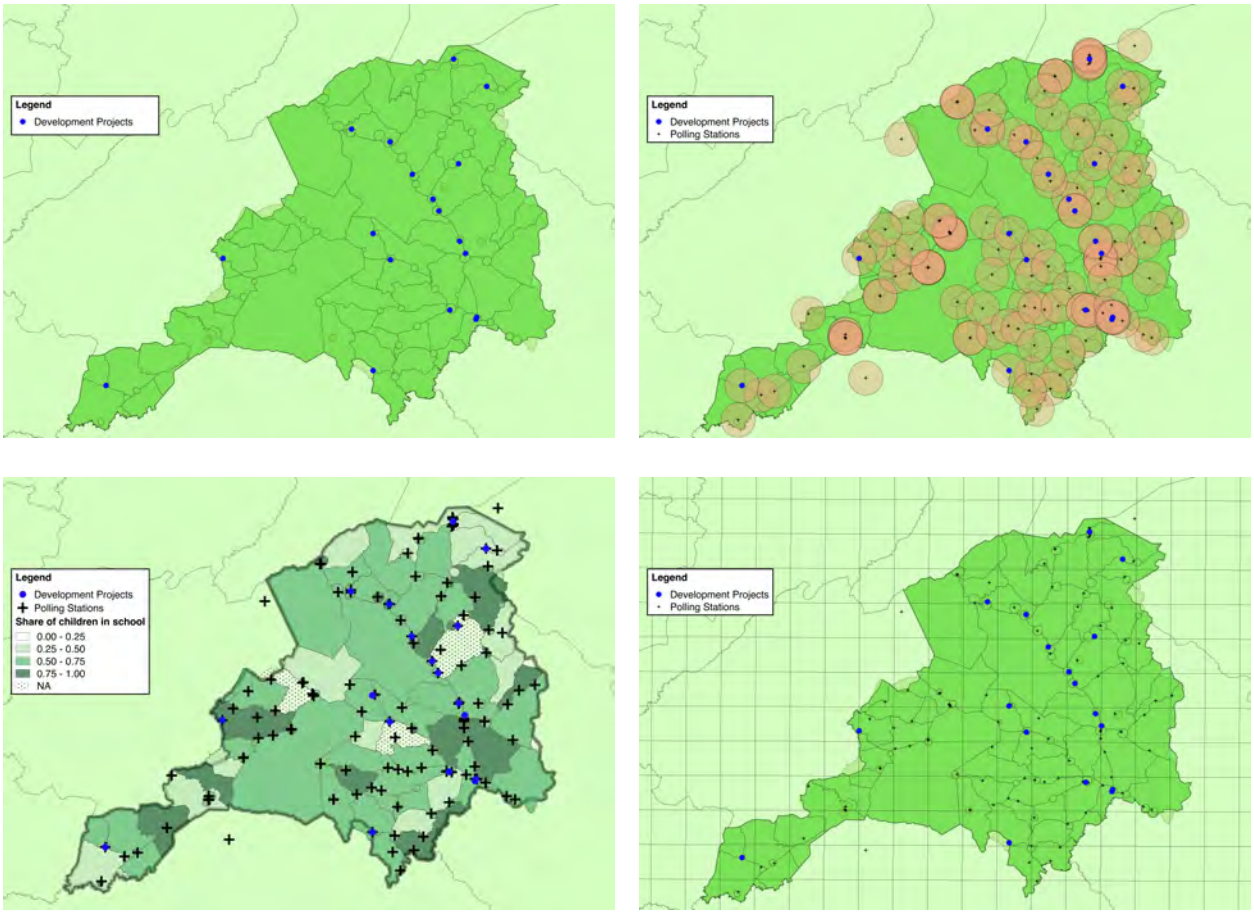
We combine our geocoded project data with a 10 percent extract from Ghana Statistical Service's 2010 Population and Housing Census at the enumeration-area level, and polling station-level electoral returns (which are themselves the result of a long data gathering process by one of us). All of this data is combined with EA and district shapefiles to provide the requisite geographic information with as much detail as possible. Merging data across these different geographic scales is itself not trivial because Ghana has split its districts since the census, and the Ghana Statistical Service regularly redraws EA maps. Moreover, even apparently small matters like the thickness of boundaries in shapefiles and small imperfections in boundaries result in troubling mismatches across files. Some enumeration areas, for instance, appear in *seven* districts, leading to a daunting task of data cleaning.

Once the data is collected and merged, a more profound set of challenges bear on how to conceptualize the unit of analysis: Is it the district, which holds fiscal power, budgets projects to communities, and where the DCE is the ultimate arbiter? Or is it the single member electoral areas from which 2/3 of district assembly members are elected? Or are DA members even more strategic, in which case they might reward and punish specific communities on the basis of voting booth returns? Or relatedly, is the relevant political unit the distinct catchment area for the different development projects - schools, clinics, public toilets, markets, etc. - that districts build? Or is the relevant political geography largely ethnic, tribal and informal in a way that transcends formal electoral institutions?

Alas, the "modifiable areal unit problem" (MAUP) tells us that the answer to these questions is likely to matter a great deal. Perhaps *the* central problem in geography and spatial analysis, the MAUP tells us

that the answers we get depend a great deal on the scale at which we analyze the problem. As outlined in Section 3 above, in Ghana's districts (and most other allocative settings), we do not know the answer. One solution would be to simply rely on knowledge about formal electoral and legislative institutions. Another would be to ask the relevant actors in the expectation that they would provide a clear answer. In our case, interviews with former and current district officials provide a rich, varied and inconclusive array of answers on both the functioning of legislative institutions and on the relevant set of actors and strategies.

Figure 1: Map 1a-d: The Level of Analysis Problem



Thus we are left with a rather vexing variant of the MAUP. To fix thoughts consider Map 1a, 1b, 1c and 1d, all of which are of a single district - Ahafo Ano South - in Ghana's Ashanti region. Map 1a simply plots the district-built development projects that we have been able to geolocate from the 2015 budget cycle. The maps shows a fair amount of geographic dispersion. It is this geographic distribution that we hope to explain. One challenge is immediately clear, namely that EAs are drawn to accommodate a similar number of structures and/or households, so population density varies considerably across EAs. This fact will complicate the estimation of geographic spillovers. Map 1b adds to the map the location of voting booths with a 5-kilometer radius circle drawn around them. One can think of these circles as the catchment area for voting booths. If the distributive politics governing the allocation of projects is primarily electoral, the voting results at the level of these booths should have important bearing on project allocation. Map 1c, on the other hand, shows the level of educational need as inferred from

census data reported at the level of the enumeration area. It shows the share of students under the age of 13 who attend school, which ranges from a low of 27 percent to a high of 100 percent across the district's EAs. Given that schools are the most common district-built project and focus for research on the relationship between physical proximity to service units and service outcomes, one can take this as a measure of the "need" for projects at a very local level. If district governments operate as social welfare maximizers, this should be the geography that matters most for project allocation. Finally, Map 1d ignores all political institutions and effectively accommodates our ignorance about the social choice process governing project allocation. It imposes a 4km x 4km grid upon the district and provides a means of analyzing the impact of past project location in neighboring and distant grid cells on the probability of a project being awarded in any given grid cell.

5 Some Evidence from Ghana's Districts

Our data results from a laborious process of collecting and digitizing reports from district governments and soliciting other granular data from the Ghanaian government. The project-level data is described above and spans the period from 2011-2016. We measure the local "need" for projects with EA-level census data, where we use a 10 percent extract to calculate the share of the households with access to electricity (whether from the grid or privately provided), the share of households with access to a public or private toilet, and the share who get their household water supply from an improved and protected source, whether it be piped water, a borehole or a covered well. Our census data covers 2,466,289 individuals across more than 19,000 enumeration areas and includes basic information on schooling, housing quality, mortality, age, ethnicity and work. Given the prominent role of ethnic politics in Ghana, we also include a measure of the share of the EA who are Akan (minus members of the Fante tribe, who have been associated with a different political party from the other Akans). Finally, we include several controls for population size and population density, since both have important bearing on the scale economies associated with government projects and services. Population density is calculated by dividing total population by the area of the EA polygon.

Although we have data for all of Ghana's 216 districts, for this initial, exploratory analysis we include only three of them. In selecting these three, our goal was to take districts that had a reasonably large number of projects and provided variety on the extent and nature of electoral competition between the two main parties, the NPP and the NDC. Amansie Central in Ashanti represents a NPP stronghold; Adaklu is an NDC stronghold in the Volta region; and Jaman North is a competitive district in the Brong Ahafo region. Together, these three districts provide 69 projects over 233 geographic areas for analysis along with considerable internal variation in project need. Summary statistics for these three districts are reported in Table 1.

Our description of government projects and the social choice process that allocates them to localities implies that standard regression models may be inappropriate for estimating the relationship between local needs, partisanship and project location. We conceptualize the decision to allocate a project to a locality or not as a discrete choice by district governments. Given that: a) projects can serve multiple communities at some spatial gradient; and b) district officials likely want to spread projects around to

Table 1: Summary Statistics for All Three Districts

	Mean	SD	Median	Min	Max	n
Total Projects	0.30	0.73	0	0	6	233
New Projects, 2016	0.03	0.16	0	0	1	233
New Projects, 2015	0.06	0.23	0	0	1	233
Share Akan	0.53	0.43	0.76	0.00	1.00	233
Population (Count)	102.41	154.18	61.00	1.00	1496.00	233
Area (Sqkm)	12.27	23.97	1.82	0.09	151.12	233
Population Density	105.28	149.78	40.66	0.13	845.04	233
Share With Electricity	0.25	0.33	0.00	0.00	1.00	233
Share With Toilet	0.60	0.34	0.70	0.00	1.00	233

maximize their electoral returns, it goes without saying that localities (or in our empirical application, enumeration areas) are not IID. Whether a locality receives a project may depend, in part, on whether a neighboring locality has one. Likewise, whether a locality receives a project in one year may depend, in part, on whether it received a project the previous year.

The standard approach to temporal dependence is to treat it as nuisance and introduce lags of varying length and/or distributions. The typical approach to spatial dependence is to estimate models with spatial lags defined by nearest neighbors or some other spatial-connectivity matrix. Only recently have researchers developed methods to simultaneously accommodate spatial and temporal dependence (Bakar & Sahu 2015, Franzese *et al*. 2016). These latter methods are clearly most appropriate for our problem and data, but as an initial cut we simply report spatial autoregressive models in which the spatial lag is defined by queen contiguity. The results are robust to alternative approaches to contiguity, but given the different sizes of enumeration areas and the potential strategy and spatial efficiencies involved in project allocation, it is not obvious that neighborliness is the appropriate concept for calculating the adjacency matrix. An alternative approach would incorporate information on the distances that Ghanaians travel to the services that these development projects deliver.

In this exploratory analysis, we find substantial global spatial autocorrelation on our "needs" variables as calculated with Moran's I statistic. At the same time, we find no global spatial autocorrelation in overall projects over 2011–16, and year-by-year, we find no global spatial autocorrelation in new projects initiated, with the exception of 2016 (Table 2; results for individual years 2011–14 not shown).

Table 2: Spatial Auto-Correlation of Census Variables and Projects, using a Row-Standardized Spatial Weights Matrix

	Moran's I stat	Expectation	Variance	p-value
Share With Electricity	0.215	-0.004	0.002	$<$0.001
Share With Water	0.376	-0.004	0.002	$<$0.001
Share With Toilet	0.240	-0.004	0.002	$<$0.001
Area (Sq.KM)	-0.108	-0.004	0.002	0.029
Population Count	0.014	-0.004	0.002	0.677
Population Density	-0.042	-0.004	0.002	0.433
Total Projects	-0.036	-0.004	0.002	0.467
New Projects, 2016	0.120	-0.004	0.002	0.004
New Projects, 2015	-0.028	-0.004	0.002	0.591

Table 3 reports our initial regression analysis. Model 1 regresses the total count of projects on two needs variables, population count, and district fixed effects (the district that is the stronghold of the governing party in this period, NDC, is the excluded category). Model 2 adds the population share of the Akan ethnic group, excluding the Fante subgroup. The Akans are associated with the then opposition NPP, while the Fante are are associated with the then ruling NDC. Non-Fante Akan ethnicity is a major predictor of vote share for the NPP. We find no relationship between projects and the needs variables, and that the Share Akan variable appears to displace the significance of the district fixed effects.

Table 3: Total Projects, 2011–16

	Total Projects, 2011–2016			
	OLS		**spatial autoregressive**	
	Model 1	**Model 2**	**Model 3**	**Model 4**
Share with Electricity	−0.045	0.006	−0.012	0.007
	(0.133)	(0.133)	(0.131)	(0.139)
Share with Toilet	0.159	0.187	0.193	0.154
	(0.138)	(0.138)	(0.135)	(0.134)
Share Akan (exl. Fante)		−0.614**	−0.626**	−0.472*
		(0.278)	(0.273)	(0.287)
Population (Count)	0.002***	0.002***	0.002***	0.002***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Amansie Central District	−0.377***	0.131	0.104	0.278
	(0.103)	(0.252)	(0.248)	(0.316)
Jaman North District	−0.329**	0.166	0.158	0.374
	(0.133)	(0.260)	(0.255)	(0.308)
Share with Electricity (Sp Lag)				−0.014
				(0.227)
Share with Toilet (Sp Lag)				0.234
				(0.229)
Share Akan (exl. Fante) (Sp Lag)				−0.465
				(0.360)
Population (Count) (Sp Lag)				−0.001*
				(0.001)
Constant	0.205**	0.185**	0.238**	0.247*
	(0.092)	(0.092)	(0.097)	(0.137)
N	233	233	233	233
R-squared	0.261	0.277		
Adj. R-squared	0.245	0.258		
Log Likelihood			−217.055	−213.656
Residual Std. Error	0.632	0.626		
	(df = 227)	(df = 226)		
F Statistic	16.068***	14.431***		
	(df = 5; 227)	(df = 6; 226)		
Wald Test (df = 1)			2.658	1.434
LR Test (df = 1)			1.869	1.019
AIC			452.110	453.311

***p < .01; **p < .05; *p < .1

Model 3 incorporates the spatial lag of the outcome model, and Model 4 is a spatial Durbin model that

adds the spatial lag of the explanatory variables. We continue to find no relationship between the needs variables and projects, and little improvement to the model from incorporating these spatial lags. For Model 3, ρ=-0.138, with a p-value of 0.172, and for Model 4, ρ=-0.105, with a p-value of 0.312; for comparison, the AIC for the linear models are approximately 452. The Share Akan remains a significant predictor in both models.

Possible explanations for these null results have been hinted at in the previous sections. In addition to MUAP and measurement error, there is significant ambiguity about the appropriate unit of analysis. Moreover, these methods do not incorporate the intertemporal dimension of these project allocations, and we have only investigated a sample of three districts out of more than two hundred possible districts.

6 Conclusion

This brief paper provides an insight into the difficulties associated with: a) collecting, cleaning and merging large-scale administrative data on government project locations; b) the theoretical challenges that development projects present for distributive politics, particularly in light of the diverse district-level processes that allocate them; and c) the analytical challenges inherent in moving from vague notions of "spillovers" to specific measures thereof. Nevertheless, we have provided some initial analytical work that begins to distinguish the distributive politics of government projects from public goods and private transfers, and have also introduced a new and exciting dataset that offers the prospects of providing crucial insight into an understudied problem in the social sciences. Finally, we have presented some very initial evidence on the extent of geographic spillovers in project location in three districts. While this exploratory investigation has not revealed a clear pattern of spatial dependence in the way we hypothesized, we would refrain from placing too much credence in the substantive results, given that they are generated from a highly restricted sub-sample of our data and the range of methodological challenges still to resolve.

This initial paper suggests a number of avenues for future work. First, if (despite our initial findings) there are important geographic considerations at play in the political allocation of projects across communities, it will challenge one of the most important findings in work on global health and education, namely that proximity to services (i.e., clinics or schools) is positively associated with outcomes (Lavy et al. 2006; McLafferty 2003). That research assumes that the location of services is exogenous; if we are right and project location is endogenous to political geography, it suggests that estimates of the relationship between distance to services and outcomes are biased. Second, there is considerable work to do in defining the nature and extent of spillovers of different kinds of services that governments deliver from built projects. The nature of services vary, and presumably the willingness of citizens to travel to those services also vary. Once one begins to incorporate varied travel infrastructures and technologies, the challenges mushroom. But addressing these issues is a crucial precursor to measuring spatial dependence and any corresponding spatial externalities in the distribution of government projects.

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