The Allocation of Public Goods and National Elections in Ghana

Pierre André and Sandrine Mesplé-Somps

THEMA, Université de Cergy-Pontoise, IRD, DIAL Paris,
mesple@dial.prd.fr

January 2011

Politics and the geographic allocation of public funds in a semi-democracy. The case of Ghana, 1996 - 2004.*

Pierre André†, Sandrine Mesplé-Somps‡

January 2011

Abstract

The body of literature on purely democratic countries can sometimes fail to explain the behavior of government in semi-democratic African countries. Empirical and theoretical political economic papers find that public funds target ruling party supporters and swing districts. Our results, however, suggest that the opposite was true of Ghana. We observe that pro-government districts received less public investment when the NDC was in power. We posit that this finding is partially driven by the government's will to curry favor with opposition politicians. Indeed, in addition to pursuing its electoral objectives, the government of an emerging democracy may fear political instability and keep the lid on potential unrest by bargaining with opposition leaders. Our analysis also shows that, when controlling for votes and other covariates (including wealth, urbanization and density), public goods allocation is not driven by ethnic group targeting either.

Keywords: Public goods, Elections, Politics, Ghana.

JEL classification codes: D72, O55, R53.

*We thank the AFD (Agence Française de Développement) for its contribution towards the research for this paper. We also thank Thomas Bossuroy for the election data he collected in Ghana and aggregated at district level. Our acknowledgements to Sylvie Lambert, Denis Cogneau and seminar participants at the Oxford CSAE conference and Paris LEA seminar for helpful discussions and suggestions, and to Ted Miguel for his help with data collection.

†Université de Cergy-Pontoise, THEMA, F-95000 Cergy-Pontoise, pierre.andre@univ-cergy.fr

‡Institut de Recherche pour le Développement (IRD), UMR 225 DIAL, Université Paris Dauphine. E-mail: mesple@dial.prd.fr

1 Introduction: Political motives and public funds allocation, a short review of the literature

A growing number of developing countries have become (fully or partially) democratic since the 1990s. The impact of these political changes on the development process is a major issue in the economic debate. Most of the papers that analyze the links between these political changes and economic performance in developing countries are inspired by models designed for developed countries. This is particularly true of the geographic allocation of public funds (Diaz-Cayeros, 2008; Miguel and Zaidi, 2003; Schady, 2000; Moser, 2008; Case, 2001; Cole, 2009).

Usually, a democratic government gunning seeking re-election will have incentives that target two groups of people.[1] The first kind of targeted transfer is for the incumbent government's "core support" group, and is sometimes called "machine politics": politicians reward their core supporters by means of the preferential allocation of public goods (or private transfers). Theoretically, Dixit and Londregan (1996) predict this will happen mainly if the leading party is more efficient at providing public goods to its core support group than to opposition supporters. Most of the abovementioned papers on developing countries point up this mechanism.[2]

The second kind of targeted public transfer is explained by the "swing voter" model. It comes about mainly if some voters have strong preferences for one of the political parties. In that case, public goods provision targets the median voters, who are the politically central group and could vote for either party. A number of empirical papers have pointed up such a mechanism (like Dahlberg and Johansson, 2002; Diaz-Cayeros, 2008; Cole, 2009 and Banful, 2010 respectively in Sweden, USA, India and Ghana).

Levitt and Snyder (1997) mention that MPs may step up their effort to obtain government funds when they are seeking re-election. Therefore, MPs may make more of an effort in politically central districts, so that government spending is higher in these districts. This would generate a negative correlation between the votes for the incumbent MP at the last election and government spending. This is therefore a version of the swing voter model for election with constituencies (with politically central constituencies instead of

[1] Earlier theoretical studies (including Downs, 1957 and Bowen, 1943) have been summarized and extended by Dixit and Londregan (1996).

[2] See, for instance, Levitt and Snyder Jr (1995) and Joanis (2008) for empirical evidence of public funds targeting the government's " core support" group in developed countries.

politically central voters).

Although this literature provides relevant insights into political life in established democracies, we believe it may well fail to describe some semi-democracies, and some African countries in particular where the political institutions are much weaker.

This assertion is related to some recent political economic literature. North, Wallis, and Weingast, (2009a, 2009b) assert that social orders are different in developing countries and developed countries. They explain that the social order of developing countries is a limited-access order (or natural state). By contrast, an open-access social order has long been in place in most developed countries. In a natural state order, *"personal relationships among the elite form the basis for political organization and constitute the grounds for individual interaction. A natural state is ruled by a dominant coalition; people outside the coalition have only limited access to organizations, privileges and valuable resources and activities,"* (North, Wallis, and Weingast, 2009b). In these circumstances, elections typically do not provide an institutional, competitive environment. This prevents political competition from conveying information to politicians and constraining them. Therefore, public goods are provided personally: governments are inclined to use public goods as a means of rewarding members of the elite coalition. This mechanism may make it pointless to target public funds on specific groups of people for electoral purposes.

In addition, in a semi-democratic country, the dictatorial mechanisms may be relevant for the incumbent government and its opponent(s). Indeed, dictatorship (or rebellion) is a potentially relevant alternative for them. This is particularly true when the democratic political reforms are recent and undertaken by former dictators. The literature on post-conflict political economics defines conditions whereby a peace equilibrium occurs (Esteban and Sákovics, 2008; Hirshleifer, 2001; Azam, 2006). In particular, Azam (2006) builds a model with reference to African countries that defines conditions for a peaceful equilibrium in a bargaining game between dictators and their opponents. In his model, peace is systematic when the opponent faces high opportunity costs of conflict or when the opponent's military technology is too poor. When the incumbent faces high opportunity costs of conflict, but the opponent does not, there may be coordination between them to avoid conflict. The incumbent may (partly) commit to giving a transfer to the opponent conditional on peace, which works if this promise is credible enough.

A common feature of the framework proposed by North and his co-authors and by the "post-conflict" political models is that personal relationships are central to an understand-

ing of the social and economic order in some developing countries (and/or semi-democratic countries). In both cases, the government makes compromises with the opposition elite. In the former case, this is due to personal relationships between elite members. In the latter, it is due to military threat.

This paper focuses on Ghana to show that political mechanisms in developing countries may very well be counterintuitive. We find that, while Jerry Rawlings was President (or at least between 1998 and 2000), the accumulation of publicly provided infrastructures was greater in districts voting for the opposition. This was due to "politically sensitive" districts - districts where national opposition leaders had been general election candidates - and districts in the capital area. We find this result to be in line with the natural state social order model described by North et al. (2009a) and with the bargaining mechanisms found by Azam (2006) in an emerging democracy.

In the late 1990s, Ghana displayed conditions conducive to such a mechanism. First, Ghana had experienced political instability prior to 1982, so the threat of political instability was credible and bargaining between the President and his opponents was equally credible. Second, the former dictator, Jerry Rawlings, had been President for more than 15 years at that date. This may have made it easier to coordinate to find a peaceful equilibrium with his opponents and with all the members of the "elite". Indeed, the incumbent leader's commitment to give a transfer to the opponent has more credibility if he has already made such a transfer in the past. This also makes it less likely for the opposition to win subsequent elections, as African opposition parties rarely win elections when the former dictator is still in charge. Lastly, regular presidential and general elections have been held peacefully every four years since 1992. Ghana was therefore an emerging democracy between 1998 and 2003.

To our knowledge, one other paper analyzes the political motivations of public fund transfers in the Ghanaian case. Banful (2010) studies an intergovernmental transfer: the District Assemblies Common Fund (DACF). The DACF is supposed to be allocated in keeping with a national formula, which is designed to favor needs-based allocation. Banful first shows that central government allocated fewer funds from the DACF endowment to districts with larger vote margins in the last presidential elections. This corresponds to the "swing voter" model (actually "swing districts"): when there is a lot of electoral competition in a district, the provision of public funds is high. Second, her results provide

evidence that the DACF has been targeted at districts voting for the opposition party (except in 2003). This result seems counterintuitive and remains unexplained.

We first show that her latter paradoxical result is not only specific to the District Assemblies Common Fund, but reflects the actual national allocation of public goods. With our nationally representative data on public goods allocation, we observe that districts voting for the opposition saw a particularly sharp increase in public goods availability between 1998 and 2000. Most importantly, however, we develop an economic interpretation of this observation based on the need to curry favor with opponents in an emerging democracy, as Ghana was in the late 1990s. Standard theories based on democratic competition actually fail to explain this Ghanaian pattern. Besides, our data do not reveal the "swing districts" pattern found by Banful (2010): districts with smaller vote margins did not see a particularly large accumulation of public infrastructure in our aggregated data.

This paper is structured as follows. Section 2 presents the Ghanaian political and macroeconomic environment. Sections 3 and 4 describe the data and the empirical strategy. Section 5 presents the results. Section 6 discusses the robustness of our results and Section 7 offers concluding remarks.

2 Ghanaian environment

2.1 Ghana's Political History

Ghana has been independent since 1957, frequently switching between dictatorships and democracies from 1957 to 1992. In particular, between 1966 and 1981, Ghana has experienced frequent political instability. The Ghanaian economy has been strongly affected by this instability. The main recent political leader of Ghana is Jerry Rawlings. He was Flight Lieutenant in 1981, when he led a coup and took power. Rawlings'government at the time included left-wing Nkrumahists,[3] but made the country's economic stability a priority right from the beginning of the 1980s. The Economic Recovery Program included the privatization of state-owned assets and the devaluation of the Cedi, the Ghanaian currency. Since 1984, Rawlings' government and successors post a return to stable growth.

[3]Nkrumah was president of Ghana between 1960 and 1966. The Party he founded (the Convention People's Party,CPP) had positions sometimes close to socialism (although Nkrumah claimed to be non-aligned).

Under both international and domestic pressure, Rawlings' government ushered in democracy with the first parliamentary and presidential elections in 1992.[4] Rawlings stood for his own succession as candidate for the National Democratic Congress (NDC). One candidate represented the Danquah/Busia movement[5] (right wing), on behalf of the New Patriotic Party (NPP). Three candidates represented the Nkrumahist movement and the most credible of them struck an electoral alliance with the NPP. The splintering of the Nkrumahist movement and its paradoxical alliance with the right-wing party left the door wide open for Rawlings to move into their traditional political arena: like Kwame Nkrumah, Rawlings was a charismatic leader and presented a populist platform ideologically close to the Nkrumah tradition (see Morrison, 2004).

Today, the NDC is considered to be the left-wing party in Ghana, and is a member of Socialist International, whereas the Nkrumahists are now minor parties. The NPP is deemed the right-wing party. However, the political parties are also differentiated on an ethnic basis. The NPP is largely supported by the Ashanti and has its geographic strongholds in the Ashanti region. Conversely, the Volta region is inhabited by Ewe, Rawlings' ethnic group, and votes for the NDC. The poorest Northern regions also tend to vote for the NDC (see Bossuroy, 2008). These geographic patterns have been constant since 1992 (see Figure 1).

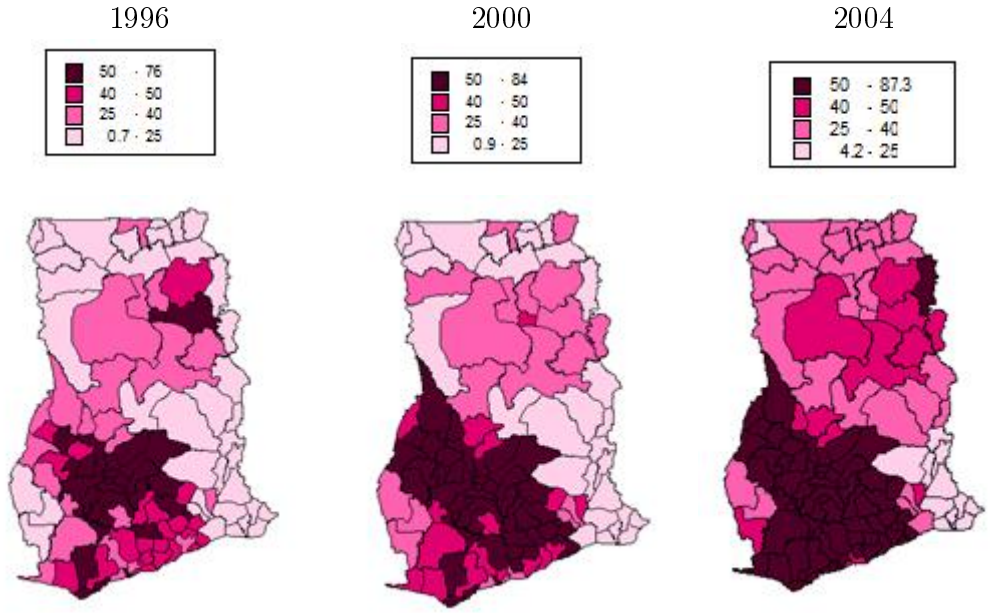
Since this time, presidential and parliamentary elections have been held every four years. In 1996, with Ghana's political system leaning towards a two-party system, the two main parties secured most of the votes, and the NDC won both the presidential (Jerry Rawlings) and parliamentary elections.

The 2000 elections were very different from the previous ones. First, Jerry Rawlings was constitutionally prevented from running for a third presidential term. He is one of the rare African presidents to have fulfilled this obligation. So the NDC candidate was John Atta Mills, who was seen as less charismatic and was less well-known at the time. In addition, the NDC's campaign was perceived by some as arrogant and the economic situation had taken a downturn (Boafo-Arthur, 2008). The elections were won by John Kufuor for the NPP, which also won the parliamentary elections. However, voting patterns revealed a geographically heterogeneous shift. In 1996, broadly 80% of

[4]However, the first parliamentary elections were not representative since they were boycotted by the opposition.

[5]Joseph B. Danquah led the first Ghanaian political party in the days before independence, the United Gold Coast Convention (UGCC). Kofi Busia was one of the founders of the National Liberation Movement (NLM) party, a conservative party supported by the Ashanti region and the educated elite.

Figure 1: Presidential elections, % of votes for the NPP party in 1996, 2002 and 2000



Sources: Official election results, authors' calculations

the Central, Brong-Ahafo and Northern MPs were members of the NDC. In 2000, the NDC won 80% of the seats in the Northern region, 50% in the Central region, and 33% in the Brong-Ahafo, where the shift was impressive (Asante and Gyimah-Boadi, 2004). Overall, the NPP essentially won the support of Accra and the Akan regions (Ashanti, Eastern, Brong-Ahafo and, to a lesser extent, Central regions).[6]

In 2004, the NPP (led by Kufuor) won the presidential and parliamentary elections, but this dominance remained fragile and the party had lost part of its influence in Accra. The second democratic shift in Ghanaian history took place in 2008. John Atta Mills (NDC) won the presidential elections with 50.23% in the second round, and the NDC took 114 of the 228 seats (107 for the NPP). Nana Akufo-Addo was the NPP's presidential candidate.

2.2 Public service policies in Ghana

A centralized system behind decentralization reforms

Decentralization reforms have been implemented in Ghana since the 80's. However, the central government remains the main political decision-maker.

[6]Asante and Gyimah-Boadi (2004) talk of anti-Ashanti sentiments in some regions (Ashanti is the largest ethnic group among the Akan and is associated with the NPP). This could explain why softening the NPP's ethnic identity could be profitable for this party in non-Ashanti Akan regions.

The major decentralization program was launched in 1988. It was designed mainly to devolve some political and central government power[7] to the district assemblies. However, most observers of the decentralization process believe that many factors impeded local government capacities, autonomy and performance (Asante, 2003; Asante and Ayee, 2008; Akramov and Asante, 2008). Lack of funds is one of the reasons for their weak decision-making power: transfers from central government account for over 80% of local revenues and around 2.5% of central government public expenditure.[8] The will to maintain as strong a central government as possible has actually driven policy and reforms in Ghana since independence. For instance, a federalist system has always been rejected, and it is well known that one of the aims of the decentralization reforms - first implemented by Rawlings - was to curb the chieftaincies' power (Jacquemot, 2007).

Investments in local infrastructures

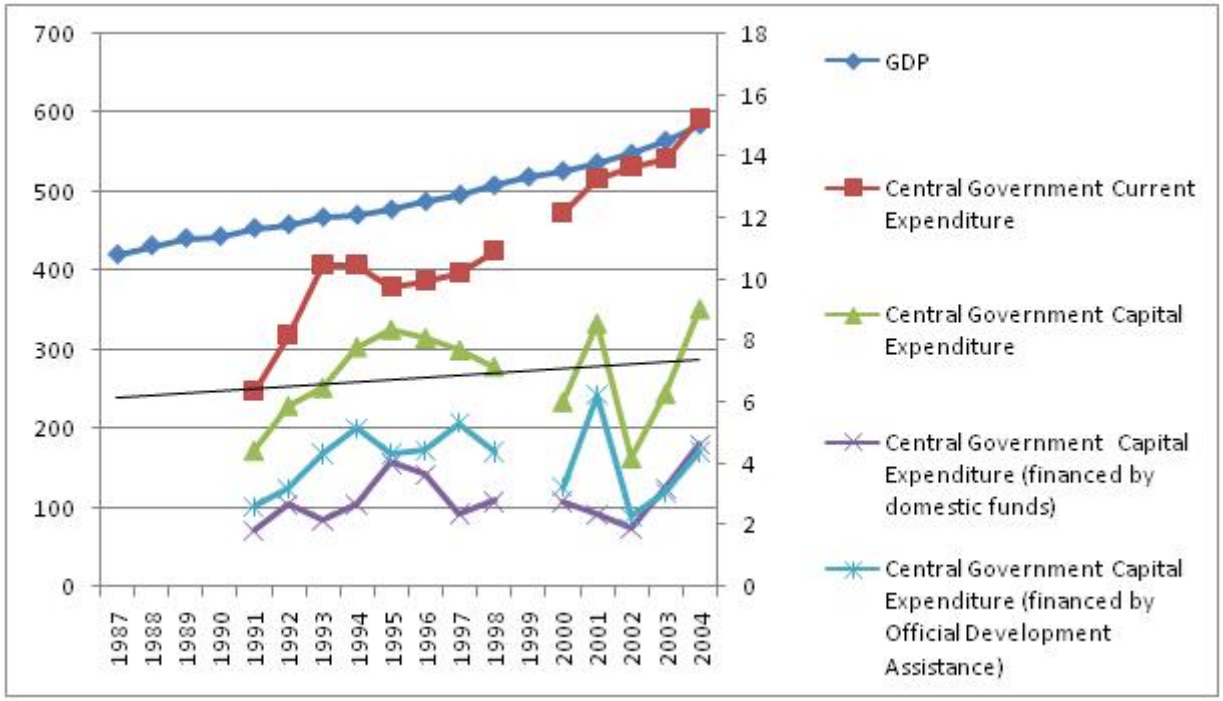
Ghana's growth performances over the past two decades have been positive and stable with real GDP per capita growth rates standing at around 2% per year. As shown by Figure 2, per capita public expenditure rose steadily during this period of stability and growth, even though public capital expenditure growth was erratic. Note that most of public capital expenditure is financed by Official Development Assistance (ODA), which funds the majority of the reforms and investment in the social sectors. Figure 3 presents the national mean levels for the public facilities analyzed in this paper. The indicators on primary and secondary school and healthcare facilities are presented for the rural areas only, since our data do not provide statistics on school and health centre facilities in towns (see the Data section below and Appendix A for more detailed information on the data).

Mean access to primary and secondary schools, even in rural areas, appears to be quite high. Around 90% of rural inhabitants live in areas with at least one primary school. 66% of primary schools were built when Kwame Nkrumah was president(1957-1966) (Akyeampong, Diangmah, Oduro, Seidu, and Hunt, 2007). The main progress since the mid-1980s appears to be in electricity and water supply. The number of people connected to the electricity grid doubled while access to piped water was multiplied by

[7]Including decentralized administration, development planning and implementation.

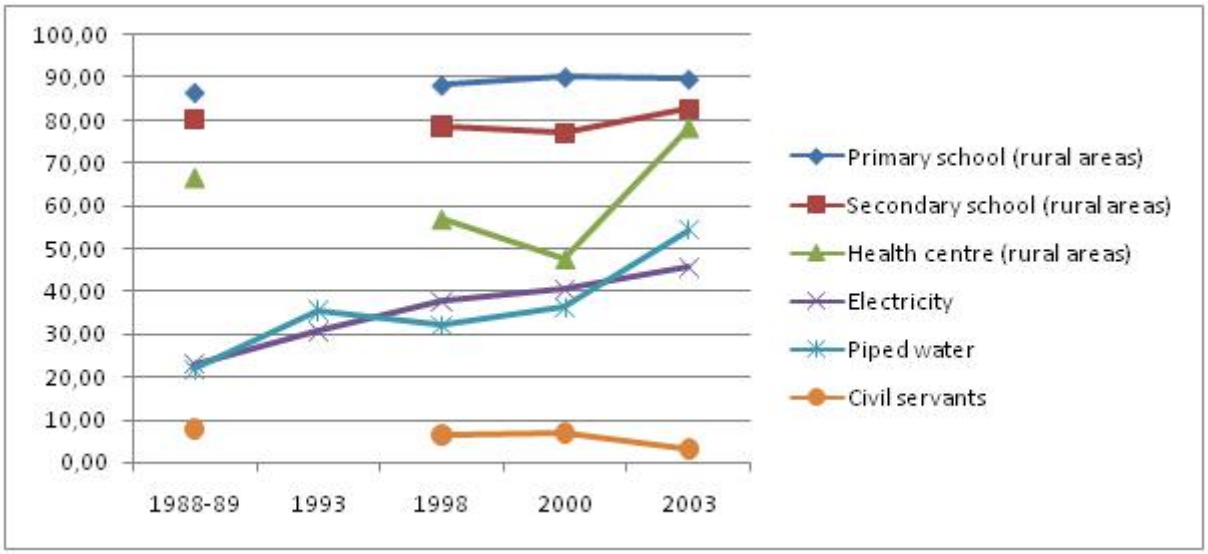
[8]These funds (District Assembly Common Funds, DACF) are allocated among the districts based on a formula approved by the National Parliament every year. Akramov and Asante (2008) and Banful (2010) report that this formula takes in various social and economic factors such as "Need", "Responsiveness", "Service Pressure", and "Equality".

Figure 2: GDP at constant prices and public expenditure per capita (Cedis), 1987 - 2004



Sources: IMF 2000, 2005; WDI 2006.
Note: Central government public expenditure data are not available for 1999.

Figure 3: Public goods provision (% of people with access to public facilities), 1988- 2003



Source: see Data section below.

Note: Access to primary and secondary schools and health centres is measured as a percentage of people living in rural areas with primary and secondary schools and health centres. The electricity and piped water indicators present the percentage of people living in dwellings connected to the electricity grid and with access to piped water. The civil servant statistic covers the people working in the public sector as a percentage of the labor force as a whole.

2.5. Employment in the public sector fell from 2000 onwards.[9]

Regional disparities in public goods in Ghana

These national infrastructure levels conceal large regional disparities (Figure 4). The most obvious regional inequality is between the North and South of the country. This is quite closely correlated with poverty (Figure 5). Yet, over and above the country's North-South divide, there are disparities between districts. The disparities in the North are especially salient between rural and urban areas. In the South, some districts of the Brong Ahafo, Western and even Ashanti regions are less endowed with public goods than the average of Upper West, Upper East and Northern regions (Figure 4).

3 Data

This paper draws on election data and national household data. The election results for the 1996, 2000 and 2004 presidential elections are aggregated at district level.[10]

The information on public goods and covariates is drawn from a number of national household datasets, namely GLSS4 (1998), DHS (1998 and 2003), the 2000 national household and facility survey, and the 2003 CWIQ survey.[11] Together, these surveys provide information on the availability of public goods in Ghanaian districts at three points in time: 1998, 2000 and 2003. Figure 6 presents an overview of the national survey we use and compares their dates with the dates of national elections. They include information on the share of households with access to electricity and piped water[12] (all surveys), the share of civil servants (all except the DHS surveys), and the share of the rural population with access to primary schools, secondary schools and community clinics[13] (all surveys except the DHS). All this information is aggregated at district level to generate district access rates for each facility. Appendix A presents the definition of each variable in detail and the sample size for the surveys used.

[9]Yet these comparisons using different surveys are not necessarily entirely reliable, as they depend on the comparability of the surveys in question.

[10]The parliamentary and presidential elections are held at the same time in Ghana. Since both results are highly correlated, we focus on the presidential election outcomes in this paper. Parliamentary constituencies are nested in the 2000 districts.

[11]Section 2 draws on the GLSS1 and DHS 93 surveys for its national statistics for 1988 and 1993.

[12]Inside or outside the household dwelling.

[13]Note, however, that this information is based on the availability of the public good in the community in the GLSS and the facility survey, while it is based on travelling time between the household and the facility in the CWIQ survey.

Figure 4: Normalized public goods aggregate, 2000

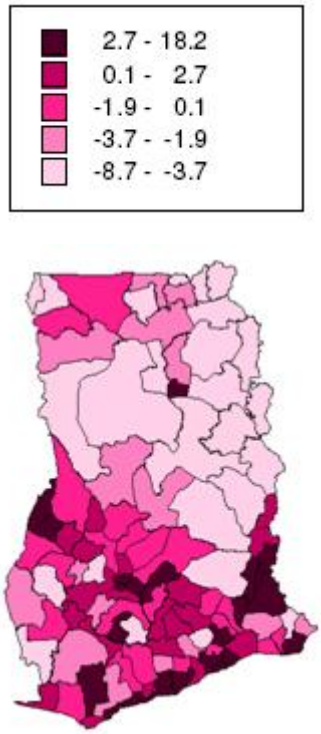


Figure 5: Mean housing amenities index, 2000

Source: Population and Infrastructure Census, 2000, authors' calculations.
Note: The map on the left shows the normalized public goods aggregate. Public goods are primary and secondary schools and health centers in rural areas, and civil servants, electricity and piped water connections for the country as a whole. The map on the right presents the mean score for housing amenities by district. The score is the sum of the indicators for the fuel used and housing roof, wall and floor building materials. The higher the score, the better the housing amenities (see Section ?? and Appendix A).

Figure 6: National elections and national household surveys in Ghana between 1996 and 2004

	1996	1998	2000	2003	2004
Election	NDC		NPP		NPP
Surveys and census		GLSS & DHS	Census	CWIQ & DHS	

The same national household datasets include socioeconomic information such as education, the quality of the household's dwelling (all except the DHS surveys), and ethnic and religious structure. All this information is aggregated at district level.

Finally, we have two variables to single out districts with influent members of the elite. We have drawn a list of Ghanaian former ministers at the end of the 1990s and the beginning of the 2000s.[14] We took the names of each minister in Kufuor's government from 2001 to 2005 and the names of each minister in Rawlings' government from 1993 to 2000. The 1996 parliamentary election results provide information on whether they were candidates and, if so, in which district. Of the 37 Kufuor's ministers, 15 were NPP candidates in the 1996 parliamentary election and 14 were elected. Eight of the corresponding 15 districts were urban (proportion of urban population greater than 50%) and six of these were regional capitals. We also single out the districts where the 1996 parliamentary election candidate was a minister before 2000, under NDC rule. Of the 39 Rawlings' ministers, 18 were NDC candidates and 17 were elected. Only five of the corresponding 17 districts were urban and two of these regional capitals (Accra and New Juaben).

As the information in this paper is aggregated at the district level, it is worth noting we focus on the Ghanaian districts as of 2000, and there were 110 districts in 2000.

4 Estimation strategy

4.1 Baseline model

This paper seeks to identify the link between political mechanisms and public goods allocation in Ghana. As pointed out in the introduction, a number of theoretical models can find a link between districts' electoral results and this allocation. Firstly, the "party machine" model predicts that the districts voting for the incumbent will receive more public goods. Secondly, the "swing voter" model predicts that the politically centre districts will be favored. Lastly, the post-conflict literature and the "limited-access order model" of North et al. (2009b) posit that the government may very well curry favor with its opponents and may therefore invest in their districts.

To assess the relative relevance of these models in the Ghanaian case, we estimate equation (1) over two periods: 1998 - 2000 (period 1) and 2000 - 2003 (period 2).

[14] This list is from Wikipedia and may not be complete.

$$G_{g,d,t,s} = \rho G_{g,d,t-1,s} + \alpha\delta(t)diff_{d,t-1} + \gamma diff^2_{d,t-1} + X_{d,t-1}\beta + \epsilon_{g,d,t,s} + \mu_s(G_{g,d,t}) \quad (1)$$

$G_{g,d,t,s}$ is the availability of public good g in district d at the end of the period, as found by survey s. $G_{g,d,t-1,s}$ is the availability of public good g in district d at the beginning of the period, as found by survey s. In keeping with the survey dates, for period 1, t is 2000 and $t-1$ is 1998; for period 2, t is 2003 and $t-1$ is 2000.

$diff_{d,t-1}$ is the difference between the share of votes for the NPP and the NDC in district d at the last presidential elections[15]: at the 1996 election for period 1 (1998-2000) and at the 2000 election for period 2 (2000-2003). $diff_{d,t-1}$ takes positive values when the NPP is the majority party in the district and negative values when the NDC is the majority party.

$\delta(t)$ is a time dummy variable that takes value 1 if the NDC is in power at time t (period 1) and 0 if the NPP rules at time t (period 2). Coefficient α captures whether or not the government in power provides its supporters' districts with more public goods. In actual fact, α measures the double difference between NPP voters and NDC voters, and between period 1 (1998-2000) and period 2 (2000-2003).[16] It is the main coefficient in this paper, as it points up the pork barrel mechanisms. α should be negative under the "party machine" model: the NDC was in charge during period 1, the NPP was in charge during period 2, so the NPP voters should be relatively deprived during period 1. α can be positive only under the "post-conflict literature" model and the "natural order model", where the incumbent helps its opponents.

The empirical validity of our strategy is based on the double difference between districts voting for the NPP and for the NDC, and between period 1 and period 2. Therefore, we need to find the districts' unobservable characteristics that cause the accumulation of public goods to be constant over the five years of our panel. In particular, the correlation between the districts' political preferences and the accumulation of public goods changes between the periods 1 and 2. This should be exclusively ascribed to a pork barrel mechanism.

Coefficient γ in model (1) is the coefficient of the square of the difference between the

[15] We use solely the results of the presidential elections in this paper. However, the patterns are the same when we look at the results of the parliamentary elections.

[16] The covariates $X_{d,t-1}$ include time dummies and $diff_{d,t-1}$. The complete list is given below.

NPP and the NDC. It is expected to be negative under the "swing voter model": political competition may increase investment in public goods.

A vector of covariates $X_{d,t-1}$ is added, including $diff_{d,t-1}$, proxies for the district's wealth and education, ethnic structure, and region-year dummies (there are 10 regions in Ghana, the 110 districts are nested in the regions). The covariates are measured at the beginning of the period, since investment over the period may affect the covariates at the end of the period. The estimations are made by pooling all the types of public goods by year and survey. All the specifications consequently contain type of public good-survey fixed effects.

Some public goods are measured on the same date by two different surveys. For example, the share of households connected to the electricity grid and to piped water in 2003 is measured by the 2003 DHS survey and by the CWIQ survey (Figure 6). In our data, all this information is pooled, as two observations of the same good in the same district from two surveys are far from independent. We therefore have to control in detail for the correlation between those two observations. So error term $\mu_s(G_{g,d,t})$ is included in the equation. All the standard errors are then corrected for an arbitrary correlation between different observations for the same district. The variance-covariance matrix between different observations for the same district is given by the data. The estimated standard errors are hence corrected for the fact that two observations of the same good in the same district from two surveys are strongly correlated.

The model (1) pools different types of public goods (schools, health centers, etc.). Hence, the information on each public good is normalized: the observations for different districts in the same survey for the same good g have a mean of 0 and a standard deviation of 1. We interpret our normalized variable $G_{g,d,t,s}$ as the relative position in the country of district d for public good g at time t. The relative position is comparable across goods and dates.

4.2 Interacted model

The "post-conflict literature" model and the "natural order model" do not predict the government will target any opponent district. Conversely, however, the "post-conflict literature" model predicts that the government will target opponents with enough political power to lead a coup (bribing them in peace time increases the opportunity cost of a coup). The "natural order model" predicts the government will target the elite among its

opponents. Both may obviously be correlated. Let's assume we can measure "political power" pp, then this heterogeneity is measured in model (2) by coefficient $\kappa > 0$:

$$\begin{aligned} G_{g,d,t,s} = \rho G_{g,d,t-1} + \alpha\delta(t)diff_{d,t-1} + \kappa\delta(t)diff_{d,t-1}pp \\ +\gamma diff^2_{d,t-1} + X_{d,t-1}\beta_1 + \beta_2 pp + \epsilon_{g,d,t,s} + \mu_s(G_{g,d,t}) \end{aligned} \tag{2}$$

4.3 Fixed-effect model

The coefficient ρ of $G_{g,d,t-1}$ is expected to be positive. Note, however, that in this equation, the residuals $\epsilon_{g,d,t,s}$ may well be serially correlated. A serial correlation of these residuals would induce a correlation between $G_{g,d,t,s}$ and $G_{g,d,t-1,s}$ due to the correlation between $\epsilon_{g,d,t,s}$ and $\epsilon_{g,d,t-1}$. This would mean that ρ would then be biased. It should be positive for two reasons: because there is some inertia in public goods availability, and because the unobservable characteristics causing $G_{g,d,t,s}$ are persistent. ρ would be the sum of these two effects. This has a repercussion for the other coefficients: the control for $G_{g,d,t-1,s}$ is imperfect. To see the extent to which the empirical results of model (1) and model (2) may be biased, we estimate a fixed-effect specification for model (1) and model (2), which controls for the constant district unobservable characteristics in equation (3) and (4). (Note that $diff_{d,1996}$ is taken from the 1996 elections for periods 1 and 2 to ensure strict exogeneity in this specification.)

$$G_{g,d,t,s} = \alpha\delta(t)diff_{d,1996} + \lambda_d + \epsilon_{g,d,t,s} + \mu_s(G_{g,d,t}) \tag{3}$$

$$\begin{aligned} G_{g,d,t,s} = \alpha\delta(t)diff_{d,1996} + \kappa\delta(t)diff_{d,1996}pp \\ +\lambda_d + \epsilon_{g,d,t,s} + \mu_s(G_{g,d,t}) \end{aligned} \tag{4}$$

4.4 Fully interacted model

Lastly, the political power of a district pp may be correlated with observable characteristics $X_{d,t-1}$ or with unobservable characteristics $\epsilon_{g,d,t,s}$. This can make the identification of equation (2) questionable. If coefficient α is heterogeneous between districts with different $(X_{d,t-1}, \epsilon_{g,d,t,s})$ and pp is correlated with $(X_{d,t-1}, \epsilon_{g,d,t,s})$, then the estimation of κ in equation (2) is biased. The estimation of equation (5) controls for the interaction $\delta(t)diff_{d,t-1}X_{d,t-1}$, assuming $\alpha = \alpha_0 + \beta_3 X_{d,t-1}$. Therefore, it assesses whether the estimation of κ in equation (2) may be subject to an omitted variable bias, if the omitted variable is included in $X_{d,t-1}$ or correlated with $X_{d,t-1}$.

$$\begin{aligned} G_{g,d,t,s} = \rho G_{g,d,t-1} + \alpha_0 \delta(t) diff_{d,t-1} + \kappa \delta(t) diff_{d,t-1} pp \\ + \gamma diff^2_{d,t-1} + X_{d,t-1}\beta_1 + \beta_2 pp \\ + \beta_3 \delta(t) diff_{d,t-1} X_{d,t-1} + \epsilon_{g,d,t,s} + \mu_s(G_{g,d,t}) \end{aligned} \tag{5}$$

5 Results

Table 1 shows the results of the estimation of three different specifications of model (1). The first specification does not include any control for the districts' characteristics, whereas specifications 2 and 3 take in different vectors of covariates. The last two specifications are the estimations of model (2). Region-year dummies and survey-public good dummies are included in all specifications, but their coefficients are not shown. The estimated standard errors are robust to the correlation of different observations of the same district. Table 2 shows the district fixed effect specification.

In each specification, the public good index at time $t-1$ is a predictor of the public good index at time t. The coefficient is positive and significant, as expected.

In the first specification (column 1, Table 1), the difference between votes for the NPP and the NDC is correlated with the increase in infrastructure availability. However, the coefficient becomes much smaller and not significant when controlling for the covariates, especially the district's mean wealth level (column 2 and following). The fact that the coefficient of the difference in votes between the NPP and the NDC is halved when controlling for urbanization and education can be explained by the fact that the NPP is the right-wing party in Ghana. The districts that vote for the NPP are wealthier on average, and wealthier districts accumulate more public goods. The correlation between votes and infrastructure availability diminishes when controlling for our proxies for wealth, education and urbanization.

The coefficient of the differences in votes interacted with the dummy for the first period (fourth line of Table 1) is positive and significant in each specification (columns 1, 2 and 3). It is the estimation of coefficient α in equation (1): the double difference between NPP voters and NDC voters, between period 1 and period 2. The fixed effect specification renders the same positive and significant coefficient (Column 1 in Table 2). This positive coefficient means that the NPP voters were relatively favored in period 1, when the NDC was in charge. The standard democratic competition theories are therefore useless when it comes to explaining this pattern in the relation between votes and public investment. The

"machine politics" model does not fit the data, since the districts supporting the parties in power did not receive more public goods and the districts supporting the opposition actually received more public goods between 1998 and 2000. In addition, the "swing voter model" produces no prediction for coefficient α, but does provide a prediction for coefficient γ. It is therefore unable to explain why α is positive.

This paper gives a plausible explanation for this fact, based on the estimation of model (2). Specifications 4, 5, Table 1 and specification 2, Table 2 interpret the counterintuitive relationship between votes and the allocation of public goods, by estimating coefficient κ in equation (2) in column 4 and column 5, Table 1. Column 2, Table 2 shows the corresponding district fixed-effect specification (equation (4)). These specifications focus on the relationship between votes and public goods allocation in different contexts. They single out districts with different kinds of political power, as found by equation (2).

First, we single out districts in which a candidate standing for the 1996 parliamentary elections became minister after 2000 (under NPP rule). These districts were probably the constituency of a leader of the opposition party before 2000. In these 15 districts, the coefficient of the correlation between voting for the NPP and public goods in the first period is positive and significant (2.71, line 6, column 4 Table 1). By comparison, it is not significant in the other districts (0.30, line 4, column 4 Table 1). Our interpretation of this result is as follows: in addition to pursuing its electoral objectives, the NDC government wants to govern a peaceful country. Therefore, "sensitive" districts are rewarded to ensure the country's stability. The districts with an opposition leader may be considered to be sensitive mainly when they are opposition strongholds. This would explain the positive coefficient of the interaction between our proxy for politicians and votes under the NDC government.

We also single out the districts where the 1996 parliamentary election candidate was a minister before 2000, under NDC rule. The coefficient of this dummy variable and its interaction with votes is not significant, from 1998 to 2000 (line 8, column 4 Table 1). The districts with an NDC leader did not receive more public goods than others during Rawlings' government, whatever their election results. Again, this is not in line with the "party machine model". However, column 4, Table 1, shows that after 2000, the districts with an opposition (NDC) leader had more public goods. The coefficient of the interaction between votes and the dummy variable for districts with an NDC minister is significant and positive (0.46, line 7).

Table 1: Determinants of the allocation of public goods in Ghana

	(1)	(2)	(3)	(4)	(5)
lag of public good index	0.49**	0.35**	0.36**	0.35**	0.35**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Votes NPP - Votes NDC	0.56**	0.22	0.29	0.36+	0.34+
	(0.14)	(0.17)	(0.21)	(0.19)	(0.20)
(Votes NPP - Votes NDC)^2	0.50*	0.38+	0.42+	0.34+	0.34+
	(0.24)	(0.22)	(0.22)	(0.20)	(0.20)
(Votes NPP - Votes NDC) * (1998 - 2000)	0.79**	0.71**	0.62+	0.30	0.38
	(0.25)	(0.24)	(0.34)	(0.28)	(0.30)
(Votes NPP - Votes NDC)				-1.16**	
* NPP parliamentary candidate, minister after 2000				(0.24)	
(Votes NPP - Votes NDC) * (1998 - 2000)				2.71**	
* NPP parliamentary candidate, minister after 2000				(0.60)	
(Votes NPP - Votes NDC)				0.46**	
* NDC parliamentary candidate, minister before 2000				(0.14)	
(Votes NPP - Votes NDC) * (1998 - 2000)				-0.63	
* NDC parliamentary candidate, minister before 2000				(0.40)	
(Votes NPP - Votes NDC) * political index					-0.56**
					(0.13)
(Votes NPP - Votes NDC) * (1998 - 2000) * political index					0.94*
					(0.38)
(Votes NPP - Votes NDC)				-1.35**	-1.36**
* District in Accra region				(0.20)	(0.21)
(Votes NPP - Votes NDC) * (1998 - 2000)				2.61**	2.36**
* District in Accra region				(0.43)	(0.40)
Share of urban population in the district		0.37*	0.36+	0.25	0.30+
(measured in 2000)		(0.18)	(0.18)	(0.18)	(0.18)
Education index in the district		0.33**	0.31**	0.34**	0.33**
		(0.10)	(0.10)	(0.10)	(0.10)
Household amenities index		0.05	0.06	0.08	0.07
		(0.05)	(0.05)	(0.05)	(0.05)
Ethnic heterogeneity index		-0.69	-0.60	-0.63	-0.60
		(0.69)	(0.68)	(0.71)	(0.70)
Share of Akan in the district		-0.30+	-0.46+	-0.47*	-0.46+
		(0.16)	(0.25)	(0.24)	(0.24)
Share of Akan in the district * (2000 - 2003)			0.33	0.28	0.26
			(0.34)	(0.31)	(0.31)
Share of Ewe in the district		0.03	-0.12	0.11	0.13
		(0.20)	(0.28)	(0.27)	(0.26)
Share of Ewe in the district * (2000 - 2003)			0.30	-0.06	-0.05
			(0.39)	(0.39)	(0.38)
Share of Ashanti in the district (measured in 2000)		-0.52+	-0.61	-0.60+	-0.59+
		(0.29)	(0.39)	(0.34)	(0.34)
Share of Ashanti in the district (in 2000) * (2000 - 2003)			0.19	0.28	0.23
			(0.60)	(0.53)	(0.57)
log(population density) (measured in 2000)		0.14**	0.14**	0.14**	0.15**
		(0.04)	(0.04)	(0.04)	(0.04)
NPP Parliamentary candidate, minister after 2000				0.37**	0.18*
				(0.08)	(0.08)
NPP Parliamentary candidate, minister after 2000				-0.37+	-0.00
* (1998 - 2000)				(0.19)	(0.17)
NDC Parliamentary candidate, minister before 2000				0.12	0.13+
				(0.07)	(0.07)
NDC Parliamentary candidate, minister before 2000				-0.28	-0.38*
* (1998 - 2000)				(0.19)	(0.18)
Observations	1480	1449	1449	1449	1449
R^2	0.515	0.570	0.571	0.585	0.582

**, * and + mean respectively that the coefficients are significant at the 1%, 5% and 10% levels.
Notes: OLS with standard errors given beneath the coefficients. The standard errors are corrected for an arbitrary correlation between different observations for the same district. The public goods included in the specification are: the share of households connected to the electricity grid, the share of households with access to piped water, the share of civil servants in the labor force, the share of the rural population with access to a primary school in the community, the share of the rural population with access to a secondary school in the community, and the share of the rural population with access to a health clinic in the community. All the specifications include region-year fixed effects and type of public good-survey fixed effects.

Table 2: Determinants of the allocation of public goods in Ghana, fixed effects specifications

	(1)	(2)
(Votes NPP - Votes NDC) (1996 elections) * (1998 - 2000)	0.28+	0.09
	(0.16)	(0.15)
(Votes NPP - Votes NDC) (1996 elections) * (1998 - 2000) * political index		0.58*
		(0.27)
(Votes NPP - Votes NDC) (1996 elections) * (1998 - 2000) * District in Accra region		1.79**
		(0.36)
NPP parliamentary candidate, minister after 2000 * (1998 - 2000)		0.09
		(0.14)
NDC parliamentary candidate, minister before 2000 * (1998 - 2000)		-0.29+
		(0.16)
Observations	1480	1480
R^2	0.575	0.580

**, * and + mean respectively that the coefficients are significant at the 1%, 5% and 10% levels.
Notes: OLS with standard errors given beneath the coefficients. The standard errors are corrected for an arbitrary correlation between different observations for the same district. The public goods included in the specification are: the share of households connected to the electricity grid, the share of households with access to piped water, the share of civil servants in the labor force, the share of the rural population with access to a primary school in the community, the share of the rural population with access to a secondary school in the community, and the share of the rural population with access to a health clinic in the community. All the specifications include region-year fixed effects and type of public good-survey fixed effects.

We then generate a political index that takes the value of 1 if one of the parliamentary election candidates was a minister under NPP rule and -1 if one of the parliamentary election candidates was a minister under NDC rule.[17] As expected, the coefficient for the interactions between votes and this index is positive and significant from 1998 to 2000 in column 5, Table 1, and negative and significant from 2000 to 2003 in column 5. The same result is found with the fixed effect specification (column 2 in Table 2).

The correlation between support for the NPP and the differences in votes is also positive in the Accra region in the first period. This is also compatible with our theory of "sensitive" districts, as the capital's regions are well known for being a good place for demonstrations and they take in many members of the elite.

Column 4, Table 1 also presents a negative coefficient for votes in the Accra region under NPP rule. This means that the districts voting for the NPP in Accra received fewer public goods after 2000. This coefficient is intuitive: Accra is a sensitive place for both parties.

Overall, the validity of model (2) ($\kappa > 0$) means that the government curries favor with its opponents' elite. This does not mean it does not help its own supporters' elite. In fact, we only observe transfers through public goods allocation in the districts. Transfers to the supporters' elite may go via a different channel, and some of the potential channels cannot be observed by the social scientist (such as informal cash transfers).

In line three of Table 1, the coefficients for the square of the difference between NPP and NDC votes are always positive and significant. This coefficient appears to invalidate the "swing voter" model, or at least the version put forward by Levitt and Snyder (1997), wherein politically centre districts receive more public funds because of MPs' incentives. The politically centre districts in the electoral competition do not benefit from particularly generous investment in public goods.

The coefficients of the log of population density and mean education in the district are positive in columns 2 and 3. The coefficient for wealth (as measured by our household amenities index) is not significant, but wealth is strongly correlated with urbanization and education. This means that urban districts receive more public goods, which may be due to cost-recovery policies and community-driven approaches or national political targeting. The coefficients for the other covariates are not significantly different from zero at the 5% level. For instance, the coefficient for the ethnic heterogeneity variable is not

[17] This political index takes the value of 0 if none of the parliamentary election candidates was a minister and if at least one parliamentary election candidate was a minister for either party.

significant. This result differs from the findings of Banerjee and Somanathan (2007) in India, where ethnic heterogeneity prevents an increase in public goods availability from 1971 to 1991. This result may be partly explained by the fact that Ghana's system of public goods allocation is centralized, rather than decentralized.

The Akan districts, and especially the Ashanti districts, receive fewer public goods than the others, but these results are significant only at the 10% level. This is true only after controlling for the other covariates. The same regressions without controlling for votes would paint a totally different picture of ethnicity, as votes are strongly correlated with ethnicity in Ghana. Once ethnic pork barreling has been disentangled from electoral pork barreling, the effect of ethnic pork barreling is small and rarely significant.

6 Robustness checks

This section assesses the validity of the interpretation of the coefficients in Table 1. It focuses on the link between the allocation of public goods and votes. Section 5 shows that investment in infrastructures under NDC rule was particularly high in the "sensitive" districts[18] that voted for the NPP. The OLS estimates could be biased by two different mechanisms: reverse causality and omitted variables. Reverse causality does not seem plausible in this case. The allocation of public goods from 1998 to 2000 causes neither the votes in 1996 nor the fact that a given district is in the Accra region. Moreover, it seems implausible for the ministers in the NPP government after 2000 to have been chosen because they obtained public goods from the NDC before 2000.

As regards the omitted variables bias, we identify the coefficient κ with the heterogeneity of the correlation between the votes for the NPP and public goods between districts with and without "political power". However, "political power" is probably correlated with other characteristics X_{it}. In equation (5), we assume these characteristics X_{it} may be correlated with the heterogeneity of coefficient α. Table 3 assesses whether such heterogeneity biases the coefficients in Table 1. In other words, the correlation between votes for the NPP and public goods is bigger in the districts with "political power". We check whether some heterogeneity of the correlation between votes for the NPP and public goods based on other observable characteristics can change our results.

To do so, the difference in votes is interacted with a number of other characteris-

[18] In other words, districts with a national NPP politician or in the Accra region.

tics (plus an interaction with the dummy for the 1998-2000 period), as in equation (5). The variables included are: the district's population density, share of urban population, education index, household amenities index and ethnic variables. Column 2 of Table 3 presents the results of this specification, and the first column of this table reproduces the estimates from Table 1, specification 5. In columns 1 and 2, the sign and significance of the coefficients interacted with the difference in votes are the same, which indicates that the omitted variable bias is probably moderate.

The coefficient for the interaction between the difference in votes and the log of population density and the difference in votes for the 1998-2000 period is positive and significant (0.54). Again, this is compatible with our theory of a targeting of "sensitive districts", as urban districts may be harder to control.

The coefficient for the interaction between the difference in votes and the share of Akan for period 1 (1998-2000) is positive and significant (2.24). Again, Akan might be a proxy for strong opposition to the ruling party before 2000. Indeed, it is the majority ethnic group in Ghana, and Akans tend to vote for the NPP, which was the opposition party prior to 2000. The other coefficients interacted with the difference in votes for the 1998-2000 period in column 2 are not significant at the 5% level, and do not change the column 1 coefficients.

Column 3 tests for an omitted variable bias due to other political considerations. Asante and Gyimah-Boadi (2004) explain that Rawlings' government made an effort in the Ashanti region. Two explanations are possible. The first is the will to win votes from the Ewe, who migrated to the region to produce cocoa. The second ties in with the traditional Ashanti kingdoms, which may still wield power and compel certain public transfers from central government. So we control for a specific effect of the share of Ewe in the Ashanti region. One of the two variables for this effect appears to be significant at the 1% level. In addition, we control for the same particularity tying in with the Ashanti kingdoms. These kingdoms are in the Ashanti region, and the best proxy we have for the districts within these kingdoms is the share of the Ashanti ethnic group in the population. So we control for a specific effect of the Ashanti ethnic group in the Ashanti region, which does not appear to be significant. Overall, the coefficients of interest in column 3 are very similar to those in column 1.

Table 4 presents specification 5 for Table 1 disaggregated by type of public good. The estimation of the coefficients is imprecise here, as the sample has been broken down into

Table 3: Endogeneity checks: control for omitted variables

	(1)	(2)	(3)
(Votes NPP - Votes NDC) * (1998 - 2000)	0.38	-3.14	-0.30
	(0.30)	(2.34)	(0.23)
(Votes NPP - Votes NDC)	0.34+	3.44+	0.28
	(0.20)	(1.95)	(0.17)
Votes NPP - Votes NDC) * political index	-0.56**	-0.42**	-0.49**
	(0.13)	(0.13)	(0.14)
(Votes NPP - Votes NDC) * (1998 - 2000) * political index	0.94*	0.88**	0.83*
	(0.38)	(0.29)	(0.34)
(Votes NPP - Votes NDC) * District in Accra region	-1.36**	-1.60**	-1.09**
	(0.21)	(0.38)	(0.23)
(Votes NPP - Votes NDC) * District in Accra region * (1998 - 2000)	2.36**	2.46**	1.94**
	(0.40)	(0.55)	(0.31)
(Votes NPP - Votes NDC) * log(population density)		-0.24*	-0.01
		(0.11)	(0.07)
(Votes NPP - Votes NDC) * log(population density) * (1998 - 2000)		0.54**	0.33*
		(0.18)	(0.13)
(Votes NPP - Votes NDC) * Share of urban population		0.05	
		(0.67)	
(Votes NPP - Votes NDC) * Share of urban population * (1998 - 2000)		0.05	
		(1.01)	
(Votes NPP - Votes NDC) * Education index		-0.16	
		(0.28)	
(Votes NPP - Votes NDC) * Education index * (1998 - 2000)		-0.54	
		(0.37)	
(Votes NPP - Votes NDC) * Household amenities index		0.39+	
		(0.22)	
(Votes NPP - Votes NDC) * Household amenities index * (1998 - 2000)		-0.06	
		(0.28)	
(Votes NPP - Votes NDC) * Ethnic heterogeneity index		-3.03	
		(2.17)	
(Votes NPP - Votes NDC) * Ethnic heterogeneity index * (1998 - 2000)		2.49	
		(2.83)	
(Votes NPP - Votes NDC) * Share of Akan		-1.79+	
		(0.91)	
(Votes NPP - Votes NDC) * Share of Akan * (1998 - 2000)		2.29*	
		(1.12)	
(Votes NPP - Votes NDC) * Share of Ewe		-0.17	
		(0.99)	
(Votes NPP - Votes NDC) * Share of Ewe * (1998 - 2000)		0.50	
		(1.15)	
(Votes NPP - Votes NDC) * Share of Ashanti		0.42	
		(0.86)	
(Votes NPP - Votes NDC) * Share of Ashanti * (1998 - 2000)		0.30	
		(1.08)	
Share of Ewe * region Ashanti			1.94
			(1.23)
Share of Ewe * region Ashanti * (1998 - 2000)			-3.01**
			(1.14)
Share of Asante * region Ashanti			0.57
			(0.58)
Share of Asante * region Ashanti * (1998 - 2000)			0.13
			(0.51)
Observations	1449	1449	1449
R^2	0.583	0.606	0.597

**, * and + mean respectively that the coefficients are significant at the 1%, 5% and 10% levels.
Notes: OLS with standard errors given beneath the coefficients. The standard errors are corrected for an arbitrary correlation between different observations for the same district. The public goods included in the specification are: share of households connected to the electricity grid, share of households with access to piped water, share of civil servants in the labor force, share of the rural population with access to a primary school in the community, share of the rural population with access to a secondary school in the community, and share of the rural population with access to a health clinic in the community. All the specifications include region-year fixed effects and type of public good-survey fixed effects, and the same covariates as specification 5 in Table 1, but all covariates are interacted with time in specification 2.

different parts. Nevertheless, the signs of the coefficients remain similar for each public good.

7 Conclusion

This paper sets out to shed light on the mechanisms of political competition in semi-democratic African countries. The Ghanaian democratization process presents an opportunity to analyze how the political economy affects the allocation of public infrastructure in Ghana.

Most empirical and theoretical papers posit that the government should either target central districts in the electoral competition ("swing districts") or its supporters. We find the opposite to be true in Ghana. When the NDC was in power from 1998 to 2000, the districts that voted for the opposition received more public goods. This was particularly true when the districts had a leading opposition party politician. We assert that this finding is partially driven by a sense of need to curry favor with opposition party politicians.

These results were observed, at the end of the 1990s, in most particular circumstances. Ghana was politically unstable from independence to the 1980s, when Jerry Rawlings took over as dictator. By the end of the 1990s, Ghana was an emerging democracy with Jerry Rawlings as the first democratic president. A promising future paper could therefore be to identify the emergence of these political mechanisms before 1992 when Ghana was a dictatorship, and to check the persistence of these political patterns since 2004, following two peaceful general and presidential elections in Ghana.

Table 4: Disaggregation between different types of public goods

	(1) All	(2) water	(3) electricity	(4) civil servants	(5) primary schools	(6) secondary schools	(7) health centres
lag of public good index	0.35**	0.61**	0.38**	0.29**	0.29**	0.11+	0.14+
	(0.04)	(0.09)	(0.09)	(0.10)	(0.09)	(0.06)	(0.09)
(Votes NPP - Votes NDC)^2	0.34+	0.13	0.71+	-0.11	0.59	0.20	0.87+
	(0.20)	(0.33)	(0.41)	(0.40)	(0.70)	(0.43)	(0.48)
(Votes NPP - Votes NDC) * (1998 - 2000)	0.38	0.19	0.17	0.26	1.25+	0.65	0.87
	(0.30)	(0.26)	(0.26)	(0.42)	(0.64)	(0.47)	(0.54)
(Votes NPP - Votes NDC)	0.34+	0.29	0.37	-0.07	0.27	0.55+	0.52
	(0.20)	(0.22)	(0.28)	(0.35)	(0.45)	(0.31)	(0.35)
(Votes NPP - Votes NDC) * (1998 - 2000) * political index	0.94*	0.36	0.42	0.15	2.14+	1.42*	2.13**
	(0.38)	(0.41)	(0.53)	(0.49)	(1.09)	(0.68)	(0.75)
(Votes NPP - Votes NDC) * political index	-0.56**	-0.38	-0.27	-0.75*	-1.13*	-0.47	-0.61
	(0.13)	(0.24)	(0.22)	(0.30)	(0.55)	(0.37)	(0.44)
(Votes NPP - Votes NDC) * District in Accra region * (1998 - 2000)	2.36**	0.93	2.20**	1.45*	0.31	2.37**	4.65**
	(0.40)	(0.65)	(0.57)	(0.68)	(0.90)	(0.77)	(1.05)
(Votes NPP - Votes NDC) * District in Accra region	-1.36**	-1.34*	-1.24**	-2.61**	-0.74	-0.60	-1.12+
	(0.21)	(0.60)	(0.33)	(0.65)	(0.87)	(0.55)	(0.60)
Observations	1449	318	318	208	197	204	204
R^2	0.583	0.783	0.776	0.779	0.504	0.701	0.668

**, * and + mean respectively that the coefficients are significant at the 1%, 5% and 10% levels.

Notes: OLS with standard errors given beneath the coefficients. The standard errors are corrected for an arbitrary correlation between different observations for the same district. The public goods included in the specification are: share of households connected to the electricity grid, share of households with access to piped water, share of civil servants in the labor force, share of the rural population with access to a primary school in the community, share of the rural population with access to a secondary school in the community, and share of the rural population with access to a health clinic in the community. All the specifications include region-year fixed effects and type of public good-survey fixed effects, and the same covariates as specification 5 of Table 1.

Bibliography

Akramov, K., Asante, F., 2008. Decentralization and local public services in Ghana: Do geography and ethnic diversity matter?, IFPRI GSSP Background paper 16.

Akyeampong, K., Diangmah, J., Oduro, A., Seidu, A., Hunt, F., 2007. Access to basic education in Ghana: The evidence and the issues, country Analytic Report, CREATE, 127 P.

Asante, F. A., 2003. Economic Analysis of Decentralisation in Rural Ghana. Peter Lang Frankfurt am Main, Berlin, bern, Bruxelles, New York, Oxford, Wein, development Economics and Policy nb. 32, 150 p.

Asante, F. A., Ayee, J. R. A., 2008. The Economy of Ghana, Analytical Perspectives on Stability, Growth & Poverty, chap. Decentralization & Poverty Reduction. James Currey Woeli Publishing Services, 423 p.

Asante, F. A., Gyimah-Boadi, E., 2004. Ethnic structure, inequality and governance of the public sector in Ghana, United Nations Research Institute for Social Development.

Azam, J., 2006. The paradox of power reconsidered: A theory of political regimes in Africa. Journal of African Economies 15, 26.

Banerjee, A. V., Somanathan, R., 2007. The political economy of public goods: Some evidence from India. Journal of Development Economics 82, 287–314.

Banful, A., 2010. Do formula-based intergovernmental transfer mechanisms eliminate politically motivated targeting? evidence from Ghana. forthcoming, Journal of Development Economics .

Bossuroy, T., 2008. Voting in an african democracy: does only ethnicity rule? an empirical assessment on contemporary Ghana.

Bowen, H., 1943. The interpretation of voting in the allocation of economic resources. Quarterly Journal of Economics 58, 27–48.

Case, A., 2001. Election goals and income redistribution: Recent evidence from Albania. European Economic Review 45, 405–423.

Cole, S., 2009. Fixing market failures or fixing elections? agricultural credit in India. American Economic Journal: Applied Economics 1, 219–250.

Dahlberg, M., Johansson, E., 2002. On the vote-purchasing behavior of incumbents. American Political Science Review 96, 27–40.

Diaz-Cayeros, A., 2008. Electoral risk and redistributive politics in Mexico and the United States. Studies in Comparative International Development 43, 129–150.

Dixit, A., Londregan, J., 1996. The determinants of success of special interests in redistributive politics. Journal of Politics , 1132–1155.

Downs, A., 1957. An economic theory of democracy. Harper & Row, New York.

Esteban, J., Sákovics, J., 2008. A theory of agreements in the shadow of conflict: the genesis of bargaining power. Theory and Decision 65, 227–252.

Hirshleifer, J., 2001. The paradox of power. The Dark Side of the Force: Economic Foundations of Conflict Theory , 43.

IMF, 2000. Ghana: Statistical appendix, IMF Washington DC, 61 p.

IMF, 2005. Ghana: Statistical appendix, IMF Washington DC, 75 p.

Jacquemot, P., 2007. Chefferies et décentralisation au Ghana. Afrique contemporaine 22, 55–74.

Joanis, M., 2008. The road to power: Partisan loyalty and the centralized provision of local infrastructure, GREDI Working Paper 08-15, Sherbrooke University.

Levitt, S., Snyder, J. M., 1997. The impact of federal spending on House election outcomes. Journal of Political Economy 105, 30–53.

Levitt, S., Snyder Jr, J., 1995. Political parties and the distribution of federal outlays. American Journal of Political Science 39, 958–980.

Miguel, E., Zaidi, F., 2001. Do politicians reward their supporters? regression discontinuity evidence from Ghana.

Morrison, M. K. C., 2004. Political parties in Ghana through four republics, a path to democratic consolidation. Comparative Politics 36, 421–442.

Moser, C., 2007. Poverty reduction, patronage, or vote buying? the allocation of public goods and the 2001 election in Madagascar. Economic Development and Cultural Change 57, 137–162.

North, D., Wallis, J., Weingast, B., 2009a. Violence and social orders: a conceptual framework for interpreting recorded human history. Cambridge University Press New York.

North, D., Wallis, J., Weingast, B., 2009b. Violence and the rise of open-access orders. Journal of Democracy 20, 55–68.

RCEER, 2005. Guide to electricity power in Ghana. Tech. rep.

Schady, N., 1999. Seeking votes: The political economy of expenditures by the Peruvian social fund (FONCODES), 1991-95, World Bank Policy Research Working Paper Nb. 2166.

World Bank, 2008. Ghana, public expenditures review rural water and sanitation sector. Tech. rep.

Appendices

A Definition of the variables

Difference between shares of votes for the NPP and the NDC: Difference between the district's shares of votes for the NPP and the NDC at the last presidential elections. It takes the value of the 1996 election for the 1998-2000 period, and the value of the 2000 election for the 2000-2003 period.

Civil servants: Share of civil servants in the labour force.

District education: District average of an education variable for individuals aged 25 and over. This variable takes the value of 0 if the individual has never been to school (but possibly pre-school), 1 if he started primary school, 2 if he completed primary school, 3 if he went to lower secondary school, 4 if went to upper secondary school, and 5 if he went to university.

Electricity supply: Share of households with access to electricity in the household.

Ethnic heterogeneity in the district: Sum of the squares of the shares of Akan, Ewe, Ga-Adangbe and Others in the district. Included in the [0, 1] interval.

Health centres: Share of the rural population with access to a hospital, health clinic or health centre. The 2000 facility census defines areas with a hospital, health clinic or health centre less than 4 km away as having a health centre. The CWIQ 2003 survey defines clusters in which more than 60% of households report access to a hospital or health clinic less than 45 minutes away on foot as having a health centre.

Household amenities index: Synthetic variable measuring the comfort of the dwelling. It is the sum of four variables, averaged at district level. The first variable takes the value of 1 if the cooking energy is charcoal, 2 if the cooking energy is electricity, gas or kerosene, and 0 otherwise. The second variable takes the value of 1 if the roof is made of metal, concrete or asbestos, and 0 otherwise. The third variable takes the value of 1 if the wall

is in stabilised or made of burnt bricks, concrete or metal. The last variable takes the value of 0 if the floor is made of earth, and 1 otherwise.

Log (population density): The population density is calculated from the 2000 census.

Northern regions: Dummy taking the value of 1 for the Northern, Upper West and Upper East regions

NPP candidate, minister after 2000: This variable takes the value of 1 if one or more 1996 NPP parliamentary election candidates in this district were minister(s) at some point between 2000 and 2005. It takes the value of 0 otherwise. Taking the names of each minister in Kufuor's government from 2001 to 2005, the 1996 parliamentary election results provide information on whether they were candidates and, if so, in which district. Of the 37 ministers, 15 were NPP candidates in the 1996 parliamentary election and 14 were elected. Eight of the corresponding 15 districts were urban (proportion of urban population greater than 50%) and six of these were district capitals.

Public goods aggregate: All six types of public goods (civil servants, electricity supply, health centres, primary schools, secondary schools and water supply) are transformed by linear transformation to have a mean of 0 and a standard error of 1, so as to ensure comparability between public goods. The public goods aggregate is the sum of these six variables.

Primary schools: Share of the rural population with access to a primary school. The 2000 facility census defines areas with a primary school less than 4 km away as having a primary school. The CWIQ 2003 survey defines clusters in which more than 60% of households report access to a primary school less than 45 minutes away on foot as having a primary school.

Political index: Takes value 1 if one of the legislative candidates was minister after 2000 (under the NPP), -1 if one of the legislative candidates was minister before 2000 (under the NDC), and 0 if neither or both.

Secondary schools: Share of the rural population with access to a secondary school. The 2000 facility census defines areas with a secondary school less than 4 km away as

having a secondary school. The CWIQ 2003 survey defines clusters in which more than 60% of households report access to a secondary school less than 45 minutes away on foot as having a secondary school.

Share of Akan in the district

Share of Ashanti in the district: This is calculated from the 2000 census.

Share of Ewe in the district

Share of urban population: This is calculated from the 2000 census. The definition of an urban area in Ghana is one with a population of more than 5,000 inhabitants.

Water supply: Share of households with access to piped water in the district.

B Data sources

Data	DHS 1998	GLSS4 1998	CWIQ 2003	DHS 2003	Census 2000
Date	Nov. 98 - Feb. 99	Apr.98-Mar.99	Jan. 03 - May 03	Jul. 03 - Oct. 03	March 2000
Sample size (# of households)	6,003	6,009	39,584	6,251	379,372
# of clusters	400	300	3,267	412	

C Water and electricy supply policies in Ghana

Water Supply

The Community Water and Sanitation Agency[19] is made up of a head office and ten regional offices. It is the agency through which the majority of funds to the water sector are channelled and co-ordinated (around 88% of total funds from 2001 to 2006). In

[19]However, there are other institutions working in the sector: Ghana Water Company Ltd (GWCL) and the Water Resources Commission (WRC). [A Water Directorate has been set up in the Ministry of Water Resources, Works and Housing to co-ordinate the activities of all sector institutions.]

1994, Ghana launched the national Community Water and Sanitation Program (1994-1999 CWSP-1 and 1999-2004 CWSP-2) based on a demand- and community-driven approach. The underlying principle is that a 5% community contribution normally has to be applied to capital costs for water facilities for every investment in the water sector. However, the World Bank (2008) reports that there are variations in the interpretation and application of the policy.

Electricity Supply[20]

Two main operators generate electricity: the Electricity Company of Ghana and the Volta River Authority (VRA) in charge of the hydroelectric plants in the Volta Basin. The VRA is also mandated to distribute electricity in the North of Ghana. This led to the creation of the Northern Electricity Department in 1987. By the end of 1997, two key regulatory institutions had been created by acts of Parliament: the Public Utilities Regulatory Commission (PURC) and the Energy Commission (EC). The Ministry of Energy is responsible for broad policy direction while the PURC is in charge of economic regulation, fair competition among utilities and monitoring service quality. The EC is responsible for national indicative planning, licensing electricity utilities and technical standards. These two regulatory bodies were established to create the conditions required by the World Bank to improve the electricity sector's operational efficiency, transparency and independence from government. The two government-owned generation and distribution utilities (ECG and VRA) have been granted significant debt relief by both government and international donors. Despite structural reforms and government and international support, Ghana's electricity distribution sector is plagued with problems including poor infrastructure, managerial failings that have led to high system losses, and severe liquidity problems. Limitations on electricity services reportedly check economic growth and can play a part in social unrest.

[20] All the information in this paragraph comes from RCEER (2005).