

# The Allocation of Public Goods and National Elections in Ghana<sup>1</sup>

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## **Abstract**

This chapter analyses how political concerns affect the allocation of public goods. It studies Ghana over the 1998-2003 period, which includes a democratic shift. A panel of 110 Ghanaian districts is built from nationally representative household surveys and the results of two elections. Most empirical political economics papers find that public funds target ruling party supporters and swing districts. Our results suggest that the opposite used to be true in Ghana. We observe that, when the NDC was in power (with Jerry Rawlings as President), pro-NDC districts received fewer public goods. We posit that this finding is partially driven by a sense of need to curry favour with opposition politicians since, in addition to pursuing its electoral objectives, the government wants to govern a peaceful country. Our analysis also shows that, when controlling for votes and other covariates (including wealth, urbanisation and density), ethnic variables have no impact on public goods allocation.

# 1 Political motives and public goods allocation

Public goods are one of the objectives of political action, and the allocation of public goods can affect election outcomes. A growing number of developing countries have become (partially or fully) democratic since the 1990s. Hence the way democracy influences the production and the distribution of economic resources is a major issue in the study of economic development.

Economic modelling has extensively shown that public goods allocation may not be optimal in a democracy where the people are stakeholders in the decision-making process. Earlier theoretical studies (including Downs, 1957, Bowen, 1943) have been summarized and extended by Dixit and Londregan (1996). They compare two kinds of targeted transfers.

The first one is the “swing voter” outcome. It may happen especially if some electors have strong preferences for one of the political parties. In that case, public good provision targets the median voters, who are the politically central groups and are likely to vote for either party. Various empirical papers (Dahlberg and Johansson, 2002, Diaz-Cayeros, 2008) have emphasised such mechanism (respectively in Sweden and USA).

The second kind of targeted transfer favors the “core support” of the incumbent, and is sometimes called “machine politics” outcome : politicians reward their base supports through preferential allocation of public goods (or private transfers). This happens notably if the leading party is more efficient in providing public goods to his core support than the supporters of his opponents. Some empirical studies have shown such outcome, both in developed countries (e.g. Levitt and Snyder Jr, 1995, Joanis, 2008) and developing countries (e.g. Diaz-Cayeros, 2008, Miguel and Zaidi, 2003, Schady, 2000, Moser, 2008, Case, 2001).

The electoral design may also generate political budget cycles, meaning that public goods provision is particularly high in election years. Examples of this are found in Schady (1999) on Peru, Banful (2009) on Ghana and Cole (2009) on India (in the case of agricultural credit provided by government-owned banks).

Besides the democratic models, the political economic literature gives insights on the political economics of democratization process of “non-democratic” regimes. In accordance with the literature on conflicts (Grossman, 1991 ; Collier and Hoeffler, 2006, Bates, 2007), these researchs set up models that define conditions by which democracy emerges (Acemoglu and Robinson, 2006) or equilibrium peace occurs (Esteban and Sákovics, 2008, Hirshleifer, 2001, Azam, 2006). Among this literature, Azam (2006) sets up a model that defines conditions of peaceful equilibrium in dictatorships with references to African countries. In this model, peace is systematic when the opponent faces high opportunity costs of conflict, or when his war technology is too poor. When the incumbent faces high opportunity costs of conflict but the opponent doesn't, there may be coordination between them to avoid conflicts. The incumbent can (partly) commit to give a transfer to the opponent conditional on peace, which works if this promise is credible enough.

This paper studies the case of one of the rare African full democracies, Ghana. The aim of this paper is to analyse which mechanisms drive the allocation of public goods in a country like Ghana, a new democratic African country. Do political considerations affect the allocation of public goods in Ghana ? Does the incumbent party give preference to his supporters ? Does it favor the strategic swing districts ? On the other hand, does the incumbent redistribute to the opponents to maintain peace ? We think that Ghana is a good field for such a research. After a long period of political instability, regular presidential and legislative elections have been organized peacefully every four years since 1992. Moreover, the Ghanaian political field is

structured along two-party system, the NDC party (with Jerry Rawlings, the former dictator, as historical leader) and the NPP party.

To our knowledge, two papers study the allocation of public goods in the Ghanaian case. Akramov and Asante (2008) show that, in 2003, more public goods went to the districts with less ethnic heterogeneity and the wealthiest districts. However, they use cross-sectional data only, making it hard to infer any causal link from their regressions. Banful (2009) studies the District Assemblies' Common Funds before and after the 2000 parliamentary and presidential elections. She shows that central government allocated less money to the districts that voted for the ruling party (the NPP) after 2000. This somewhat contradicts the findings in the rest of the literature, since all the other studies of developing and developed countries show that more public goods are allocated either to swing districts or to the incumbents' supporters.

This paper shows that this contradiction is not only driven by the particularities of the District Assemblies Common Funds, but reflects the actual national allocation of public goods. It uses national household surveys and the 2000 population and infrastructure census that both give information on the availability of public goods like piped water, electricity connexion, school, health centres. We show that the spatial allocation of public goods in Ghana is not driven by vote buying, since the "swing districts" do not benefit from particularly generous investment in public goods. The patronage motive is not patent : the districts supporting the parties in power do not receive more public goods. We observe that, when the NDC was in power (with Jerry Rawlings as president), the fewer votes the NDC won in the 1996 election, the more public goods the districts received.

This paper is, to our knowledge, the first trying to explain such apparent paradox. We find that this paradox is driven by the targeting of politically "sensitive" districts, such as those where national NPP leaders were candidates, and districts in the Accra region. We assert that this result is in line with the role of redistributive mechanisms emphasized by Azam (2006) in an emerging democracy. In the end on the 1990s, Ghana faced favorable conditions to observe such mechanism. First, Ghana has experienced political instability before 1982, so that the threat of political instability is credible. Second, the former dictator, Jerry Rawlings, had been president for more than 15 years at that date. This may have made easier to make the coordination to a peaceful equilibrium with his opponents. Indeed, the credibility of the incumbent's commitment to give a transfer to the opponent is easier if he has already done such transfer in the past. Finally, according to our intuition, such transfer may be useless in a democracy if the opponent strongly believes in his ability to win the elections. Indeed, the threat of trying a coup may not be credible if the chances to win the elections are high : failing a coup may suppress the chances to win elections in the future, and there are probably collective returns to democracy. Ghana was still a new democracy in the late 1990s, and had never experienced a democratic turnout. Hence the self-assessed probability to win the 2000 elections for the opponents may have been (wrongly) low, as incumbents rarely loose elections in an African emerging democracy.

This paper is structured as follows. Section 2 presents the Ghanaian political and macroeconomic environment. Section 3 describes the data and the empirical strategy. Section 4 presents the results. Section 5 discusses the robustness of our results and Section 6 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. One of the main political leaders of Ghana is Jerry Rawlings. He was Flight Lieutenant in 1981, when he led a coup and took power. Despite not being elected, he declared that all the country's stakeholders could be involved in the decision-making process and created various committees to this end. Although the government at the time included left-wing Nkrumahists,<sup>1</sup> it 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. By 1984, Rawlings' government (and successors) was posting a return to stable growth.

Under both international and domestic pressure, Rawlings' government ushered in democracy with the first parliamentary and presidential elections in 1992.<sup>2</sup> Rawlings stood for his own succession as candidate for the National Democratic Congress (NDC). One candidate represented the Danquah/Busia movement,<sup>3</sup> 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. Although the NPP progressed in mainly the Akan constituencies of the Eastern region and in certain areas of the Northern and Western regions, it did not manage to make much headway in most of the Central and Brong-Ahafo regions and the rest of the Western region (see Nugent, 1999). In addition, the majority of the Northern and Upper regions voted for the NDC, as they did in 1992. Finally, the NDC held onto the majority in most of the constituencies of Greater Accra, whereas the costs of the Structural Adjustment Programme were borne heavily by parts of the urban population (ibid.). These patterns were qualitatively similar for the parliamentary and presidential elections.

The 2000 elections were very different from the previous ones. First, Jerry Rawlings was

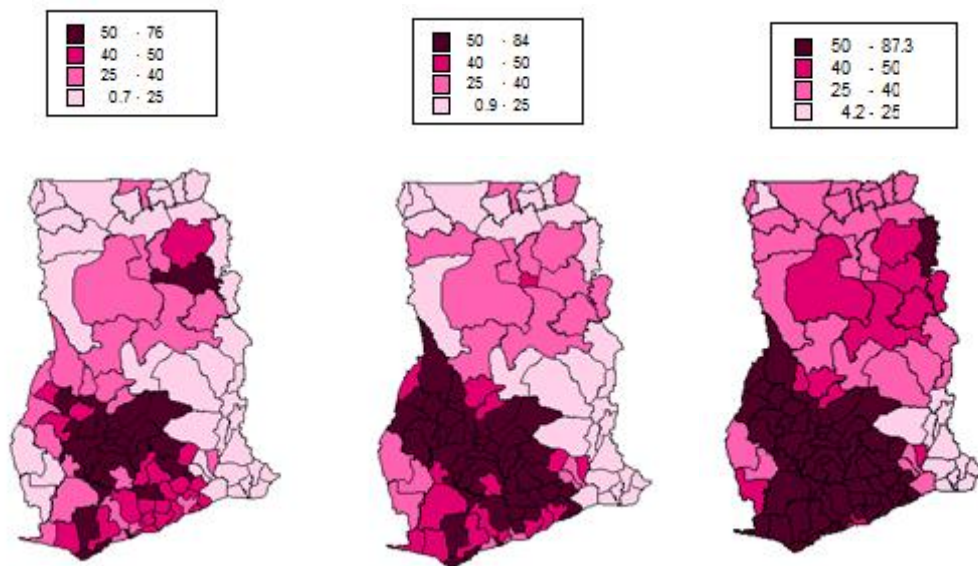
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1. Nkrumah was president of Ghana between 1960 and 1966. The Party he founded (the Convention People's Party, CPP) had positions sometimes close to socialism (although Nkrumah claimed to be non-aligned).

2. However, these first elections were not representative since they were boycotted by the opposition.

3. 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

constitutionally prevented from running for a third presidential term. Instead, 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). So 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 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 swing was impressive with the NPP winning 66% of the seats (Asante and Gyimah-Boadi, 2004). Overall, although Asante and Gyimah-Boadi (2004) and Boafo-Arthur (2008) report that the swing was partly due to the fact that the NPP was no longer perceived as a purely Ashanti party, the NPP essentially won the support of the Akan and Accra regions (Ashanti, Eastern, Brong-Ahafo and, to a lesser extent, Central regions).<sup>4</sup>

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.

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4. 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.

## 2.2 Public service policies in Ghana

### A centralised system behind decentralisation reforms

A major decentralisation programme was launched in 1988, designed mainly to devolve political and central government power<sup>5</sup> to the district assemblies. One of the programme's objectives was to give people living in rural areas access to basic services and infrastructures. A list of 86 specific district assembly responsibilities was defined, including the building, fitting out and maintenance of primary, middle, secondary and special schools, and the promotion of public healthcare (Asante and Ayee, 2008). However, most observers of the decentralisation process believe that many factors impeded local government capacities, autonomy and performance (Asante, 2003 ; Asante and Ayee, 2008 ; Akramov and Asante, 2008). District assemblies act as central government agents without significant discretionary powers. A 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.<sup>6</sup> Economic and social policy guidelines are still decided at central government level.<sup>7</sup> 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 decentralisation reforms - first implemented by Rawlings - was to curb the chieftaincies' power (Jacquemot, 2007).

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. Growth slowed slightly in the mid-1990s, but picked up again in 2001 (Aryeetey and Kanbur, 2008). This twenty-year period of economic growth was initially triggered by free-market reform programmes with major support from the International Monetary Fund and the World Bank. Since 1991, the structural liberalisation reforms have been coupled with a series of plans focusing on poverty reduction and human development.

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 more erratic than it is now. 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. Tsekpo and Jebuni (2008) produce a functional distribution of total central government expenditure (financed by Ghanaian government resources plus donor grants and credits), which suggests a substantial redistribution of public funds with more spending on social services and infrastructure and less on administration and economic services. Figure 3 presents the national mean levels for the public facilities analysed 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

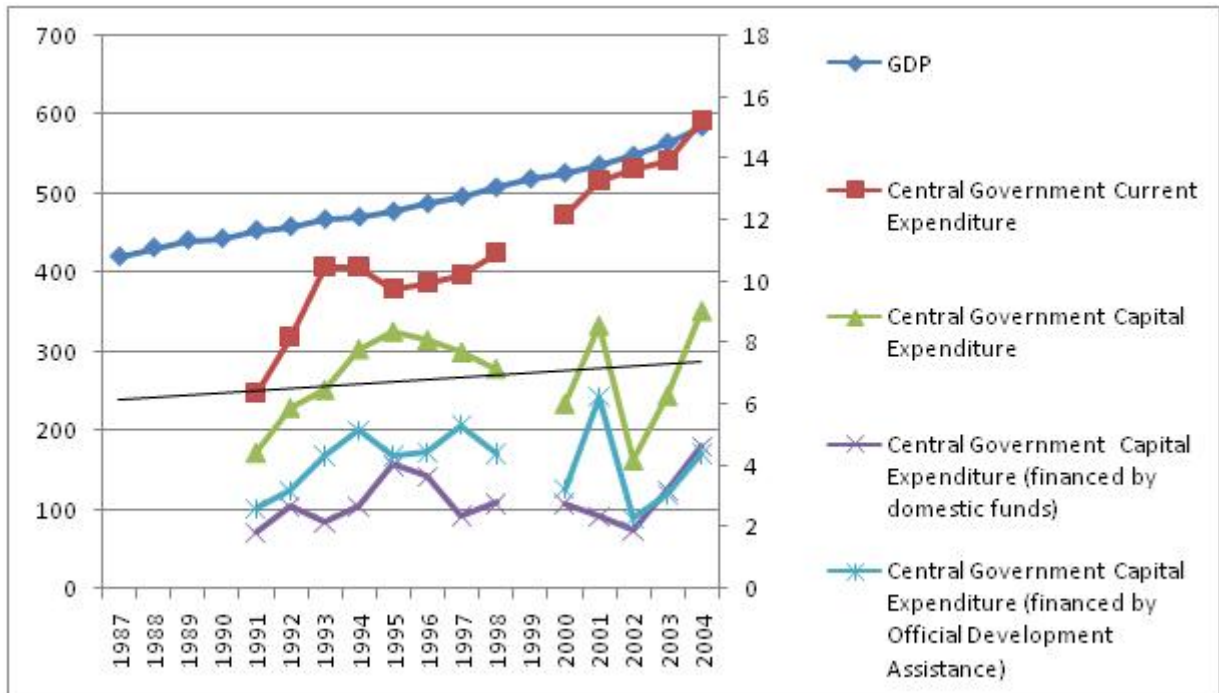
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5. Including decentralised administration, development planning and implementation.

6. 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 (2009) report that this formula takes in various social and economic factors such as "Need", "Responsiveness", "Service Pressure", and "Equality".

7. Appendix B details the national water and electricity policies and the central agency organisations in charge of water and electricity production/generation and distribution.

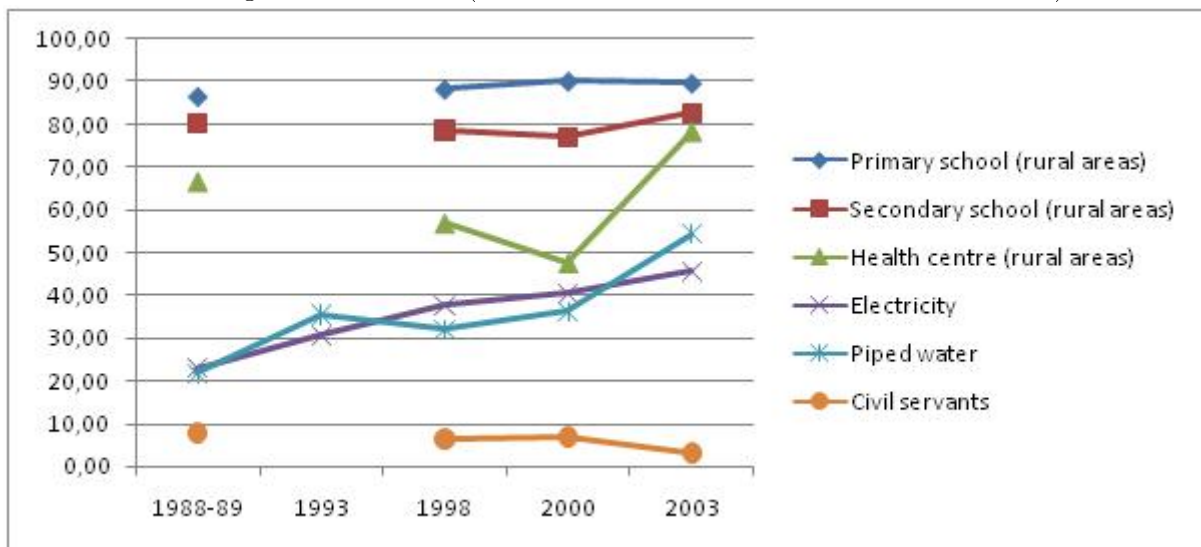
FIGURE 2 – GDP at constant prices and public expenditure per capita (Cedis), 1987 - 2004



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 labour force as a whole.

high. Around 90% of rural inhabitants live in areas with at least one primary school. Most of these facilities were built during the Nkrumah period (1957-1966). Akyeampong, Diangmah, Oduro, Seidu, and Hunt (2007) counted 66% of primary school facilities in this case in 2000. 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 rose by 2.5. Employment in the public sector fell from 2000 onwards. Yet these comparisons using different surveys are not necessarily entirely reliable, as they depend on the comparability of the surveys in question.

## 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). As noted by Shepherd et al. (2006), the causes of this inequality can be found in a number of factors :

- The North of the country is a bush region with lower rainfall than the South ;
- Pre-colonial relationships between kingdoms and tribes, more specifically the Ashanti Kingdom that used to run a slave trade in people from the North (Austin, 2005) ; -
- The colonial dispensation that favoured the South by actively promoting migration to the forest zone in the South and not promoting investment in the North ;
- The post-colonial failure to right the imbalance. The North's economic interests were neglected during the structural adjustment period (1980s), as reforms focused more on the cocoa production zone in the South. The 1980s saw the start of a number of poverty reduction programmes. Donors and international NGOs and, to a lesser extent, the Ghanaian government all prioritised the North in these programmes without significantly reducing the North-South gap.

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 Upper West, Upper East and Northern regions (Figure 4). As already mentioned, the aim of this paper is to analyse the extent to which electoral motives affect the between-district disparities and how they have changed since the end of the 1990s.

## 3 Data and estimation strategy

### 3.1 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.<sup>8</sup>

Our 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.<sup>9</sup> Together, these surveys provide information on

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8. We use the 2000 census districts. 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.

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

FIGURE 4 – Normalised public goods aggregate, 2000

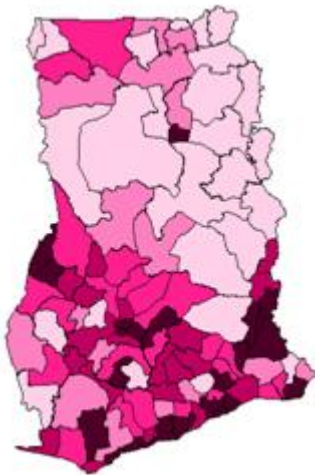
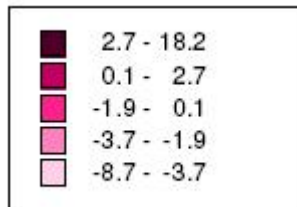
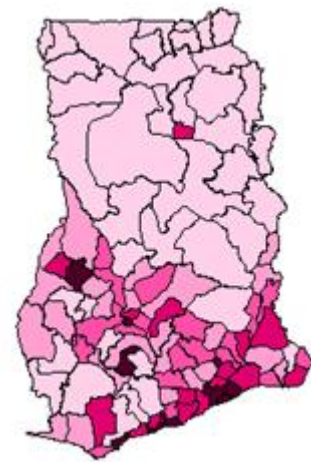
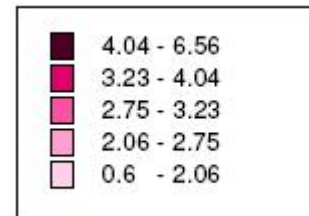





FIGURE 5 – Mean score for household housing amenities, 2000



Source : Population and Infrastructure Census, 2000, authors' calculations.

Note : The map on the left shows the normalised public goods aggregate. Public goods are primary and secondary schools and health centres 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 3 and Appendix A).

FIGURE 6 – National elections and national household surveys in Ghana between 1996 and 2004

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

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<sup>10</sup> (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<sup>11</sup> (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.

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.

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.

### 3.2 Estimation strategy

This paper estimates the potential relationship between the allocation of public goods in Ghana and election results. The baseline model we estimate is :

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

$G_{g,d,t}$  is the availability of public good  $g$  in district  $d$  on time  $t$ , and  $G_{g,d,t-1}$  is the availability of public good  $g$  in district  $d$  on time  $t-1$ . Public goods availability is measured on the different survey dates. So,  $t$  is equal to 2000 or 2003 and  $t-1$  to 1998 or 2000. The model (1) pools different types of public goods. Different public goods are not comparable : for example, using as dependant variables in the same regression the share of population with an access to electricity and the share of civil servants in the labor force. Hence, the information on each public good is normalised : the observations of 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 normalised variable  $G_{g,d,t}$  as relative position in the country of district  $d$  for public good  $g$  at time  $t$ . The relative position is comparable between observations.

$\text{diff}_{d,t-1}$  is the difference between the share of votes for the NPP and for the NDC in district  $d$  at the last presidential elections.<sup>12</sup> So it concerns the 1996 election when  $G_{d,t}$  is measured in 2000 and the 2000 election when  $G_{d,t}$  is measured in 2003.  $\text{diff}_{d,t-1}$  takes positive values if the NPP is the majority party in the district and negative values if the NDC is the majority party.  $\delta(t)$  is a time dummy variable that takes value 1 if the NDC is in power on time  $t$  (1998-2000 period) and 0 if the NPP rules on time  $t$  (2000-2003 period). Coefficient  $\alpha$  captures whether or not the government in power provides its supporter districts with more public goods. It is the main coefficient in this paper, as it emphasizes the potential clientelism mechanisms.

Coefficient  $\gamma$  is the coefficient of the square of the difference between the NPP and the NDC. It is expected to be negative, as political competition, notably in swing districts, may increase

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10. Inside or outside the household dwelling.

11. 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.

12. We use solely the results of the presidential elections in this paper. However, the patterns are the same when we use the results of the parliamentary elections.

investment in public goods. A vector of covariates  $X_{d,t-1}$  is added, including 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). Our specifications include the covariates on time  $t - 1$ , since investment between time  $t - 1$  and time  $t$  may affect the covariates on time  $t$ . 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.

The remainder of this section lists and assesses the main estimation concerns in this paper.

### Correlation between $G_{g,d,t-1}$ and the error term

The specification in model (1) includes the lagged variable  $G_{g,d,t-1}$ . There are two main concerns with  $G_{g,d,t-1}$ . First, there could be some measurement error, so that it only controls partly for the availability of public good  $g$  at time  $t - 1$ . Second,  $G_{g,d,t-1}$  could be correlated with the unobservable characteristics of the districts. In both cases, the coefficient  $\rho$  in equation (1) will be biased. This has a consequence for the other coefficients : the control for  $G_{g,d,t-1}$  is imperfect so that the coefficients could partly be due to the initial level of public goods and not only the coefficients of the accumulation of public goods.

### Correlation of the unobservable characteristics of the districts with the electoral results

A correlation between the unobservable characteristics of the districts could potentially bias the coefficients  $\alpha$  and  $\gamma$ . All the specifications in this paper are based on the idea that these unobservable characteristics causing the accumulation of public goods are probably constant through the 5 years of our panel. In particular, if the correlation between the votes and the accumulation of public goods changes between the two periods (1998 - 2000 and 2000 - 2003), this should be exclusively ascribed to a clientelism mechanism.

### Different surveys per year

Our data include different observations per district for two of the public goods in 2003 : the share of households connected to the electricity grid and the share of households with access to piped water. This is due to the inclusion of two different household surveys in our data in 2003 (DHS and CWIQ). Here is the corresponding adaptation of model (1) :

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

$G_{gd,t,s}$  is the observation of public good  $g$  in district  $d$  at time  $t$  given by survey  $s$ .  $\mu_s(G_{gd,t})$  is the corresponding measurement error. Hence the error terms from two different observations of the same public good at date  $t$  are probably highly correlated, as both measurement errors include  $\epsilon_{g,d,t}$ . It is nevertheless necessary to control in details for the correlation between those two observations. In this paper, all the standard errors are corrected for an arbitrary correlation between different observations of the same district. The variance-covariance matrix between different observations of the same district is given by the data. In particular, it controls for the fact that the observations of two surveys at the same date can be strongly correlated.

### Fixed effect specification

So as to ensure that we fully control for the district unobservable characteristics, we derived a fixed-effect specification for model (1) :

$$G_{gd,t} = \alpha\delta(t)diff_{d,t-1} + \lambda_d + \epsilon_{g,d,t} \quad (3)$$

This specification considers explicitly that the characteristics of the districts causing the allocation of public goods are constant through time. Under this assumption, the coefficient  $\alpha$  identifies a clientelism mechanism.

## 4 Results

Table 1 shows the results of the estimation of six 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 and the fourth specification contains district fixed effects (without any covariate). The last two specifications are described and analysed later. Region-year dummies and survey-public goods dummies are included in all specifications, but their coefficients are not shown. The estimates' standard errors are robust to the correlation of different observations of the same district.

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

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 urbanisation and education. This means that urban districts receive more public goods, and 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 ethnic heterogeneity variable is not significant. This result differs from the findings of Banerjee and Somanathan (2007) in the case of India where ethnic heterogeneity prevents an increase in public good availability from 1971 to 1991. The result can partly be explained by the fact that Ghana remains a centralized system of public good allocation, but not a decentralized one. 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 and only when these variables are not interacted with period dummy variables (column 2 versus column 3).<sup>13</sup>

In the first specification, 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 urbanisation 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 receive more public goods. The correlation

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13. This last point 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 clientelism has been disentangled from electoral clientelism, the effect of ethnic clientelism is small and rarely significant.

TABLE 1 – Determinants of the allocation of public goods in Ghana

	(1)	(2)	(3)	(4)	(5)
lag of public goods index	0.49** (0.04)	0.35** (0.04)	0.36** (0.04)	0.35** (0.04)	0.35** (0.04)
Votes NPP - Votes NDC	0.56** (0.14)	0.22 (0.17)	0.29 (0.21)	0.36+ (0.19)	0.37+ (0.20)
(Votes NPP - Votes NDC) <sup>2</sup>	0.50* (0.24)	0.38+ (0.22)	0.42+ (0.22)	0.34+ (0.20)	0.36+ (0.20)
(Votes NPP - Votes NDC) * (1998 - 2000)	0.79** (0.25)	0.71** (0.24)	0.62+ (0.34)	0.30 (0.28)	0.36 (0.30)
(Votes NPP - Votes NDC) * parliamentary candidate, minister after 2000				-1.16** (0.24)	
(Votes NPP - Votes NDC) * (1998 - 2000) * parliamentary candidate, minister after 2000				2.71** (0.60)	
(Votes NPP - Votes NDC) * parliamentary candidate, minister before 2000				0.46** (0.14)	
(Votes NPP - Votes NDC) * (1998 - 2000) * parliamentary candidate, minister before 2000				-0.63 (0.40)	
(Votes NPP - Votes NDC) * political index					-0.49** (0.14)
(Votes NPP - Votes NDC) * (1998 - 2000) * political index					0.91* (0.37)
(Votes NPP - Votes NDC) * District in Accra region				-1.35** (0.20)	-1.30** (0.22)
(Votes NPP - Votes NDC) * (1998 - 2000) * District in Accra region				2.61** (0.43)	2.34** (0.39)
Share of urban population in the district (measured in 2000)		0.37* (0.18)	0.36+ (0.18)	0.25 (0.18)	0.33+ (0.18)
Education index in the district		0.33** (0.10)	0.31** (0.10)	0.34** (0.10)	0.34** (0.10)
Household amenities index		0.05 (0.05)	0.06 (0.05)	0.08 (0.05)	0.07 (0.05)
Ethnic heterogeneity index		-0.69 (0.69)	-0.60 (0.68)	-0.63 (0.71)	-0.59 (0.70)
Share of Akan in the district		-0.30+ (0.16)	-0.46+ (0.25)	-0.47* (0.24)	-0.47+ (0.24)
Share of Akan in the district * (2000 - 2003)			0.33 (0.34)	0.28 (0.31)	0.26 (0.31)
Share of Ewe in the district		0.03 (0.20)	-0.12 (0.28)	0.11 (0.27)	0.11 (0.26)
Share of Ewe in the district * (2000 - 2003)			0.30 (0.39)	-0.06 (0.39)	-0.06 (0.38)
Share of Asante in the district (measured in 2000)		-0.52+ (0.29)	-0.61 (0.39)	-0.60+ (0.34)	-0.58+ (0.35)
Share of Ashanti in the district (in 2000) * (2000 - 2003)			0.19 (0.60)	0.28 (0.53)	0.24 (0.57)
log(population density) (measured in 2000)		0.14** (0.04)	0.14** (0.04)	0.14** (0.04)	0.14** (0.04)
NPP parliamentary candidate, minister after 2000					0.09 (0.10)
NPP parliamentary candidate, minister after 2000 * (1998 - 2000)					0.04 (0.16)
NDC parliamentary candidate, minister before 2000				0.12 (0.07)	0.12 (0.07)
NDC parliamentary candidate, minister before 2000 * (1998 - 2000)				-0.28 (0.19)	-0.37* (0.18)
Observations	1480	1449	1449	1449	1449
R <sup>2</sup>	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 under 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 labour 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. Specifications 4 and 6 include district 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+ (0.16)	0.09 (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 under 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 labour 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.

between votes and infrastructure availability diminishes when controlling for our proxies for wealth, education and urbanisation.

The coefficient of the differences in votes interacted with the dummy for the first period is expected to be negative under the “patronage hypothesis” : when the NDC is in power, the districts voting for the NPP are expected to receive fewer public goods. It is, however, positive and significant in each specification. This result is very similar to Banful (2009), who observes that the districts voting for the NPP received approximately the same amount of DACF<sup>14</sup> funds as the pro-NDC districts before 2000 and less funds after 2000. We find that the districts voting for the NPP received more public goods before 2000 and approximately the same amount after 2000. The difference between the DACF and our public goods aggregate may be partly due to the districts’ unobservable characteristics. In fact, the pro-NPP districts are wealthier than the pro-NDC districts. So they may obtain more public goods irrespective of government transfers, or obtain different government transfers.<sup>15</sup> This would explain why the pro-NPP districts received more public goods than the others and the same amount of DACF in 1998-2000, and the same amount of public goods as the others in 2000-2003 with less DACF. However, the fact remains that the double difference between pro-NPP and pro-NDC districts and the two periods is the same, and appears to reflect some “negative patronage”. The significance of this double difference can be checked in Table 2, with district fixed effects.

We expand on Banful’s results in two ways. First, we extend our observations from the DACF to the actual availability of public goods. Second, we use a more flexible comparison of election results with public goods allocation. Banful compared DACF allocation between districts where the NPP was in the majority and districts where the NDC was in the majority. We use a linear relationship between election results and allocation of public goods, which suits our data better than the dummies used by Banful. Figure 7 semi-parametrically plots the difference in the share of NPP and NDC votes in the district and the allocation of public goods. It shows that the relation is almost linear. The coefficient for the square of the difference between NPP and NDC votes is nevertheless always positive and is significant in some specifications. This is unexpected, as the allocation of public goods should favour the most competitive districts, like the swing districts.

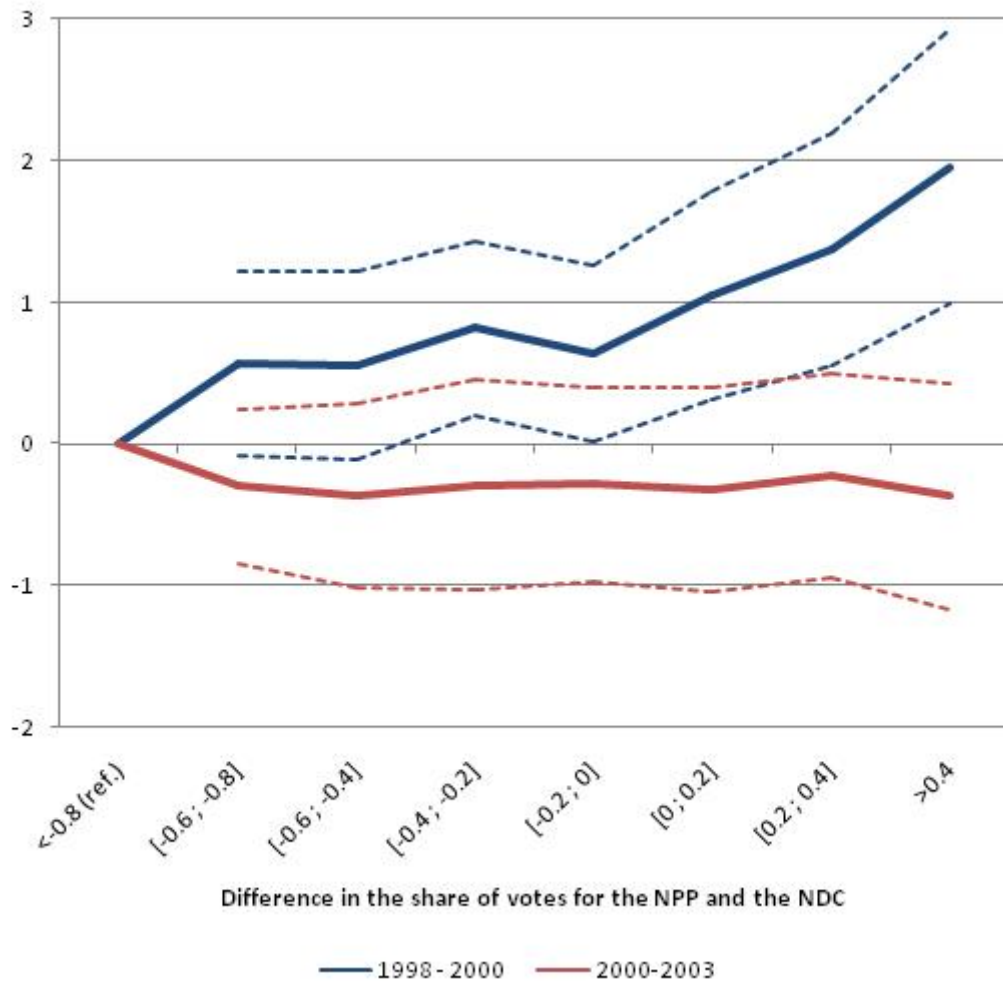
Specifications 4, 5, Table 1 and specification 2, Table 2 interpret the counterintuitive relationship between votes and the allocation of public goods. Column 4 and column 5, Table 1 include covariates and column 2, Table 2 is the district fixed-effect specification. They focus on the relationship between votes and public goods allocation in different contexts. They single out the districts in which a candidate in the 1996 parliamentary election was minister after 2000 under NPP rule and the districts in which candidate was minister before 2000 under NDC rule. The idea behind this is that a local NPP (NDC) politician was probably a national opposition leader before 2000 (after 2000). Taking 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. In these 15 districts, the coefficient of the correlation between voting for the NPP and public goods

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14. DACF stands for District Assemblies Common Fund

15. The Ghanaian government subsidises the districts by means of the DACF. Therefore, direct government investment is not included in the DACF.

FIGURE 7 – Allocation of public goods and votes, semi-parametric specification.



Notes : This figure presents the correlation between election results and public goods in Ghanaian districts, as in specification 2 of Table 1, with a dichotomised variable for the share of votes.

in the first period is positive and significant (1.26). By comparison, it is not significant in the other districts (0.28). 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 because 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. 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). The coefficient of this dummy variable and its interaction with votes are not significant, from 1998 to 2000. This is consistent with the previous result and does not validate patronage hypothesis. Indeed, the districts with a NDC leader did not receive more public goods than others during Rawlings’ government, whatever their election results. On the other hand, column 4, Table 1, points out that after 2000, the districts with an opposition leader had more public goods. The coefficient of the interaction between votes and the dummy variable for districts with a NDC minister is significant and positive (0.46). We then generate a political index taking 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.<sup>16</sup> As expected, the coefficient for the interactions between votes and this index is positive and significant from 1998 to 2000 in columns 5, Table 1, and 2, Table 2, and negative and significant from 2000 to 2003 in column 5.

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.

Column 4, Table 1, also shows a negative coefficient for votes in the Accra region during 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. It would therefore be logical if, with the NPP in power, the pro-NDC districts in the Accra region received more public goods.

## 5 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 4 shows that investment in infrastructures under NDC rule was particularly high in the “sensitive” districts<sup>17</sup> 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.

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16. This political index takes the value of 0 if none of the parliamentary election candidates was a minister and if more than one parliamentary election candidates were ministers for both parties.

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

As regards the omitted variables bias, the districts with a national NPP politician and the districts in the Accra region that voted for the NPP could have specific unobserved characteristics. Table 3 assesses whether the decomposition between the Accra region and districts with a national politician, on one side, and the other districts, on the other, in Table 1 is spurious. In other words, we check whether any underlying characteristic explaining why the districts voting for the NPP in 1996 in the former group should have received more public goods before 2000 than the latter group.

To do so, the difference in votes is interacted with a number of other characteristics (plus an interaction with the dummy for the 1998-2000 period) : 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 6.

If some of these supplementary observable characteristics are the underlying variables of the decomposition in specification 1, then the coefficients are biased in column 1 and unbiased in column 2. In columns 1 and 2, the sign and significance of the coefficients interacted with the difference in votes is 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 (0.53). Again, this is compatible with our theory of a targeting of "sensitive districts", as urban districts may be harder to control. 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 the votes of the Ewe who migrated to the region to produce cocoa. The second is linked to the traditional Ashanti kingdoms, which may still wield power and compel specific 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 10% level. In addition, we control for the same particularity due to the Ashanti kingdoms. Those 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 column 3 coefficients are very similar to those in column 1.

TABLE 3 – Endogeneity checks : control for omitted variables

	(1)	(2)	(3)
Difference in votes between NPP and NDC	0.38+	3.37	0.32+
	(0.20)	(2.03)	(0.18)
Difference in votes * (1998 - 2000)	0.34	-3.02	-0.34
	(0.30)	(2.48)	(0.23)
Difference in votes * political index	-0.40*	-0.17	-0.24
	(0.17)	(0.15)	(0.16)
Difference in votes * political index * (1998 - 2000)	0.84**	0.60*	0.63*
	(0.32)	(0.27)	(0.28)
Difference in votes * District in Accra region	-1.24**	-1.37**	-0.90**
	(0.24)	(0.39)	(0.24)
Difference in votes * District in Accra region * (1998 - 2000)	2.30**	2.23**	1.83**
	(0.37)	(0.55)	(0.29)
Difference in votes * log(population density)		-0.23*	0.01
		(0.11)	(0.07)
Difference in votes * log(population density) * (1998 - 2000)		0.53**	0.31*
		(0.18)	(0.12)
Difference in votes * Share of urban population		0.13	
		(0.69)	
Difference in votes * Share of urban population * (1998 - 2000)		-0.07	
		(1.04)	
Difference in votes * Education index		-0.24	
		(0.30)	
Difference in votes * Education index * (1998 - 2000)		-0.45	
		(0.38)	
Difference in votes * Household amenities index		0.41+	
		(0.23)	
Difference in votes * Household amenities index * (1998 - 2000)		-0.09	
		(0.29)	
Difference in votes * Ethnic heterogeneity index		-2.94	
		(2.22)	
Difference in votes * Ethnic heterogeneity index * (1998 - 2000)		2.40	
		(2.97)	
Difference in votes * Share of Akan		-1.59	
		(0.97)	
Difference in votes * Share of Akan * (1998 - 2000)		2.05+	
		(1.19)	
Difference in votes * Share of Ewe		-0.02	
		(0.99)	
Difference in votes * Share of Ewe * (1998 - 2000)		0.39	
		(1.19)	
Difference in votes * Share of Asante		0.03	
		(0.89)	
Difference in votes * Share of Asante * (1998 - 2000)		0.67	
		(1.10)	
Share of Ewe * region Ashanti			2.22+
			(1.20)
Share of Ewe * region Ashanti * (1998 - 2000)			-3.16**
			(1.13)
Share of Asante * region Ashanti			0.40
			(0.61)
Share of Asante * region Ashanti * (1998 - 2000)			0.22
			(0.52)
Observations	1449	1449	1449
$R^2$	0.581	0.604	0.595

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

Notes : OLS with standard errors given under 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 labour 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.

TABLE 4 – Disaggregation between different types of public goods

VARIABLES	(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** (0.04)	0.62** (0.09)	0.39** (0.09)	0.30** (0.10)	0.28** (0.09)	0.11+ (0.06)	0.13 (0.08)
Square of the difference in votes between NPP and NDC	0.34+ (0.20)	0.15 (0.34)	0.71+ (0.40)	-0.09 (0.39)	0.58 (0.70)	0.19 (0.43)	0.88+ (0.49)
Difference in votes * (1998 - 2000)	0.34 (0.30)	0.14 (0.26)	0.13 (0.25)	0.32 (0.41)	1.09+ (0.65)	0.56 (0.46)	0.77 (0.53)
Difference in votes between NPP and NDC	0.38+ (0.20)	0.32 (0.22)	0.39 (0.28)	-0.04 (0.35)	0.39 (0.47)	0.63* (0.31)	0.59+ (0.35)
Difference in votes * political index	0.84** (0.32)	0.16 (0.32)	0.31 (0.41)	0.48 (0.44)	1.64 (0.99)	1.17* (0.56)	1.72* (0.66)
Difference in votes * political index * (1998 - 2000)	-0.40* (0.17)	-0.17 (0.18)	-0.13 (0.17)	-0.65* (0.27)	-0.83 (0.65)	-0.24 (0.35)	-0.35 (0.41)
Difference in votes * District in Accra region * (1998 - 2000)	2.30** (0.37)	0.76 (0.65)	2.10** (0.56)	1.60* (0.63)	0.19 (0.84)	2.23** (0.72)	4.43** (1.00)
Difference in votes * District in Accra region	-1.24** (0.24)	-1.14+ (0.60)	-1.12** (0.32)	-2.53** (0.61)	-0.57 (0.89)	-0.47 (0.57)	-0.96+ (0.57)
Observations	1449	318	318	208	197	204	204
R <sup>2</sup>	0.581	0.780	0.775	0.772	0.498	0.701	0.665

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

Notes : OLS with standard errors given under 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 labour 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 an 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.

Table 4 presents specification 5 for Table 1 disaggregated by type of public goods. The coefficients are imprecisely estimated here, as the sample has been divided into several parts. The signs of the coefficients nevertheless remain similar for each public good.

## 6 Conclusion

This chapter sets out to shed light on the link between democratization, on one side, and political institutions and development on the other. The Ghanaian democratisation process provides an opportunity to analyse the extent to which political economy affects the allocation of public goods in Ghana.

While most empirical papers confirm the patronage hypothesis or the targeting of swing districts, our results reflect some “negative patronage”. When the NDC was in power from 1998 to 2000, the districts that voted for the NPP received more public goods. We assert that this finding is partially driven by a sense of need to curry favour with party politicians. This kind of redistribution system is more complex than what Azam (2001) describes when defining the African states. The Ghanaian redistribution system is no more exactly driven by ethnic considerations (within ethnic or kin groups and between ethnic groups through their elite transfers), but from now through political party leader allegiance.

From 1992 to 2000, Ghana was officially a democracy, but former dictator Jerry Rawlings was still president. In addition, Ghana saw a number of coups prior to 1982 when Jerry Rawlings came to power, and bribing opposition leaders could have been a good strategy for the government to ensure national stability. So this need to curry favour with party politicians could be due to the remnants of dictatorship practices, just before the first democratic shift in Ghana. A promising future paper could hence be to check for the persistence of these political habits since 2004 and two peaceful parliamentary and presidential elections in Ghana.

## Annexes / Appendix

# Appendix 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.

## 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	

# Appendix B

## Water and electricity supply policies in Ghana

### Water Supply

The Community Water and Sanitation Agency<sup>1</sup> 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 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<sup>2</sup>

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

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1. 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.]

2. All the information in this paragraph comes from RCEER (2005).

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.

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