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Voter Behavior and Government Performance: Empirical Application in Ghana

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Abstract

Electoral competition is a democratic mechanism to guarantee high governmental performance. In reality, however, it often leads to policy failure due to Government Capture and Government Accountability. An understanding of both phenomena has to be based on voter theory and nowadays the probabilistic voter model is the workhorse model applied in voter studies. In this paper we first proceeded to derive a theoretical model to estimate voter behavior including three voting motives: non-policy oriented, policy oriented and retrospective oriented. Then, we derived government performance indicators to estimate Capture and Accountability based on marginal effects and relative importance of the three components. Subsequently, we tested our theory estimating a probabilistic voter model for Ghana using own election survey data. In particular, we calculated different mixed logit model specifications and, to allow heterogeneity, we followed the latent class approach. Using the results of the estimations, we were able to calculate marginal effects and relative importance of each voting motive and we found that the non-policy component is the most important whereas the retrospective component is the less relevant. Finally, the government performance indicators were estimated and they suggest that, although the political weights are unequally distributed in Ghana, the government is partially accountable towards the voter and elections provide an effective mechanism to promote democracy.

Keywords: probabilistic voter model, capture, accountability, agricultural policy, Ghana, Africa
JEL classification:Q18, C31, C35, C38

1 Introduction

There is a general agreement that governmental policy plays a key role in the processes of reducing poverty and undernutrition and promoting economic growth. The quality of governance is important to guarantee an effective implementation of the best available practice policies. Furthermore, in political theory, electoral competition is understood as a fundamental democratic mechanism to guarantee high governmental performance. In democratic systems elections should reflect the interests of the whole society and serve to control the government. In reality, however, electoral competition often leads to policy failure. This is because, in political practice, it is a common observation that the development of policies is biased in favor of special interest, as well as, inefficient. These distorted policies are explained by two major problems of low political performance: Government Capture (where more consideration is given to the political interests of a minority group at the expense of the majority, because there is no representativeness of society) and Government Accountability (where the government lacks incentives to implement efficient policies, because they are not being controlled). However, since it is also broadly accepted in political economy theory that policy choices of democratically elected politicians are driven by their vote maximizing probabilities, an understanding of both phenomena, biased and inefficient policies, has to be based on voter theory. Nowadays the probabilistic voter model is the workhorse model applied in voter studies.

There is a broad range of literature concerning voting behavior on the one hand and government performance on the other. Prominent examples of the former are [Campbell et al., 1960] and [Lazarsfeld et al., 1968]. Important contributions for the latter are among others from [Bailey, 1999], who addresses different topics regarding local government, and [Stevens, 2005], who assess the performance of local authorities in terms of the efficiency with which they provide services. However, fewer researchers have combined the analysis of voting behavior and government performance. For example, according to [Keefer and Khemani, 2005] and [Bardhan and Mookherjee, 2002], less electoral competition implies incentives for the government to implement policies that do not correspond to the needs and desires of the majority of society.

Additionally, some studies assume that voters apply different mechanisms to evaluate electoral candidates or parties. For example, the classical theory of [Downs, 1957] assumes that voters evaluate candidates based on their announced party platforms (i.e. policy oriented). However, following the theoretical model of [Grossman and Helpman, 1996] voters base their electoral decision on policy oriented motives, like candidates' policy positions and non-policy oriented motives, such as, candidates' appearance or ethnicity, according to their level of information on politics. In consequence, the higher the importance of non-policy oriented versus policy oriented voter behavior the lower is the incentive of a government seeking for reelection to implement policies that benefit its electorate.

2 Methodology

2.1 Voter Behavior

Three main approaches to explain voter behavior have been developed:

- The theory of rational voting [Downs, 1957] was among the first to combine voter behavior and government behavior. This theory assumes that voters gain utility from implemented policies. Therefore, they will vote for the candidate whose policies provide them with the highest expected utility. Correspondingly, political parties seek to choose the policy position that maximizes their expected vote share.
- The socio-psychological approach, also known as the Michigan School, gained fame for their study *The American Voter* [Campbell et al., 1960]. They differentiate between long term forces, like party identification, and short term forces, such as the individual perception and assessment of candidates and policy issues.
- The socio-structural approach is divided into:
  - The micro-sociological explanatory model, also known as the Columbia School, whose main work is the published book *The Peoples Choice* [Lazarsfeld et al., 1968]. They emphasize that voters' choice is mainly determined by social structures like social class, ethnicity and religion.
  - The macro-sociological explanatory model [Lipset and Rokkan, 1967] argues that cleavages determine the emergence and the content of all European political parties.

In this sense, if a voter decides to participate in an election and voter behavior is modeled taking into account the rational choice approach, researchers differentiate between a deterministic and a probabilistic voter model. In the deterministic voter model, the probability that voter i chooses party A in a two-party system is calculated as follows:

$$P_{iA}(A, B) = 1 \text{ if } V_{iA} > V_{iB} \tag{1}$$

$$P_{iA}(A, B) = 0,5 \text{ if } V_{iA} = V_{iB} \tag{2}$$

$$P_{iA}(A, B) = 0 \text{ if } V_{iA} < V_{iB} \tag{3}$$

where V_{iA} and V_{iB} are the utilities that voter i associates with parties A and B respectively. In other words, the voting decision depends on the party differential $V_{iA} - V_{iB}$. In empirical research, however, it is not possible to observe and control all the factors

involved in the voting decision process. Therefore, it is more suitable to estimate a probabilistic voter model that makes possible the inclusion, in the utility function, of an individual-specific stochastic component μ_{ik} containing these unknown factors.

$$P_{iA}(A,B) = Prob(U_{iA} \geq U_{iB}) \text{ where } U_{ik} = V_{ik} + \mu_{ik},\ k = A,B \tag{4}$$

Probabilistic voter models are estimated with Discrete Choice models, since they explain choices between two or more alternatives. More specifically, these models answer to the questions: who?, what? and how?. Hence, in the context of voter behavior, discrete choice models are exceptionally suitable, as researchers are more interested in the way results were achieved rather than the actual results. Furthermore, in an election, the set of alternatives satisfies all three requirements, i.e. all parties must be present on the ballot (collectively exhaustive), each voter is allowed to choose only one party or candidate (mutually exclusive) and there is only a finite number of parties (finite number of alternatives).

In order to derive the Discrete Choice model, it is common to apply a Random Utility Model (RUM). Here, if the voter i decides to participate in the election, he chooses party k only if this party provides him the highest utility U_{ik}. In other words, the greater the utility of a party, the more likely the party is selected by the voter.

As previously mentioned, the utility U_{ik} is divided into the part that is known by the researcher V_{ik} and the random unknown part μ_{ik}. We assume that the latter is independently, identically extreme value distributed (iid), i.e. μ_{iA} is not related to μ_{iB}, and thus a logit model is derived. This model is based on Luce's Choice Axiom (LCA) [Luce, 1959], where the ratio between the probability of voting for party A and party B is equal to the ratio between the two corresponding utilities:

$$\frac{P_{iA}}{P_{iB}} = \frac{V_{iA}}{V_{iB}} \tag{5}$$

This model can be extended to a multi-party system, meaning that voters can choose an alternative k from a set of alternatives K. In this sense, the logit probability model can be derived as [McFadden, 1974]

$$P_{ik}(K) = \frac{e^{V_{ik}}}{\sum\limits_{k=1}^{K} e^{V_{ik}}} \tag{6}$$

Depending on the kind of variables and parameters that are included, there are different logit models. A multinomial logit model consists of individual specific variables, like age, gender and religion, with alternative specific coefficients. On the other hand, a conditional logit model contains alternative specific variables, such as issue distances and party identification, with generic coefficients. Since this study includes both kinds of variables, a mixture of multinomial logit and conditional logit model is estimated, for

simplicity, in this paper we will call it mixed logit model. For this purpose, the dataset is transformed into a long format. An example is displayed in Table 1.

Table 1: Example of the long format dataset for the mixed logit model

Case	Id	Choice	Party	Age	Gender	Issue 1	Issue 2	Party ID
1	1	0	P1	23	male	9	16	0
2	1	1	P2	23	male	4	4	1
3	1	0	P3	23	male	16	9	0
4	2	1	P1	46	male	0	9	0
5	2	0	P2	46	male	16	9	0
6	2	0	P3	46	male	16	16	0
7	3	1	P1	30	female	9	16	0
8	3	0	P2	30	female	9	4	1
9	3	0	P3	30	female	4	0	0
10	4	0	P1	81	male	4	4	0
11	4	0	P2	81	male	16	4	0
12	4	1	P3	81	male	9	16	1
...	...	...	...	...	...	...	...	...

Source: own illustration based on [Thurner, 1998]

In a long format dataset the number of observations for each voter depends on the number of alternatives (K political parties). Additionally, the dependent variable *Choice* equals 1 if the party is chosen and 0 otherwise. Furthermore, individual specific variables are different for every voter/party combination, whereas alternative specific variables vary across alternatives. A simple form of the model looks as follows:

$$P_{ik}(K) = \frac{e^{V_{ik}}}{\sum_{k=1}^{K} e^{V_{ik}}} \text{ where } V_{ik} = \alpha_k + \beta x_{ik} + \delta_k r_i \tag{7}$$

where α_k is an alternative specific constant, x_{ik} is a vector of alternative specific variables with a generic coefficient β, and r_i is the individual specific variable with an alternative specific coefficient δ_k. The alternative specific coefficients are estimated with one of them set to zero and the remaining coefficients are interpreted with respect to the alternative whose coefficient was set to zero. On the contrary, generic coefficients are constant for all alternatives.

The mixed logit model estimated in this paper includes three components or voting motives: non-policy oriented (V_{ik}^{NP}), policy oriented (V_{ik}^{P}) and retrospective oriented (V_{ik}^{R}). The voter's utility function is now as follows:

$$V_{ik} = \alpha_k V_{ik}^{NP} + \beta_k V_{ik}^{P} + \delta_k V_{ik}^{R} \tag{8}$$

Not all voters are well informed and aware of policies, especially in developing countries. Therefore, voters might apply non-policy indicators to estimate their expected utility, such

as their socio-demographic characteristics x_{ij}, as well as their approval of the incumbent's work y_{ig}. Other indicators correspond to the concept of valence [Schofield, 2007], which holds that voters perceive a specific competence or popularity of candidates based on specific characteristics z_i like charisma and appearance. Furthermore, it can also be assumed that voters are influenced by the parties' campaing spending C_k [Grossman and Helpman, 1996].

$$V_{ik}^{NP} = \sum_{j}^{J} \alpha_k x_{ij} + \alpha_k y_{ig} + \alpha_k z_i + \sum_{k}^{K} \alpha_{ik} C_k \tag{9}$$

The policy oriented voter's utility function is calculated based on the spatial voting model [Davis et al., 1970, Enelow and Hinich, 1984], as the weighted distance between a voter's position x_{di} on a specific issue d and the perceived position taken by the party or candidate y_{dk} on the same issue:

$$V_{ik}^{P} = -\sum_{d}^{D} \beta_d (y_{dk} - x_{di})^2 \tag{10}$$

Notice that the coefficient β is always negative, because the greater the distance between the voter's position and the party/candidate's position, the less is the utility.

As regards the retrospective voting motive [Fiorina, 1981], voters can express a general assessment of the past performance of a party/cantidate or the government. In this sense, voters use observable welfare indicators Z_{ir} which are determined by governmental policies (γ_G).

$$V_{ik}^{R} = \sum_{r}^{R} \delta_{kr} Z_{ir}(\gamma_G) \tag{11}$$

The mixed logit model already described assumes that all voters act homogeneously. However, since we are also interested in analyzing the impact of voter behavior on government performance, more specifically on government accountability and capture, heterogeneity must be allowed as it is a necessary condition for the existence of capture. Therefore, this model needs to be extended to a latent class model. So now the probability that voter i chooses party k is class-specific (c).

$$P_{ikc} = \frac{e^{V_{ikc}}}{\sum_{k=1}^{K} e^{V_{ikc}}} \text{ where } V_{ikc} = \alpha_{kc} V_{ikc}^{NP} + \beta_{kc} V_{ikc}^{P} + \delta_{kc} V_{ikc}^{R} \tag{12}$$

The classes are generated based on the individual socio-demographic characteristics of the voter. We refer to the vector containing these characteristics as covariates. An iterative process is used to determine class-specific utility functions and the probability of class membership. The optimal model is determined by means of an information criterion (CAIC, AIC or BIC).

In the latent class model the voter has an additional utility v_{ic} if he belongs to a group because of his socio-demographic characteristics x_i and therefore chooses differently from another group.

$$v_{ic} = \alpha_c + \sum_c b_c x_i \tag{13}$$

Based on this utility v_{ic}, a probability p_{ic} that an individual belongs to a class is calculated:

$$p_{ic} = \frac{e^{v_{ic}}}{\sum_{c=1}^{C} e^{v_{ic}}} \tag{14}$$

Then, in order to calculate the probability of the classes, one has to weight the probability that voter i chooses party k given that he belongs to class c (P_{ikc}) with the probability that voter i actually belongs to class c (p_{ic}):

$$\bar{P}_{ik} = \sum_c^C P_{ikc} * p_{ic} \tag{15}$$

2.2 Government Performance

In order to assess government performance, the indicators for capture and accountability are derived. Since the probability P_{ik} is logistically distributed, the algebraic signs of the coefficients indicate the direction of the impact, but the absolute values cannot be interpreted. Hence, marginal effects are calculated, as they show how sensitive voters are to changes in policy, non-policy and retrospective components.

$$ME_i^{NP} = \frac{\partial P_{ik}}{\partial z_i} \tag{16}$$

$$ME_i^{P} = \frac{\partial P_{ik}}{\partial x_{di}} \tag{17}$$

$$ME_i^{R} = \frac{\partial P_{ik}}{\partial Z_{ir}(\gamma_G)} \tag{18}$$

These marginal effects point out the extent to which the probability P_{ik} changes when there is a one unit change in the independent variables.

To evaluate the relative importance of the different voting motives, the relative marginal effects (RI) are calculated for each voter:

$$RI_i^{NP} = \frac{ME_i^{NP}}{ME_i^{NP} + ME_i^{P} + ME_i^{R}} \tag{19}$$

$$RI_i^P = \frac{ME_i^P}{ME_i^{NP} + ME_i^P + ME_i^R} \tag{20}$$

$$RI_i^R = \frac{ME_i^R}{ME_i^{NP} + ME_i^P + ME_i^R} \tag{21}$$

2.2.1 Government Accountability

Electoral competition should encourage governments to develop and implement efficient policies. However, we assume that government accountability is low when voters choose more non-policy oriented and viceversa. Accordingly, we derive a government accountability index (GA) based on the relative marginal effects.

$$RI^{NP} = \sum_{i=1}^{n} RI_i^{NP} \tag{22}$$

$$RI^{P} = \sum_{i=1}^{n} RI_i^{P} \tag{23}$$

$$RI^{R} = \sum_{i=1}^{n} RI_i^{R} \tag{24}$$

$$GA = \frac{RI^P + RI^R}{RI^{NP} + RI^P + RI^R} \tag{25}$$

where policy and retrospective RI can be added up in order to compare policy vs. non-policy voting motives.

2.2.2 Government Capture

The implementation of biased policies is the result of high levels of government capture. Here we assume that the more policy oriented a voter chooses, the more importance he has for parties. Consequently, for the purpose of determining the government capture index (GC), we first calculate the individual relative political weights:

$$g_i = \frac{ME_i^P}{\sum_{i=1}^{n} ME_i^P} \tag{26}$$

Since voters cannot influence a political process individually, it is interesting to analyze different groups from the electorate to identify those with a greater political weight.

$$GC_{1vs2} = \frac{\frac{\sum_{i \in 1} g_i}{a_1}}{\frac{\sum_{i \in 2} g_i}{a_2}} \tag{27}$$

where a_1 and a_2 are the share of voters in group 1 and 2 respectively.

3 Data

A voter survey including questions on socio-economic characteristics, voting behavior, policy positions and network characteristics was designed and carried out in Ghana in September 2012. The interviews were conducted face-to-face in the respective first language of the interviewee. The sample contains 601 individuals from 20 different districts across the country. After data cleaning 333 complete observations remained for the analysis of voting behavior.

3.1 Dependent Variable

In a probabilistic voter model the dependent variable is usually the actual or intended vote choice. In the questionnaire, respondents were asked:

If a presidential election were held tomorrow, which party's candidate would you vote for?

Table 2 shows the results of the surveys, as well as, the official presidential election results. The survey results are quite close to the actual election results. This confirms the reliability of our data. Furthermore, the vote distribution clearly shows that electoral competition in Ghana corresponds to a two-party contest. Therefore, for the analysis in the empirical section we only considered the main parties, while the remaining small parties were dropped.

Table 2: Ghana's presidential election results

	NDC	NPP	CPP	PPP	PNC	others
Presidential election 2012	50.70	47.74	0.18	0.59	0.22	0.57
Own survey 2012	48.73	45.69	0.76	1.78	0.25	2.79

Source: [African Elections Database, 2014], own survey

3.2 Independent Variables

Policy Voting: Seven different policy issues are considered. The policy positions on these issues were asked based on a five-point scale and were presented as follow:

1. 1-Agree with liberal policies, 5-Disagree with liberal policies (Social)
2. 1-Tax revenues should be used to provide public goods, 5-Tax revenues should be used to improve economic growth (Economic)
3. 1-Economic growth shall be achieved through the agricultural sector, 5-Economic growth shall be achieved through the industrial (non-agricultural) sector (AgrvsInd)
4. 1-Economic growth through technological progress, 5-Economic growth through better market access (TPvsMA)
5. 1-Promotion of cash crops, 5-Promotion of food crops (CashvsFoodcrops)
6. 1-Agricultural sector should be taxed, 5-Agricultural sector should be supported (TaxvsProtect)
7. 1-Governmental decision making process without the population, 5-Governmental decision making process including the population (Accountability)

Retrospective Voting: In the surveys, questions considering sociotropic voting, as well as, pocketbook voting were asked. More specifically, there were six questions where the interviewees evaluated the economic situation of the country and their own personal living conditions in the past, present and future. In order to lower the number of variables in the estimation and due to collinearity, we conducted a factor analysis which resulted in a three-factors solution: ELC-Past, ELC-Present and ELC-Future.

Non-policy Voting: A whole set of sociodemographic variables such as gender, age, rurality, occupation and education was included, as well as, a variable that measures the approval of the president. In addition, regions and ethnic groups are coded as dummy variables. Furthermore, a set of questions was incorporated asking the respondents to evaluate, on a five-point scale, how the government is handling specific country matters. We performed again a factor analysis to reduce the number of variables resulting in a three-factors solution.

4 Empirical Application and Results

4.1 Mixed Logit and Latent Class Models

We estimated a probabilistic voter model to determine which factors influence voting behavior in Ghana. More specifically, with the data described in the former section, we

calculated different mixed logit model (ML) specifications. Then, to assess the degree of intercorrelation among the independent variables, a test for multicollinearity was performed. This consists in calculating the condition indexes and variance decomposition proportions in order to test for collinearity among the independent variables. In our optimal ML model, no presence of multicollinearity was detected.

Since the importance of voting motives differ across voters, we followed the latent class approach (LC) to explain this heterogeneity. The estimated LC consists of two submodels, the model for choices that determines which alternative is chosen and the model for classes that defines class membership. In the latter, the personal characteristics of the voter are included as covariates. Different model specifications were estimated with two and three classes. For simplicity, in this paper we only show the results of the LC.

When deciding about the optimal number of latent classes, we looked at convergence, the Bayesian Information Criterion (BIC) and the Akaike Information Criterion (AIC). As shown in table 3, the 2 classes models converge more often than the 3 classes models. Likewise, the 2 classes solution proved to be the best one, as the BIC is lower in all model specifications. Regarding the AIC, it prefers the 3 classes solutions in three model specifications, but it is not feasible as they do not always converge.

Table 3: Fit for different LC model specifications

	M1 (Policy)			**M2 (+Retro)**			**M3 (+Gov. Perf., Approval)**		
	BIC	**AIC**	**Conv.**	**BIC**	**AIC**	**Conv.**	**BIC**	**AIC**	**Conv.**
2 Classes	400.95	359.06	Yes	400.54	335.80	Yes	312.68	217.48	No
3 Classes	433.00	368.26	Yes	437.98	338.97	No	376.59	231.88	No

	M4 (+Regions, Ethnic Groups)			**M5 (+Other Non-Policy)**			**M6 (Optimal Model)**		
	BIC	**AIC**	**Conv.**	**BIC**	**AIC**	**Conv.**	**BIC**	**AIC**	**Conv.**
2 Classes	305.31	179.64	Yes	312.38	171.48	Yes	262.34	159.52	Yes
3 Classes	375.69	170.05	No	407.01	170.91	No	330.31	155.14	Yes

Source: Own estimation

To estimate the different LC model specifications, explanatory variables were added to improve the model fit. The incumbent party was taken as reference party, meaning that the individual specific variables are interpreted in comparison to it. Model 1 includes only the alternative specific constants, that absorb all information not explicitly incorporated in the model, as well as, the policy oriented variables. Subsequently, from model 2 to 5, variables for retrospective voting motives, government performance indicators, regions and ethnic groups, and other sociodemographic characteristics were added. The goodness

of fit is measured with the BIC, and it significantly decreases from model 1 to the optimal model M6. Finally, the optimal model includes only the significant independent variables chosen via the z-score test. The size of the class memberships are approximately 60% and 40% for classes 1 and 2 respectively, which evidences a strong heterogeneity.

Table 4 shows the LC model specifications for Ghana. The signs of the constants are identical for the two classes. The policy issues, CashvsFoodcrops and Accountability, are significant and have negative coefficients for both classes. This means that the greater the distance between a voter's position and the perceived position of a party, the less is the utility, as well as, the probability to vote for that party's candidate. All the predictor variables are significant for class 1, while for class 2 Gov-Perf-Economy and Gov-Perf-Social are insignificant. The coefficients of these variables are all negative with the exception of ELC-Present. This contradicts the theory, since it means that a positive assessment of the present situation impacts positively the opposition party. We could assume that the opposition party plays an important role in the government and voters reward this political action. The high and negative intercept in the class model reflects the existence of bias towards belonging to class 1. On the other hand, education and rurality, as well as, all regions and ethnic groups that are significant in the model, have a positive influence on membership in class 2.

Table 4: Estimation Results of Latent Class Models

Variables	M1 (Policy) BIC = 400.95				M2 (+Retro) BIC = 400.54				M3 (+Gov. Perf., Approval) BIC = 312.68				M4 (+Regions, Ethnic Groups) BIC = 305.31				M5 (+Other Non-Policy) BIC = 312.38				M6 (Optimal Model) BIC = 262.39			
	Class 1 (0.6639)		Class 2 (0.3361)		Class 1 (0.5401)		Class 2 (0.4599)		Class 1 (0.6946)		Class 2 (0.3054)		Class 1 (0.5550)		Class 2 (0.4450)		Class 1 (0.5672)		Class 2 (0.4328)		Class 1 (0.5924)		Class 2 (0.4076)	
Model for Choices	Coeff.	z-value	Coeff.	z-value	Coeff.	z-value	Coeff.	z-value	Coeff.	z-value	Coeff.	z-value	Coeff.	z-value	Coeff.	z-value	Coeff.	z-value	Coeff.	z-value	Coeff.	z-value	Coeff.	z-value
Attributes																								
NPP: Intercept	0.5437	1.4990	-0.7679	-0.9438	0.6674	1.4167	-0.9468	-1.0934	22.7342	1.6181	6.2771	1.9063	1.4742	0.5671	10.3556	2.6343	8.4844	2.6964	13.7125	2.7255	6.5493	2.4736	33.7137	2.3671
disSocial	-2.5253	-2.1260	0.1042	0.3970	-2.0541	-1.1276	-0.2337	-0.5883	-0.1113	-0.2117	0.0566	0.0563	-0.2920	-0.2784	-0.0121	-0.0362	-1.2923	-0.5723	0.0229	0.0600				
disCashvsFoodcrops	-0.1004	-1.1411	-1.1944	-1.5936	-0.5384	-1.6164	-0.4959	-1.8122	-1.6478	-1.7752	-0.1452	-0.3697	-0.6270	-2.1263	-0.4898	-1.0965	-0.7241	-2.2953	-0.6034	-1.4878	-0.5424	-1.8545	-1.2627	-1.9445
disTaxvsProtect	-0.0619	-0.8172	-1.3650	-1.6736	-0.3253	-1.7681	-0.4944	-1.2880	0.0035	0.0168	-6.8233	-2.7354	-0.4581	-1.2549	-0.5026	-1.9136	-0.4266	-1.2677	-0.4293	-1.4171				
disAccountability	-1.1981	-2.4623	-0.2869	-1.1821	-1.2993	-2.1046	-1.3706	-1.8225	-0.5905	-1.5328	-4.5498	-2.6551	-3.4330	-2.7096	-0.7075	-1.9791	-3.3796	-2.9837	-0.8307	-1.8885	-3.2354	-2.6196	-2.2722	-2.1871
Predictors																								
NPP: ELC_Future					-0.5053	-1.3736	1.8276	1.6027	0.2121	0.3957	-0.2925	-0.5479	0.2182	0.3048	0.4105	0.7675	-1.0770	-1.5496	0.7974	1.4182				
NPP: ELC_Present					-0.1480	-0.4674	-2.8017	-2.1345	1.5690	1.5524	1.5176	2.1578	2.4526	2.9695	0.2804	0.4977	2.1915	2.4314	1.1271	1.7839	1.5758	2.0974	2.1821	1.7853
NPP: ELC_Past					0.4980	0.5662	-9.3612	-2.0946	0.1998	0.3091	-3.0668	-2.5923	-1.8021	-2.5155	-1.3247	-1.6172	-2.2343	-2.9121	-1.4145	-1.9592	-1.9160	-2.5642	-2.9479	-2.0228
NPP: Gov_Perf_Economy									-4.7382	-1.5919	-1.5690	-1.7283	-3.8365	-3.1120	-1.5204	-1.7062	-2.3287	-2.5924	-1.4774	-1.8769	-2.2152	-2.4194	-0.0372	-0.0415
NPP: Gov_Perf_Social									-1.5384	-1.5123	-0.7457	-0.8967	-2.0016	-2.3698	-0.2326	-0.3792	-0.6872	-1.0590	-0.3500	-0.4615	-1.2301	-1.8789	-1.7201	-1.1528
NPP: Gov_Perf_Infrastructure									-0.9844	-1.0932	0.1692	0.2264	-1.4157	-2.1861	-0.2434	-0.3630	-0.7442	-1.4709	-0.1524	-0.1805				
NPP: Approval									-7.2813	-1.6617	-1.4258	-1.5080	-1.5140	-2.0465	-2.2943	-2.0274	-3.8164	-3.1489	-3.1519	-2.2155	-3.0335	-2.9419	-8.0467	-2.2421
Model for Classes																								
Covariates																								
Intercept	0.0000	.	-0.6808	-1.3125	0.0000	.	-0.1607	-0.3247	0.0000	.	-0.4883	-1.7482	0.0000	.	-9.1666	-2.6008	0.0000	.	-20.6052	-3.4306	0.0000	.	-15.3759	-3.1091
Western													0.0000	.	1.5873	1.9777	0.0000	.	5.9152	2.4497	0.0000	.	2.7442	2.1402
Eastern													0.0000	.	7.2609	0.9004	0.0000	.	10.5661	2.1890	0.0000	.	3.5915	2.4889
Ashanti													0.0000	.	4.9670	1.4900	0.0000	.	7.3839	2.8470	0.0000	.	4.2028	2.5372
B_Ahafo													0.0000	.	4.7365	1.5623	0.0000	.	8.2381	2.0575	0.0000	.	5.6346	1.9109
Nothern													0.0000	.	3.4758	0.5319	0.0000	.	7.6053	2.1376	0.0000	.	9.0823	2.3874
Akan													0.0000	.	8.5339	2.4467	0.0000	.	11.4782	2.7227	0.0000	.	11.8359	2.7064
Ga													0.0000	.	7.8836	2.1071	0.0000	.	12.0387	2.3110	0.0000	.	11.9807	2.5301
Grusi													0.0000	.	7.7405	2.1273	0.0000	.	11.4804	2.6517	0.0000	.	12.4710	2.7548
Rural																	0.0000	.	4.7747	1.6557	0.0000	.	4.7990	1.7323
Education																	0.0000	.	1.0282	2.4286	0.0000	.	0.4903	1.7248
Religion																	0.0000	.	3.6187	1.7504				
Marital_Status																	0.0000	.	2.3856	1.7435				

Source: Own estimation

Table 5 shows the sociodemographic characteristics for both latent classes, as well as, a t-test indicating whether the differences between the two classes are significant or not. Class 1 can be considered as the rural class with more people living in rural areas, employed in the farming sector, with lower education level and lower expenditures. As regards the regions, class 1 is dominated by people from the north and east of Ghana while class 2 is mainly represented by the south and west of the country. With respect to the ethnic groups, only the share of Akan is bigger in class 2. Looking at the dependent variable "Vote", class 1 clearly supports NDC (76%) and class 2 NPP (85%).

Table 5: Sociodemographic characteristics by classes

	Class 1 mean value	**Class 2 mean value**	**p-value**
Sociodemographic characteristics			
Rural	0.391	0.085	0.000
Gender	0.479	0.518	0.488
Age	38.099	38.454	0.835
Education	2.484	3.206	0.000
Farmer	0.552	0.369	0.001
Expenditures	235.115	388.511	0.003
Regions			
Western	0.026	0.199	0.000
Central	0.141	0.000	0.000
G_Accra	0.135	0.000	0.000
Volta	0.182	0.000	0.000
Eastern	0.005	0.348	0.000
Ashanti	0.052	0.319	0.000
B_Ahafo	0.104	0.106	0.948
Nothern	0.203	0.007	0.000
U_East	0.083	0.021	0.008
U_West	0.068	0.000	0.000
Tribes			
Akan	0.203	0.950	0.000
Ga	0.047	0.007	0.019
Ewe	0.240	0.000	0.000
Guan	0.089	0.000	0.000
Gruma	0.047	0.000	0.002
Mole	0.266	0.007	0.000
Grusi	0.068	0.035	0.180
Mande	0.021	0.000	0.045

Source: Own estimation

Finally, with the optimal models we estimated the utilities and probabilities. Table 6 shows the mean probability for each party and model. For both models the results are similar. However, in the ML model the NDC has the highest probability, whereas in the LC model is the opposition party the one with the highest probability of winning.

Table 6: Mean probabilities

Parties	ML	LC
NDC	50.15%	49.62%
NPP	49.85%	50.38%

Source: Own estimation

4.2 Government Performance Indicators

As mentioned in the methodology section, the probabilistic voter model is a logistic regression model. Therefore, its coefficients only allow to measure the direction of the impact, but to evaluate the magnitude of such impact, marginal effects had to be calculated. In the case of the LC model, marginal effects can be calculated only for the variables included in the model for choices. Therefore, to compare the marginal effects derived from the ML and the LC models, we excluded the covariates from both.

Table 7 shows the absolute marginal effect values calculated for both models. The marginal effect for non-policy voting is the highest in the ML model. This implies that when non-policy variables are increased by one unit, the probability of voting for the incumbent increases by 22%. On the other hand, in the LC model the policy voting motive has the largest value. This means that on average, when the NDC changes its policy position by one unit, it results in a probability change of 19%. Regarding the retrospective component, the impact seems to be very small in both cases.

Table 7: Marginal Effects

	ML	LC
Policy	13%	19%
Retrospective	9%	9%
Non-Policy	22%	18%

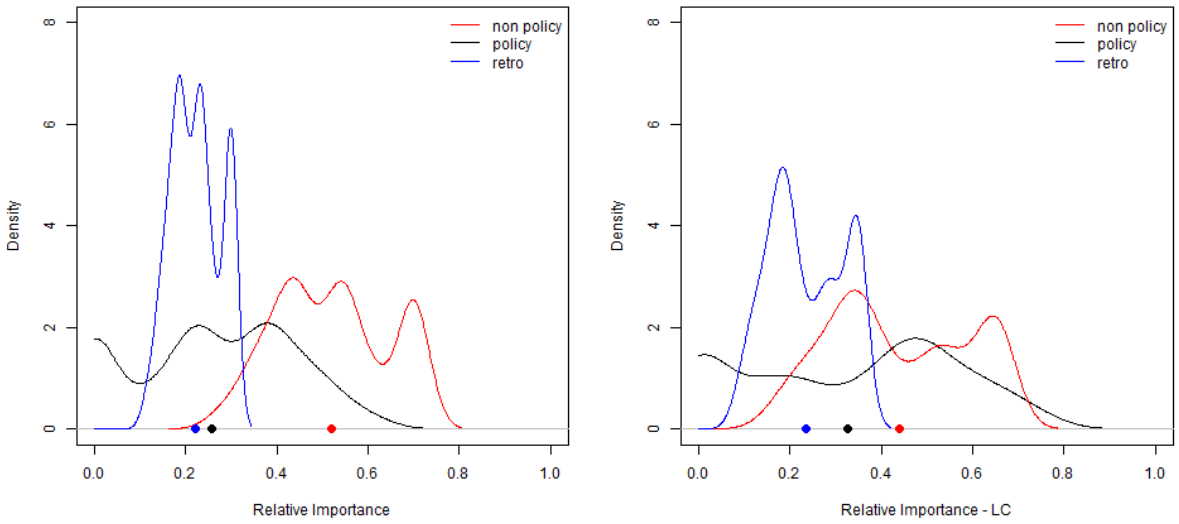
Source: Own estimation

In addition to marginal effects, the relative importance (RI) of each voting motive was calculated. As displayed in figure 1 the RI of the non-policy component is the highest for both models. On the contrary, the retrospective voting motive is the less important. More specifically, the RI of non-policy is higher than 40% for both models, whereas the RIs of the policy and retrospective voting motives are around 30%. Comparing the results, the RI of the voting motives is more equally distributed for the LC model and the retrospective component is less peaked and more widely distributed.

Governments act accountable when they implement policies serving the needs and desires of voters rather than favoring special interest of lobbying groups or intrinsic policy preferences of politicians. Based on the estimated models, accountability indices were calculated. The resulting GAs were 48% and 56% for the ML and the LC models, respec-

Figure 1: Relative Importance of voting motives

(a) ML (b) LC



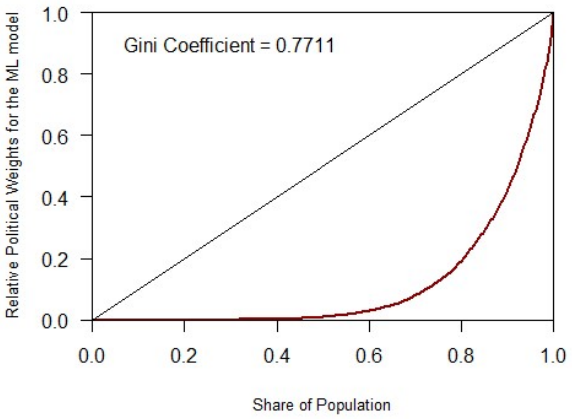
Source: Own data

tively. This suggests that voting plays a crucial role in the political process of Ghana. In other words, the function of elections of holding accountable the government is partially fulfilled.

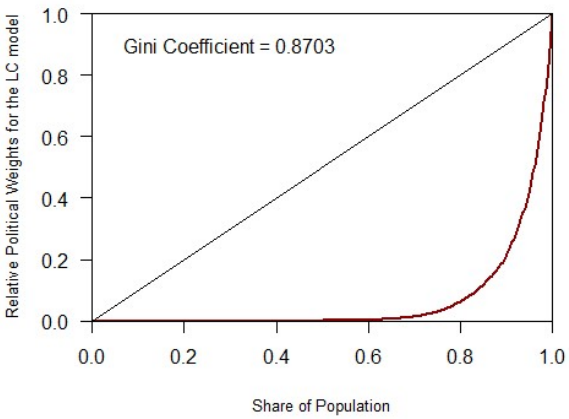
Even if a government acts accountable, electoral competition can still be biased in favor of special interests. To measure the political weight of certain groups of voters, government capture indices were calculated. In figure 3 the Lorenz curves are depicted for both models. It is clear that voter weights are unequally distributed, which is also confirmed by the high Gini coefficients.

Figure 3: Lorenz Curves

(a) ML



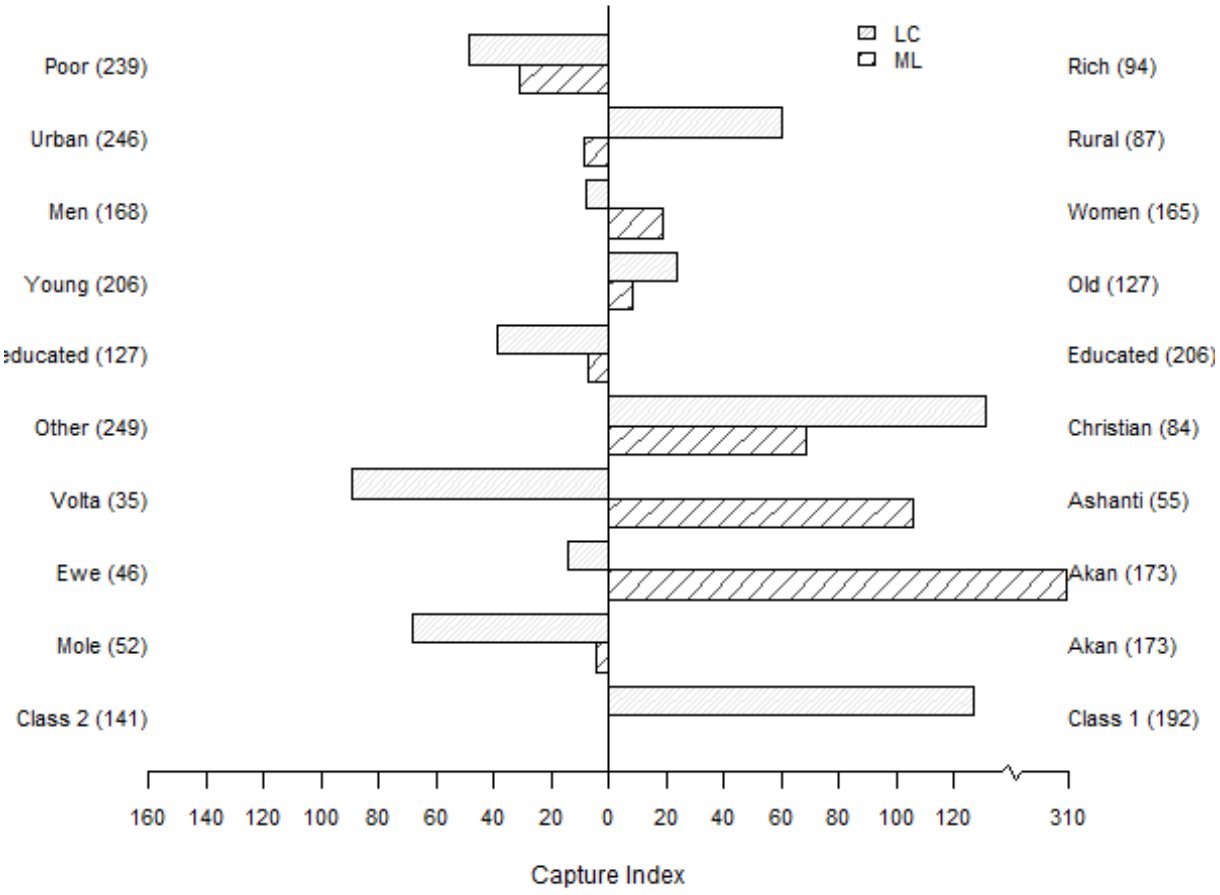
(b) LC



Source: Own data

Given the unequally distribution of voter weights, the next step is to identify which groups are being favored at the expense of others. In figure 5 is evident that poor people capture the rich, old people capture the young, less educated capture the well educated, Christians capture other religions and the ethnic group Mole captures the Akan tribe. However, in some cases the direction of the capture index is not the same for the ML and the LC models. While for the ML model the urban population captures the rural, women capture men, the Ashanti region captures Volta and the Akan tribe captures Ewe, for the LC model the capture index goes in the opposite direction. Regarding the latent classes, class 1 has a significantly larger political weight and is therefore, capturing class 2. This result is consistent with the sociodemographic characteristics of class 1.

Figure 5: Government Capture



Source: Own data

5 Summary

Ghana is a republic with a presidential system, considered as one of the most stable democracies of Sub-Saharan Africa. Although Ghana has a parliamentary multi-party system since democracy was restored in 1992, the electoral competition became a two-party system, with the NPP (center-right) and the NDC (center-left) as the main political parties in the country. By the time the data was collected in 2012, the NDC was the party in power and the NPP was the most important opposition party.

In our analysis we estimated ML and LC models and we show that voting behavior is not homogeneous but differs among voters. In the optimal estimated probabilistic voting model, policy issues, as well as, retrospective and government performance variables had significant influence on vote choice. Furthermore, with the latent class analysis we identified two classes of voters based on their socio-demographic characteristics. Even though the ML and the LC models show opposite results for the mean probabilities, in

both cases the percentage gap between the parties is very narrow. This is consistent with both, the survey results and the actual 2012 presidential election outcome, where the NDC became the winner but only by a small advantage.

Regarding the RI of the three voting motives, both models agree that the non-policy component is the most important motive. However, for the LC model the voting components are more equally distributed. By looking at the accountability indicators we can say that the role of voting in the political process of Ghana is very relevant. In this paper it is also shown that the individual political weights are unequally distributed. The Gini coefficients of 0.77 and 0.87 suggest a great disparity. Contrary to expectations, it was found that those groups usually considered to be disadvantaged in the political process actually have a higher average political weight. Therefore, we conclude that, although the political weights are unequally distributed in Ghana, the political process is not heavily biased. The government is partially accountable towards the voter and elections provide an effective mechanism to promote democracy.

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