Political Parties and Electoral Fraud in Ghana's Competitive Democracy [1]

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July 1, 2015
Word Count: 12368
(including notes and references;
excluding tables, figures and appendices)
Version 4.1

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Abstract

We study electoral fraud in a relatively new and highly competitive democracy. A field experiment implemented during Ghana's 2012 presidential elections produces measures of electoral fraud and estimates of direct and spillover effects of non-partisan domestic election observers. Fraud is higher in electorally competitive constituencies. It is committed at similar rates by the incumbent and the opposition parties but they specialize in different types of electoral malfeasance. The party of government uses a resource-intense technology that requires the participation of voters in double voting whereas the opposition party relies on a technology that deploys party activists to ballot stuff. Observers reduce fraud in the polling stations where they are present but political parties respond strategically and relocate fraud to unobserved polling places. Parties are more effective in relocating fraud in their strongholds than in politically competitive constituencies. Evasive relocation occurs in restricted geographic localities rather than broadly across constituencies, which suggests that electoral fraud is not orchestrated centrally but is instead coordinated locally by independently-operating groups of party activists. [169 words]

Cross-national data suggests that election fraud is common and that it is often serious. According to the Database of Political Institutions (DPI)'s data, 20 percent of recent executive elections experienced so much fraud or intimidation that the outcome was affected (Keefer, 2002). An alternate dataset that identifies fraud only where international election observers were present reports "moderate or major problems of election integrity" in a quarter of country-elections between 1980 and 2004 (Kelley, 2011, authors' calculations). Election fraud reduces public confidence in political institutions (Hafner-Burton, Hyde and Jablonski, 2014). It is a known trigger of post-election violence (Daxecker, 2014) and in some cases of regime instability. Poorly conducted elections in developing nations have broad impacts on economic performance (Chauvet and Collier, 2009) and affect a country's reputation and ability to secure benefits in the international realm. Identifying the conditions that permit it to occur — as well as those that may reduce it — is inherently important.

Most prior studies of election fraud have been conducted in settings of electoral authoritarianism. In these settings, fraud is committed by the incumbent regime. Producing election fraud requires human and other resources; it is a costly and often complex enterprise. It is puzzling that a government that knows it will win an election bothers to engage in fraud to increase its vote share. Theories developed to understand this may be called *incumbent-centered* theories of election fraud (Magaloni, 2006; Simpser, 2013).

Democratic settings, which are marked by robust party competition and genuine uncertainty over whether the sitting executive will retain office, naturally give rise to an alternative theory of election fraud. In democracies, political competition is organized by political parties, which are the relevant actors with interests in committing election fraud. The heart of a theory of election fraud suitable to democratic regimes is that *it is committed by political party agents in order to win competitive elections*. A theory designed to understand this may be called *party-centered*.

It seems broadly accepted that even in competitive democracies, the incumbent party is the main instigator of election fraud (Collier and Vicente, 2012). This is because of that party's greater

access to resources and control of the electoral administration. There is little research whose design permits empirical investigation of whether this is the case, or whether opposition parties also participate in election fraud. Likewise, considerations of *how* election fraud is orchestrated in democratic settings are underdeveloped. Is election fraud a top-down, centrally-controlled party activity or is it the product of independently-operating local groups of devoted party activists? Is it conducted uniformly across constituencies, or is geographically localized? Answers to these questions carry practical importance for fraud prevention and are theoretically consequential for our understanding of how political parties operate in unconsolidated institutional environments.

We speak to these questions in this paper. We report results of an experimental study that collected data on the frequency of electoral fraud during voting in Ghana's December 2012 presidential elections. Our hypotheses identify political incentives and opportunities that facilitate election fraud by political parties in a democratic setting. We sample constituencies that are historic strongholds of each of Ghana's two major political parties and constituencies that are electorally highly competitive. This produces information on the quantity and the type of fraud in areas controlled by the incumbent party, in areas controlled by the main opposition party, and in areas where the two are roughly balanced. Our research is also designed to evaluate hypotheses concerning the capacity of political parties to immediately relocate fraud in response to obvious efforts to prevent it with non-partisan observation during election day. The microscopic investigation of evasive relocation generates information about whether election fraud is centrally coordinated and whether government and opposition parties specialize in different fraud technologies. Spillover analysis is also essential to validating our measures of electoral misconduct. An alternative interpretation of the concept of election fraud that we use is that it may result from administrative negligence or incompetence. Although observers may reduce negligence and incompetence, they are unlikely to displace poor electoral administration onto nearby polling stations. Evidence of spillover thereby provides evidence of election fraud in a way that direct data collection does not.

To produce causal estimates of spillover in election fraud, we partner with Ghana's largest and most prominent election observation, the Coalition of Domestic Election Observers (CODEO), to randomize the polling place assignments of $1,292$ of their $4,000$ observers (across 26,000 polling stations) in the 2012 elections. Election observers are known from prior research to reduce election fraud (Hyde, 2007, 2010; Ichino and Schündeln, 2012; Kelley, 2012; Enikolopov et al., 2013). We collect data on markers of fraud from observed and from unobserved polling stations. Prior research has also documented that Ghanaian political parties are adept at relocating fraud when observed, at least during pre-election voter registration (Ichino and Schündeln, 2012). To estimate the frequency of relocation — also referred to as spillover — we vary the proportion of observed polling stations within constituencies and we compare markers of fraud in *unobserved* polling stations at different saturation levels. As the proportion of observed polling stations increases, we see fraud in more unobserved polling stations, thereby corroborating the existence of spillover. To understand variations in spillover and what they tell about party organizations, we also study localized spillover within subsets of constituencies that are called Electoral Areas (EAs), documenting the microscopic movement of fraud within small areas. (In Appendix D, we also present a similar analysis within one region where we use geo-coded information.)

Our main results are as follows. First, we find evidence of election fraud in 8 percent of the polling stations in our sample. Both the incumbent and the challenger engage in electoral fraud. Election observers cut in half the rates of fraud at stations where they are deployed. A more interesting result is that election observers reduce overall rates of election fraud even taking spillover into account. Roughly speaking, spillover accounts for about a third of all fraud in control polling stations. Second, fraud is more common where political incentives are greater. Third, political parties respond to observer presence by shifting fraud to polling stations that are not under observation. However, evasive relocation effects are not uniform across areas we study or for the parties of government and opposition. Evasive efforts are concentrated in the historic strongholds of Ghana's two major parties. Stronghold areas of both the governing and the opposition party re-

veal comparable frequencies of election fraud. Fourth, the two major parties specialize in distinct evasive fraud technologies. The party of government engages in evasive activities that require coordinating large numbers of voters — perhaps because it has access to government resources to do so. When the opposition party relocates fraudulent activities, its efforts require advance planning and preparation that can be conducted by single party operatives. Finally, party operatives relocate fraud to polling stations at relatively short distances rather than more generally within constituencies, suggesting they use road networks and local contacts in decentralized evasive actions.

Our contribution is threefold. First, along with Enikolopov et al. (2013), our study is one of the first experimental works that produces valid causal estimates of the effects of *domestic* rather than *international* election observers, and it is the first of which we are aware to be conducted in a genuinely democratic setting. This has policy relevance. It is theoretically consequential because it shows that even a relatively new democratic regime is capable of producing civil society organizations to effectively monitor the election process. Second, our study attests to the importance of partisan competition in inducing fraud in a democratic polity. Our findings support the interpretation that the party of government and the party of opposition engage equally in election fraud. Third, our analysis of spillovers provides evidence that parties operate in geographically restricted radii rather than uniformly across constituencies. We interpret this as consistent with a decentralized rather than a centralized theory of electoral malfeasance.

1 The 2012 Elections and Political Parties in Ghana

Ghana is characterized by many of the conditions known to make electoral fraud and mismanagement likely. It is a relatively new democracy with a history of colonial rule, military coups, and democratic breakdown. Political parties still harbor doubts that the loser in an election will step aside and permit alternation to occur. The executive wields substantial power, raising the stakes of the presidential contest. Candidates for parliament compete in single-member district plurality

elections, which are associated with more fraud than other types of electoral systems (Birch, 2007). Since both major parties enjoy support from roughly equal proportions of voters, small shifts in the numbers of votes received by their presidential candidates as well as small changes in turnout can alter the election result.

The country's December 2012 general election — the setting of our research — was the sixth following the country's return to democratic rule, two of which (in 2000 and 2008) resulted in peaceful alternations of executive power. The president is elected in a majoritarian run-off system with the country constituting a single constituency. Since each vote counts equally regardless of its location, presidential candidates have incentives to seek votes everywhere in Ghana. Our study took place during concurrent presidential and legislative elections. There are 275 Members of Parliament elected by plurality rule in single-member constituencies. All of the parliamentary seats were up for election, as was the presidency.

Ghana has a stable two-party system that includes the currently-governing National Democratic Congress (NDC) and the opposition New Patriotic Party (NPP). The parties are multilayered organizations, with permanent national, regional and constituency-level officials. They are densely organized and enjoy widespread popular support in Ghana. Both major parties elect representatives at the polling station, constituency, regional and national levels. Both maintain party offices across the country during and between elections, as well as attracting large numbers of activists (Bob-Milliar, 2012). In the 2012 elections, the two parties together captured over 98 percent of the presidential vote. Both are multi-ethnic and multi-regional in composition, although each has a region where its support is particularly concentrated — the NDC in Volta and the NPP in Ashanti (Whitfield, 2009). Many of Ghana's political constituencies across the country's eight other regions remain moderately to highly competitive.

Following the 1992 initial democratic election, national elections since 1996 in Ghana have been acclaimed "free and fair" by both local and international observers. This is in part thanks to the operation of the country's electoral administration. Established in 1992, Ghana's Electoral

Commission (EC) is an independent and well functioning administrative unit that enjoys respect in the country and on the continent (Omotola, 2013). Electoral operations are nonetheless still somewhat unpracticed, and aspects of each election are improvised; the staff required to manage the process is large in number (over 100,000) and much of it is recruited on a temporary basis for each election. Despite the respect enjoyed by the EC, elections have not been devoid of allegations of fraud and electoral malpractice, typically by the losing political party (Jockers, Kohnert and Nugent, 2010). Allegations have concerned possible fraud before, during, and after the vote. Prior to the December 2012 election, allegations included claims of ghost voters on the electoral register, illegal voting by minors and foreign nationals, intimidation of voters and party agents by national security forces and political parties, ballot stuffing, and tampering with results during transmission from polling stations to collation centers (Smith, 2002). Fraud was particularly evident in voter registration, which one study (Ichino and Schündeln, 2012, p. 294) reports inflated the rolls with more non-existent voters than the margin of presidential victory in 2008 (and listed more voters than the estimated adult population of the country.)

Allegations of fraud and other irregularities, including pre-election violence, have been concentrated in the stronghold areas of the country's two major parties. There have been accusations that the parties' activists use intimidation in stronghold areas against supporters of the minority party. Ballot box theft in prior elections had been reported in stronghold areas, along with double registration of voters and falsification of results in collation centers following the election.

In 2012, biometric voter registration and polling-place biometric verification processes were introduced in an attempt to eliminate electoral irregularities, particularly in the registration process. Biometric identification uses unique physical traits of individuals to verify their identities. The entire electorate was reregistered in spring 2012, a process that revealed 8,000 double registrations, of which 6,000 were judged to be intentional (Darkwa, 2013). By law, only persons whose identities could be verified biometrically were permitted to vote in December. The removal of illegitimate voters from the election rolls reduced opportunities for double and fraudulent voting

but may have thereby increased incentives for political parties and members of parliament to shift to alternate types of fraud or electoral malfeasance.

Presidential elections in Ghana are extremely competitive. The 2008 election had been won by $40,000$ votes out of an electorate of roughly 14 million. In the 2012 elections, the focus of our study, the NDC candidate, John Dramani Mahama, was declared winner of the presidential race with 50.7 percent of the vote and a margin of $300,000$ votes. Turnout increased from 70 percent in the prior presidential race to 80 percent after intense mobilization efforts by the two major parties. Despite the NDC's larger margin of victory than four year earlier, the NPP contested the outcome before the country's Supreme Court, citing instances of fraud and electoral malpractice. The NPP's legal petition focused on overvoting, which it defined as more votes recorded on the summary of results reported by the polling station than ballots issued or than voters registered at the station.[1] The NPP asserted that overvoting had occurred in more than $1,800$ polling stations and that turnout had exceeded 100 percent in more than 60. The Court's split decision, issued August 29, 2013, ruled that Mahama had been validly elected. The court proceedings revealed strong evidence of administrative irregularities as well as fraud at some polling stations on the day of the election. The data we collected substantiates that fraud occurred during the election and studies organizational and political conditions facilitating it.

1.1 Domestic Election Observers in Ghana

To combat electoral malpractice and enhance the credibility of the electoral process, a coalition of civic organizations established election observation in Ghana's 1996 general elections. Observation was formalized in the subsequent elections with the formation of the Coalition of Domestic Election Observers, which has led domestic election observation since 2000. CODEO is widely viewed as non-partisan and independent (Boafo-Arthur, 2006), and enjoys a high level of domestic

[1] This definition is not the same as the measure we use in the current paper. Our data collection instrument was not suitable for collecting the information to replicate the NPP's definition.

and international prestige. In addition to CODEO, elections in Ghana are observed by missions sent out by international organizations that include the Carter Center and the Economic Organization of West African States.

All CODEO observers receive formal training, which concludes with a public oath to act impartially and to support the conduct of free and fair elections. Observers are accredited by Ghana's Electoral Commission, which gives them the right to access and observe proceedings at any polling station or collation center. Observers are not permitted to interfere with or assist in the election process. Each CODEO observer is posted to a single station which she observes from the opening to the close of the polls, remaining on site for the public vote count that takes place at the end of the day at each polling place.[2] Observers wear uniforms that identify their position and affiliation. They are typically teachers and other professionals who enjoy high status in their own communities. CODEO recruits and places observers in their home areas in order to benefit from their local reputations.

A standard polling station is set up outside a public building, such as a school. It has a desk for the presiding officer, who oversees the operation of the station. The presiding officer is assisted by three or four polling officials who verify voter identity, mark each voter with indelible ink as evidence of having voted, and tear and stamp ballot slips to verify their authenticity. The polling place officials are usually residents of the local area who are temporarily recruited by the EC for the election. There is a seating area for officially-designed political party representatives, who are formally permitted on site, and two voting areas and ballot boxes where voters fingerprint their ballot slips behind cardboard screens, one for the presidential and the other for the parliamentary election. There is also a security official posted to each polling place. If there is an election observer, she usually positions herself away from other officials.

In 2012, CODEO's observers were trained in using SMS to report irregularities and disruptions to a national data center. If an incident is serious, CODEO has communication structures

[2]International observers, by contrast, move across multiple polling stations during the course of the day.

in place to immediately alert appropriate legal and security officials. CODEO also releases press statements throughout the day, and its Accra election headquarters serve as a locus of public information about the process. Deliberate election malfeasance committed in front of a CODEO observer is likely to be reported nationally and to elicit a speedy response by security forces.

In Ghana, law requires that ballots be counted in public at each polling station after the polls close; information is thereby recorded prior to any tampering that might occur at collation centers. The counting is witnessed by EC officials as well as representatives of the political parties and the CODEO observer, if there is one. Ordinary voters may also remain for the counting. The results are recorded manually and signed by political party representatives who are present.

2 Theory and Hypotheses

Political parties organize electoral competition and provide personnel for elected offices. As a result, they have an intense interest in the outcomes of elections. Although they are not the sole purveyors of election fraud, in the contemporary democratic world political parties and their agents are its primary instigators.

Electoral fraud comprises a complex set of activities and occurs at different points in the electoral process (Lehoucq, 2003). Before election day, fraud may affect voter registration. On election day, fraud may result from double voting and ballot stuffing. After votes are cast, it may occur when votes are aggregated at regional or national tabulation centers. The incentives for fraud at different points in the process may remain uniform but the opportunities differ and the technologies of fraud that come into play vary. Our research was designed to measure fraud during the process of voting on the day of the election. Our measures of fraud, detailed in Section 4, are ballot stuffing and fraudulent voting in the presidential race. Our study thus complements studies of fraud in voter registration and studies of fraud in the final vote tally.

Election fraud is conducted by political parties on the basis of prior planning, by taking advantage of operational conditions on the ground, such as the availability of individuals for fraudulent voting or the inattention of presiding officers permitting ballot stuffing. Fraud is a complex activity, but one that is essentially logistical. The specific importance of spillover is that it is a significantly more complex activity that requires the capacity by a political party to operate spatially.

We conceptualize the likelihood that a political party engages in election day fraud in a democratic setting using two parameters: (1) political opportunity and (2) electoral incentives.

Political Opportunities In a democratic setting, the activities that constitute electoral fraud are, by definition, illegal. As a result, participation in electoral fraud may result in arrest, imprisonment, fines, and, for public officials, loss of office. Practitioners evaluate whether it is opportune to commit fraud or if the likelihood of exposure is too high. This consideration leads to our first hypothesis, which is that *fraud will be greater where the likelihood of exposure is less (H1)*.

The likelihood of exposure is higher in a polling station where there is a trained non-partisan election observer. It is less where no observer is present.

Political Incentives The main incentive for election fraud in a democratic setting is the desire to win an election. For this reason, our second hypothesis is that *fraud will be greater in more competitive constituencies (H2)*. This suggests that, within a single country, political parties have more incentive to commit fraud in constituencies where the seat is closely contested.

In Ghana, all votes for the presidency count equally regardless of the constituency where a citizen voted. Parliamentary seats, however, may be more or less closely contested, and there is considerable variation in the closeness of the parliamentary race. We hypothesize that political incentives for election fraud vary with the closeness of the *parliamentary* race.

As we detail below, the proxies for electoral fraud available in our survey instrument are relevant to the presidential rather than the parliamentary race. We cannot directly examine

fraud in the parliamentary race. However, we can ascertain whether fraud in the presidential race is greater where the incentives to commit fraud in the parliamentary race are greater. It seems reasonable that when party agents commit fraud in the parliamentary race, they also do so for the presidency.

Organizational Capacity Election fraud differs from evasive relocation when an election observer is present. Political parties in a democratic setting require relatively few resources to undertake fraud during an election. Organizational capacity may affect fraud, but only modestly. The strategic relocation of electoral malfeasance in the presence of an observer is a more complex activity that requires the spatial coordination of human and material resources. Variations in organizational capacity are more likely to affect spillover than they are to affect whatever fraud would occur naturally.

Political parties vary in their degree of organizational capacity. Holding incentives constant, we expect that *the evasive relocation of fraud will be greater where political parties have more organizational capacity (H3)*. Where party organization is deeper, more articulated, and more robust, the party has more resources to deploy in order to relocate fraud.

We assess this hypothesis by using two measures of party organization, both of which were incorporated into our design as blocking variables: whether the constituency is a party stronghold and whether the polling station is located in an urban area. Neither of these represents a direct measure of party organization, such as the density of and degree of commitment by party activists. Data that captures direct measures of party organization in Ghana is not available. The measures we use are designed to proxy party capacity in the absence of direct indicators.

In its stronghold areas, a political party has a denser and more loyal set of supporters. We define party strongholds as constituencies in which one party is dominant in its ability to win shares of the *presidential* vote (details in Section 4). This variable differs from the measure

discussed earlier regarding the incentive for fraud, which varies with the *parliamentary* vote. Variations in the presidential vote are highly correlated with the margin of parliamentary victory; for the NPP, the correlation in vote shares across constituencies in 2012 was 0.98 and for the NDC, it was 0.97.

We also proxy party capacity by whether the constituency is urban or rural (detailed in Section 4). In urban areas, parties are able to operate more easily thanks to better transportation networks and greater geographic concentration of polling stations. Rural areas in Ghana consist largely of scattered small villages that are difficult to access due to poor road networks.

We expect party capacity to affect the type of evasive fraud as well as the overall quantity. Ballot stuffing consists of depositing multiple and illegitimate ballots in the box. As a practical matter, assuming he arrives at the polling station with a stack of ballots already filled out, a single individual is capable of ballot stuffing. The incumbent party has no particular advantage in effecting ballot stuffing. Double or fraudulent voting, by contrast, requires greater organizational capacity because it involves coordinating voters. These individuals have to be induced to commit illegal actions. Perhaps they have to be paid, either in cash or with the promise of a future stream of benefits; perhaps they have to be pressured or intimidated. The incumbent party's access to state resources provides it the opportunity to inappropriately redirect them to these goals. A party of government has more access to resources to engage in double or fraudulent voting than an opposition party.

3 Research Design

Given well-known limitations to observational data, recent studies have turned to experimental methods to estimate the impact of election observation on fraud (Weidmann and Callen, 2013; Enikolopov et al., 2013; Hyde, 2007, 2010). Our experiment is designed to produce unbiased estimates of the impact of domestic election observers on fraud, to directly test H1. Our study gen-

erates measures of electoral fraud, which we use to test H2. The study is also designed to produce estimates of spillover effects. We estimate these in stronghold and competitive constituencies to evaluate H3.

We implement the study in four of Ghana's ten regions. Operational constraints made it impossible for us to implement the project in all ten regions; among other reasons, CODEO was unwilling to randomize the placement of all $4,000$ of their observers across the entire country. For logistical reasons, we choose to sample regions in the south of the country, which were easier to access. We excluded the Greater Accra region, where Ghana's capital city is located, because we expected international election observers to focus on polling stations in Accra, which could in turn contaminate our ability to assess the impact of domestic election observers on fraud. Almost half (46 percent) of the Ghanaian population lives in the four sampled regions, which contain 122 of Ghana's 275 parliamentary constituencies and $10,600$ polling stations. Our regional sample was not constructed to be representative of the whole country, but because we sample both competitive and dominant-party regions and constituencies, we have no reason to believe that our results would not generalize nationally.

The four regions provide variation in the level of political competition across sampled constituencies. Ashanti and Volta are Ghana's two least electorally competitive regions, known as the historic strongholds of the two major political parties, and many parliamentary seats in these regions can be characterized as safe. Central and Western are electorally competitive and many of the constituencies within them are swing constituencies (Whitfield, 2009). Within the four regions, we sample 60 out of 122 political constituencies to obtain a mix of both urban and rural and electorally competitive and uncompetitive constituencies. This produces variation in the degree of party organizational capacity. The total number of constituencies sampled was determined on the basis of power calculations that incorporated anticipated spillover.

In our study, "treatment" consists of assigning a CODEO election observer for the whole of election day, through public ballot counting, to a polling station. Placement of all CODEO

election observers in the sampled 60 constituencies was randomized, and we collect data from observed and unobserved polling stations. In collaboration with CODEO, we randomly assigned election observers to $1,292$ of Ghana's $26,000$ polling stations.

Our research design is a variant of the block randomization and the partial population designs that is called a *randomized saturation design* (Baird et al., 2014). This design is appropriate for capturing spillover when units reside within clusters (as polling stations are nested in electoral constituencies). *Spillover occurs if treatment affects untreated units.* If spillover is known to occur and is not taken into consideration, estimated treatment effects will be biased. Prior research has established that political parties in Ghana react to observation by relocating efforts at voter fraud to unobserved locations (Ichino and Schündeln, 2012). Although the prior research concerns the voter registration process, we designed our project on the assumption that political parties would also seek to relocate fraud on election day.

Randomized saturation designs have been used in studies of cash transfer programs in Malawi (Baird et al., 2014). We are unaware of other research on voter fraud or related matters that uses a randomized saturation design. The study closest to ours is Ichino and Schündeln (2012), which uses a partial population design to estimate spillovers in Ghana's 2008 voter registration process. In that study, the authors classify constituencies on the basis of electoral competitiveness (as do we).[3] Within each block, they then randomly sample constituencies, assigning them to treatment and control. In treatment constituencies, the authors randomly sample Electoral Areas to be observed, where observation consists of short (one to two hour) visits and possible longer (full day) visits by trained observers during the registration process. The observed units are registration centers, of which there is one in each EA.

There are four chief differences between Ichino and Schündeln (2012) and our study. First, in Ichino and Schündeln (2012), the Electoral Area is the unit of observation. Our unit of observation is the polling station. This gives us higher resolution in the analysis of the spatial charac-

[3] Ichino and Schündeln (2012) uses parliamentary data whereas we use data from the presidential race for blocking.

teristics of spillover, which in turn allows us to generate inferences about the party organizational processes that coordinate election fraud. Second, our observation process consists of the entire day of the election, so that our observed units are more intensely and uniformly treated than the units that Ichino and Schündeln (2012) studies. As a result, treatment effects in our study are more accurately estimated. Third, our data permits measurement of two different aspects of fraud. That study estimates the effect of treatment on voter registration by comparing the number of voters officially registered with the EC in 2008, when the study was conducted, with the prior (2004) number of voters officially registered at the same polling stations. Data limitations meant that the study was not able to adjust for possible changes in the size of the eligible voting population, for instance. As a result, their fraud estimates are highly approximate. Our study also draws on the number of officially-registered voters, but we are able to use data that was independently collected by our enumerators at observed and unobserved polling stations and that allows us to create two separate and arguably more precise proxies for fraudulent activities — ballot stuffing and double voting. This allows us to assess fraud strategies used by the two major political parties. Finally, Ichino and Schündeln (2012) studies fraud in the voter registration process in 2008, and finds that it was considerable. Our study may be thought of as a follow up, one that asks a related but subsequent question. In 2012, the introduction of biometric verification machines drastically reduced opportunities for registration fraud. Our study investigates whether fraud was pushed onto the voting process itself.

3.1 Blocking and Randomization Procedures

A randomized saturation design involves two levels of randomization. In the first, each cluster (constituency) is randomly assigned a treatment saturation, where "saturation" defines the percentage of units that will be treated. Within each cluster, individual units (polling stations) are then sampled and randomly assigned to treatment or control.

Our unit of analysis is the individual polling station. Polling stations are nested within the 60 constituencies in our sample. Our process for assigning treatment to individual units involves three steps: first blocking, and then the two randomization procedures mentioned above. We detail each.

Blocking: We begin by sorting all constituencies in the four regions on the basis of electoral competitiveness and urbanization in order to block on these variables. Blocking incorporates hypothesized covariates into the design while potentially improving statistical efficiency (Gerber and Green, 2012). We hypothesized that political parties would be more likely to effect election fraud where they had greater organizational resources. Parties have more resources in their stronghold areas and in urban areas.

To block on these covariates, we convert continuous measures of competitiveness and urbanization into dichotomous variables. Our indicator of constituency-level electoral competition is based on results from the prior (2008) presidential election. We define a constituency as competitive if the vote margin between the top two presidential candidates was less than 10 percent and uncompetitive, or a party-dominant stronghold, if it was not.[4] Most but not all uncompetitive constituencies are located in Ghana's historic stronghold regions, Ashanti and Volta; not all constituencies in these two regions are classed as strongholds, using the criterion just elucidated. We interchangeably refer to uncompetitive constituencies as party strongholds and single-party dominant areas.

We create an indicator for urban and rural constituencies using data on polling station density. We define constituencies as urban if they have a higher-than-the-median number of polling stations per square kilometer, where there is a median of 0.14 polling stations per square kilometer in Ghana.

[4]While a 10 percent margin might be too large in some contexts, it is a frequently reversed margin in Ghanaian elections. For those constituencies where a party won a majority in the presidential election in 2008 that was different than the winning party in 2004, the average margin in 2004 had been 12 percent.

Once all 122 constituencies are classed as urban or rural and as competitive or stronghold, we randomly select a total of 60 constituencies within blocks from the four regions, drawing a number from each region that is proportional to its population. We randomize using Excel's random selection function. In some cases, it was not possible to randomize the selection of constituencies within a block because only one or two constituencies met the blocking conditions. In those cases, we select the available constituencies.[5]

Saturation: We next randomly assign each cluster to one of three treatment conditions: low, medium, and high. Constituencies assigned to the low/medium/high condition have observers deployed to $30/50/80$ percent of sample polling stations.[6] Panel A of Table 1 reports the allocation of cluster-level treatments within each block.

Table 1 about here

Unit Selection and Treatment Assignment: The third step is to select the polling station sample and randomly assign each to treatment or control. We randomly sample 30 percent of polling stations in each of our constituencies. In low saturation clusters, units are treated with 30 percent probability and in the medium and high saturation clusters they are treated with 50 and 80 percent probability, respectively. Panel B of Table 1 presents information about the polling stations assigned to treatment and control status within each of the constituency-level treatment conditions.

In Table 2, we provide evidence that polling stations assigned to treatment and control are comparable on political, socio-economic, and ethnic variables, including past voting behavior, poverty, levels of education, and tribal distribution. We use data from a household survey we conducted in the communities near observed and unobserved polling places during the

[5]For instance, in Ashanti, whose population meant we aimed to sample 23 of 47 constituencies, only two constituencies met our criterion for competitive and both were therefore selected into the sample.

[6]By design, there are relatively few control polling stations in the two higher treatment saturation clusters, while there are many in the low treatment saturation clusters. To increase statistical power to detect spillover, we therefore assign more clusters to the medium and high conditions. The probability of being assigned to the low condition is 20 percent whereas it is 40 percent each for the medium and high conditions.

two days following the elections. The table presents means in control and treated communities on covariates and the difference in these means and the associated p-values from two-tailed difference-of-means tests. The test statistics in the table verify that the communities from which we draw treated and control polling stations are not statistically different across a range of characteristics that may plausibly affect the level of fraud. The first section of the table shows the partisan voting histories of residents. There is a slight imbalance between treated and control in the proportion of respondents who voted for the NPP in the 2008 parliamentary elections. The remaining sections of the table examine measures of education, poverty and well-being, as well as linguistic identity. No significant differences emerge on any of these characteristics.

Table 2 about here

Table 3 provides evidence of covariate balance at the constituency level. To construct constituency-level data, we use the same data as in Table 2 but aggregate responses to the level of constituencies. On average, respondents from constituencies allocated to the low, medium and high treatment conditions are not significantly different in their previous vote choices, levels of poverty or education, and in tribal affiliation.

Table 3 about here

3.2 Potential Outcomes and Assumptions

In our randomized saturation framework, potential outcomes are determined by unit treatment status and the treatment condition of each unit's cluster. Potential outcomes can be written as:

$$Y_{ij}(T_{ij}, s_j)$$

where Y_{ij} is an indicator of fraud at polling station i in constituency j and T_{ij} indicates treatment condition at polling station i in constituency j ($T_{ij} = 1$ if an observer is present and 0

otherwise). The constituency-level treatment condition is indicated by s_j, where $s_j = p$ and $p \in (low, medium, high)$.

Our central assumption is that potential outcomes are solely a function of unit and cluster treatment status. This implies that spillover effects occur only *within* constituency boundaries. This assumption has been made in prior research studying spillover of fraud in Ghana (Ichino and Schündeln, 2012), and we likewise believe it is valid given the structure of political parties in the country. Parties are organized hierarchically, with relatively independent organizations operating at the constituency and lower levels. Constituency-level organizations engage in parliamentary candidate selection (Öhman, 2004). Even more localized networks of party activists function as the building blocks of constituency organizations (Osei, 2012). The assumption of constituency-specific party operations is thus appropriate for our setting. This assumption does not necessarily imply that parties operate uniformly within constituency boundaries; only that their operations do not extend across boundaries.

3.3 Quantities of Interest

To test H1, we estimate the average treatment effect of election observers, conditional on saturation. We do so as follows:

$$ATE(p) = E(Y_{ij}|T_{ij} = 1, s_j = p) - E(Y_{ij}|T_{ij} = 0, s_j = low) \quad (1)$$

This equation compares treated units in constituencies with $s_j = p$ to control units in constituencies with $s_j = low$. We use the latter to approximate "pure control" units — units that are not exposed to spillover. Because our study was conducted during a real election in partnership with an organization whose mission is to reduce fraud, we were unable to designate constituencies without

observers (which would have true pure controls). CODEO deemed it central to its purpose to send observers to every constituency in the country. As a result, there are no constituencies with $s_j = 0$.[7]

To estimate the average treatment effect in the full sample, we turn to a regression framework. We first define a variable W that takes a value of one if $(T_{ij} = 0, s_j = p_{high})$ or $(T_{ij} = 0, s_j = p_{medium})$ and zero otherwise. W indicates whether the polling place is a control unit in one of the medium or high saturation clusters. To estimate the average treatment effect, we estimate the following regression model:

$$Y_{ij} = \beta_0 + \beta_1 T_{ij} + \beta_2 W + \varepsilon_j \tag{2}$$

In this equation, β_0 estimates the level of fraud in control units in low saturation constituencies. β_1 provides an estimate of the average treatment effect. It compares levels of fraud in all treated units to control units in the low saturation constituencies. β_2 estimates the average spillover effect (more on this below) by comparing levels of fraud in all control units in medium and high saturation constituencies with levels of fraud in control units in low saturation constituencies. To test H2, we also estimate this model adding a measure of electoral competitiveness, as measured by the vote margin in the parliamentary race.

3.3.1 Spillover Effects onto Non-Treated Units

To test H3, we examine spillover effects onto non-treated units. *If treatment does not produce spillover effects, outcomes at control units in each saturation will be the same in expectation.* Evidence of spillover exists if outcomes in the control units vary by saturation. The intuition underlying this expectation is that the share of polling stations that experience spillover will be greater in clusters with more treated units. That is, because we expect party activists at polling stations

[7] Even if we were able to create constituencies with $s_j = 0$, it is questionable that these comprise "pure" control units. This is because CODEO has been observing elections since 2000 and the organization is highly visible in Ghana. We are thus operating in an environment in which political parties *expect* observers to be deployed across the country. To the extent that part of the treatment lies with the expectation of observation, it is unlikely that we could ever recover the true value of $E(Y_{ij}|T_{ij} = 0, s_j = 0)$.

with election observers to relocate fraud to unobserved polling stations, then where more polling stations are observed, we should see fraud at more unobserved stations. This design thus relies on the assumption that every treated polling station within each block has the same probability of being visited by an equally capable group of party activists who intend to commit election fraud.

We estimate average spillover effects onto non-treated units (ASNT) at each level of saturation:

$$ASNT(p) = E(Y_{ij}|T_{ij} = 0, s_j = p) - E(Y_{ij}|T_{ij} = 0, s_j = low) \tag{3}$$

The design permits estimates of two possible spillover responses to treatment. An increase in markers of fraud in control polling stations that is associated with increases in observer saturation ($ASNT > 0$) provides evidence that observers *displace* fraud to non-treated polling stations in the same constituency. We designed the research with this response in mind. Conversely, a decrease in fraud in control polling stations that is associated with increases in observer saturation ($ASNT < 0$) provides evidence that observers *deter* fraud at non-treated polling stations in the same constituency. Although we do not expect to find that observers deter fraud in non-treated units, we examine results for both possible effects.

4 Data Collection and Measurement

Measuring election fraud accurately is difficult since it is usually conducted clandestinely. Prior research has used data drawn from formal legal complaints lodged by losing candidates (Molina and Lehoucq, 1999; Ziblatt, 2009) or from reports by international observers (Kelley, 2011). Such data provides information about the content of irregularities but is likely to suffer reporting biases (Kelley, 2012; Lehoucq, 2003). The decision to lodge a legal complaint may be a function of whether fraud occurred, but it may also be determined by the perception of how likely such a complaint is to alter the electoral outcome. Data collected by international observers is biased by what

they do not observe. If local actors shift fraud around in attempts to hide it from observers, reports by international observation missions will underreport the true level of electoral irregularities.

One solution to this problem lies with forensic analyses of election returns (Beber and Scacco, 2012; Deckert, Myagkov and Ordeshook, 2011; Cantú and Saiegh, 2011; Mebane, 2008; Myagkov, Ordershook and Shakin, 2009). These use statistical techniques that draw on assumptions about the probable mathematical distribution of polling place returns if there is no fraud. Election returns can be manipulated, however, and if those undertaking the manipulation are aware of forensic analysis, they can commit election fraud while adjusting returns so that fraud is not apparent. The reverse is also possible. In low-income settings where election administration is weak, returns are often manually adjusted (rounded up, for instance) for reasons not directly relevant to fraud but that result in patterns to returns that may appear fraudulent. Election forensics are thus susceptible to false negatives and false positives.

Our measures of fraud draw on first-hand observation of activities during a real election and use information that is as close to "objective" as possible. Our data was collected using a survey instrument (reproduced in Appendix A). At treated stations, information was gathered by CODEO observers as part of their official activities. As a result, at treated stations, data is the product of direct observation on the part of the data collector. At control stations, data was collected by trained enumerators who interviewed multiple people — party agents representing each the two major political parties or, where one or both party agents were unavailable, presiding officers — after the polls closed. (Each political party is allowed to designate an official representative as a party observer; that individual is allowed to remain in the polling station for election day.) To avoid "observing" control stations, enumerators could not be present at control stations during the election process itself. Instead, they collected information after the close of the polls. Enumerators were provided training identical to that of CODEO observers, were accredited by the Election Commission as observers, and were outfitted with CODEO-identifying clothing and valid EC accreditation badges.

Variation in the data collection processes introduces the concern that these differences may drive estimated treatment effects. We have four reasons to believe that this is unlikely to be a problem.

First, the information that we use is as close to "objective" as possible. We use three pieces of information from the survey instrument: (1) the answer (yes/no) to the question "Were more ballot papers found in the presidential ballot box than voters who cast ballots?"; (2) the number of total valid votes cast; and (3) the number of rejected ballot papers. Other questions on the survey require subjective judgement by the enumerator. For instance, the survey asks, "Do *you* agree with the vote count for the parliamentary election?" We do not use answers to this question as a measure of electoral fraud. What we use are simply matters of fact.

Second, our measures use data collected during vote counting, which occurs after the 5:00pm close of the polls. This means that enumerators who were not present at the counting were asking respondents to recall information that had occurred within the last few hours, not early in the day. Respondents are more likely to recall accurately more recent events than earlier ones, especially during a hectic and busy day. In addition, party agents generally report polling station results to their own party officials, so this is information that party agents record for their own purposes.

Third, to obviate possible partisan bias in the data, we collect identical information from two people at each control polling stations. Enumerators were instructed in the first instance to collect information from party officials designated by each of the two major parties; by a party official designated by a minor party if a representative of a major party proved unavailable; and lastly from a polling station official. In most cases, enumerators successfully collected data on the three items of interest from two separate individuals; the total observations where this is true ranges from 78 to 84 percent. This is evidenced by the information reported in Table 4. The data analyzed in this paper excludes observations with two responses which were not identical. In order to use as much data as possible, it includes observations collected from only a single individual as

well as those (when identical) gathered from two respondents. In Appendix B, we report identical analyses to those reported in the paper but exclude all observations of control stations where we do not have two identical pieces of data. The results shown there are similar to those reported in the main analysis.

Table 4 about here

Finally, reporting differences are not directly relevant to the measurement of spillover, which constitutes a theoretical focus of this paper. Spillover is measured by assessing differences in rates of fraud *only at control polling places.* Data was collected at control polling stations by enumerators who all used identical data-collection methods. Even if there were data collection differences between observed and unobserved polling stations, this would not affect estimates of spillover.

4.1 Measures of Fraud

We construct two proxies for electoral fraud, which we label the *rate of overvoting* and *ballot stuffing*. Our first measure identifies the share of voters over 100 percent who cast votes for the president. We construct the rate of overvoting as the share of the vote that exceeds 100 percent. It reflects the total number of valid and invalid votes that sum to a number greater than the number of registered voters, where the latter information was provided by the Electoral Commission prior to the election. This provides an underestimation of fraud, because some votes were probably illegitimate even when they did not cause total turnout to exceed 100 percent. For instance, given that nationally turnout averaged about 80 percent, turnout rates that are reported to be 90 or 95 percent may well include some fraudulent votes. Because we do not know what turnout ought to be in the case of no voter fraud at the polling place, we use the rate above 100. This unequivocally marks fraud, since voters are only allowed to vote at the polling station where registered. The overvoting rate ranges from 3 percent (meaning turnout at the polling station was 103 percent) to

more than 600 percent (meaning turnout was more than 600 percent); the mean value for polling stations where we observe overvoting is 78 percent (meaning turnout was 178 percent).

Our second measure identifies whether the presidential ballot box was stuffed. This measure takes a value of one if more ballots were discovered in the ballot box than the number of voters that were known to have cast ballots and zero otherwise. The information is collected in answer to a single yes/no question on the survey instrument (detailed above). There may be more ballots in the presidential ballot box than voters even if overvoting is not apparent at the polling station (that is, even if the number of valid and invalid ballots does not sum to more than the number of voters registered according to the EC) when ballot stuffing results in more ballots than voters but turnout nonetheless remains below 100 percent.

Although overvoting and ballot stuffing both represent attempts to alter the electoral outcome through vote rigging, we analyze them separately. The two are not correlated in our sample ($r = 0.02$). Polling stations where our data reveal overvoting are an almost entirely different set of polling stations than those with ballot stuffing, as the data reported in Table 5 shows. Only six polling stations in our sample show evidence of both whereas 69 and 71 exhibit ballot stuffing and overvoting, respectively.

Table 5 about here

This implies that our measure of overvoting results from double or fraudulent voting rather than ballot stuffing. If it were the product of ballot stuffing, then the polling stations that registered overvoting would also be polling stations where enumerators reported more ballots in the presidential ballot box than voters. This is almost never the case. Instead, overvoting occurs in polling stations where there is a discrepancy between the number of registered voters according to the official EC figures — a number released prior to the election and taken as accurate across the continent — and the number of voters according to the local paper registry (recorded in answer to

item AN on the survey instrument; see A).[8] This suggests that local partisans deliberately adjusted the local registry in advance of the election to facilitate double voting or voting by persons who had not been registered at that polling station. This reconfirms the validity of the measure we use. Turnout rates above 100 percent can only be generated when voters who were not supposed to vote at the polling station did, or did so more than once.

To understand more about how these types of election fraud could have occurred, we need to think about the processes underlying the measures. Just how does a ballot box end up with more ballots than voters who cast them? And what leads to turnout rates above 100 percent?

Overvoting occurs when registered voters vote more than once at the same polling station or when individuals vote who are not registered by the Electoral Commission. The former is difficult to effect because, as commonly occurs in African elections as well as in India, one finger is required to be inked when the voter is handed ballot papers. Indelible ink is applied precisely to prevent double voting. Repeat voting is thus possible only if an individual's finger is not inked the first time, or if election officials fail to examine the finger when the individual returns to vote again. Either could occur occasionally due to administrative error, or more often if there is deliberate collusion on the part of election officials. But inducing polling station officials to assist in committing voter fraud is a difficult process and double voting is patently onerous to orchestrate. It is thus not surprising that we observe overvoting in relatively few polling places in our sample.

In 2012, the use of biometric verification equipment further circumscribed opportunities for repeat voting by the same individual or for voting by individuals not on the EC's electronic registry of voters. Once a registered voter's identity was verified by the machine, that information was stored electronically and the individual would be unable to vote again at the same polling station, even under another name, assuming the biometric identification machine was operational. However, biometric verification machines failed to operate for some period (minimally, about two

[8] Approximately 287 polling stations in our sample record local numbers of registered voters that differ from the EC's official figures; of these, about a quarter also exhibit actual overvoting.

hours) in 17 percent of polling stations around the country during the 2012 elections. The EC instructed election officials to suspend voting during machine failures, but some failed to do so. Temporarily using the paper registry of voters during biometric machine failure potentially permitted double or fraudulent voting.

Double or fraudulent voting not only requires administrative negligence or collusion. The voter must commit an obviously illegal act. This means that voters must be encouraged, paid, or intimidated, each of which requires financial or technical resources, organizational capacity, and foresight. Since our measure of overvoting captures double or fraudulent voting only where the impact generates turnout above 100 percent, overvoting was quite extensive for it to register in our data. This implies a very significant on-the-ground resource-intense effort by the party effecting fraud.

Ballot stuffing involves adding ballots that have already been filled in to the ballot box; when it occurs, it is usually low-level party activists, known in Ghana as "foot soldiers," who do the stuffing (Bob-Milliar, 2014, p. 136). Ballot stuffing can occur when election officials are distracted. Ordinary voters are not involved in the process. It requires only a single individual rather than the coordination of many. Polling place officials may be complicit, but in principle, ballot stuffing could occur even without this. It therefore requires fewer resources than double or fraudulent voting, although it does require advance preparation of ballots.

The differences in the processes that underlie overvoting and ballot stuffing are theoretically consequential, as we show later in this paper. Ballot stuffing requires few resources other than committed party activists; overvoting requires sufficient financial and organizational resources to induce voters to commit illegal actions, and may involve the complicity of polling station officials and the advance preparation of a local registry of voters that has been tampered with. The differences in resources required to effect these two types of malfeasance explain why they are committed in different polling places rather than simultaneously. Our interpretation of results in later sections expands on this point.

Table 6 presents descriptive information of the two measures of fraud. We report means with standard deviations in parentheses. As the data reported documents, the average overvoting rate is 3 percent.[9] We uncover ballot stuffing at 4 percent of polling stations in our sample. Columns 2 and 3 provide preliminary evidence for the effects of domestic election observers. At treated polling stations, we find substantial reductions in overvoting rates and ballot stuffing. The data implies an observer-related reduction in the rate of overvoting from 6 to 2 percentage points, which is a threefold reduction. It implies an observer-related reduction of 100 percent in the probability of ballot stuffing, which falls from 6 to 3 percentage points. Columns 4, 5 and 6 present the rates of fraud in competitive and uncompetitive constituencies, distinguishing NDC-dominated and NPP-dominated constituencies. There are more irregularities in electorally competitive constituencies than in strongholds. Polling stations in NDC- and NPP-dominated constituencies experience similar rates of overvoting but polling stations in NPP strongholds are almost twice as likely as those in NDC strongholds to experience ballot stuffing. Finally, columns 7 and 8 report differences in fraud rates at polling stations in urban and rural constituencies, and confirm that there is more fraud in urban areas.

Table 6 about here

5 Opportunities and Incentives for Fraud

We begin by examining rates of fraud at each of the three (cluster level) x two (unit level) conditions. Panel A in Table 7 presents the difference of means between treated and control units at each cluster treatment condition as well as associated p-values. These differences represent average treatment effects without taking spillover into account.

Table 7 about here

[9]This figure is calculated using all polling places in the sample. Polling stations with turnout at or below 100 percent are coded 0 on overvoting; those whose turnout is greater than 100 percent are coded as the percent greater than 100.

The results reported in Table 7 substantiate that rates of both types of fraud are lower in treated than control polling stations at every saturation level. In the low saturation constituencies, the difference between rates of overvoting in treatment and control polling stations is nearly three percentage points, while in medium and high conditions the difference is higher — about five and seven percentage points, respectively. Differences are significant in a two-tailed difference-of-means test at the medium and high saturation conditions. The probability of ballot stuffing is between 45 and nearly 60 percent greater in treated than control polling stations depending on the saturation level. Differences are statistically significant only in the medium saturation, and estimated treatment effects are roughly the same at each saturation condition.

Panel B of Table 7 presents estimated treatment effects that incorporate potential spillover onto non-treated units. These estimates compare rates of fraud at each saturation condition to control stations in the low saturation condition. Even when spillover is incorporated into the estimated average treatment effect, observers systematically reduce rates of overvoting and the incidence of ballot stuffing. This is verified by the lower rates of fraud at treated than control stations. Most of the estimates are not statistically significant.

In Table 8, we extend the exercise reported in Panel B of Table 7 and report the results of regression models that estimate average treatment effects while incorporating spillover. We estimate the overvoting model using OLS and the ballot stuffing model using probit. We find that the presence of an election observer consistently reduces rates of overvoting and ballot stuffing, as indicated by the negative sign on the observer coefficient. These results are not statistically significant at standard levels.

Table 8 also presents average spillover effects for the full sample. Patterns are consistent with evasive relocation — fraud is higher in control stations where the saturation of observers is higher — but average spillover effects are imprecisely estimated. We thus find weak evidence of a general within-constituency spillover effect.

Results reported in Tables 7 and 8 allow us to estimate how much of the fraud we observe in our data is due to spillover and how much occurs naturally, without movement to another polling station in response to the presence of an election observer. The overvoting rate in control stations is 6.3 percent and the average spillover effect is about 2.5 percent. This suggests that about one third of overvoting in control stations is due to spillover. The ballot stuffing rate in control stations is about 6 percent. The average spillover effect is about 2 percent. Again, this suggests that about one-third of the ballot stuffing we observe in control stations is due to spillover.

We now examine whether fraud varies with political incentives, as we speculated in H2. We begin by referring readers back to Table 6, where we reported simple descriptive statistics of the extent of overvoting and ballot stuffing in different settings. The data show that constituencies with greater competition in the presidential race also exhibit more election fraud.

Table 8 about here

As a more rigorous test of H2, we introduce a measure of the parliamentary vote margin into the regression models.[10] This measure is a proxy for the incentive to commit fraud. Because parliamentary and presidential margins are highly correlated, we cannot include the blocking variable for the latter in the models without introducing collinearity. We likewise omit the blocking variable for urbanness. Results show that the incentive for fraud, measured by tightness of the parliamentary race, significantly affects the likelihood of ballot stuffing; as the margin narrows, the probability of ballot stuffing increases, indicated by the negative coefficient. This is consistent with H2. The result on the overvoting rate is incorrectly signed and not statistically significant. We interpret these results as weak corroboration of the importance of political incentives in inducing fraud.

[10]It would have been methodologically preferable to use the vote margin from the prior election (2008) but the creation of 45 new constituencies in the 2012 elections prevented this.

6 Organizational Capacity and Spillover

We know from the data reported in Table 6 that rates of overvoting and ballot stuffing reflect party organizational capacity only in part. Party capacity is greater in stronghold areas but rates of both types of fraud are higher where the incentives are greater; namely, in competitive areas. Fraud of both types is somewhat higher in urban than rural areas, which is consistent with the view that parties commit more election fraud where their resources are more concentrated. Organizational capacity appears relatively unimportant for the commission of election fraud, perhaps because Ghana's political parties are sufficiently well organized to commit electoral fraud anywhere in the country.

Organizational capacity comes forcefully into play when parties confront an election observer and relocate fraud elsewhere. Relocation is an organizationally demanding activity that requires moving party loyalists over difficult terrain within a matter of hours or contacting and activating loyalists elsewhere when the latter may not have been anticipating and planning to engage in malfeasance. The abilities of political parties to engage in evasive actions are sensitive to variations in their organizational capacities.

We evaluate this hypothesis (H3) by focusing on heterogeneous spillover effects. Estimates of spillover rely on comparisons of outcomes in control units at each of the saturation conditions. We present results at control polling places graphically (numerical results appear in Appendix C). Panel A in Figure 1 displays spillover in the rate of overvoting at low, medium, and high saturation conditions for the full sample. The rate of overvoting increases almost linearly with saturation, attesting to a consistent pattern of strategic relocation. Spillover effects are imprecisely estimated and are not statistically significant; the graphs thereby confirm the results in Table 8.

Figure 1 about here.

We expect that parties have more resources to strategically relocate fraud in single-party dominant constituencies and in urban areas. Because we block randomized when assigning cluster-

level treatment conditions, we are able to generate experimental estimates of spillover separately for competitive and stronghold constituencies and for urban and rural constituencies. The graphics also distinguish NDC- and NPP-dominated strongholds, although we did not block by party in our research design. We present graphical results of heterogeneous effects for competitive and stronghold constituencies and comment on the urban-rural distinction in the text below.

Panel B of Figure 1 displays the spillover results for competitive constituencies and Panels C1 and C2 for NDC- and NPP-dominant constituencies, respectively. Once again, spillover effects are not precisely estimated and cannot be statistically distinguished from zero. The data are nonetheless informative. Patterns of spillover in competitive constituencies are visibly different than in strongholds. In competitive constituencies, overvoting rates increase slightly in unobserved polling places when we increase cluster saturation from low to medium and then fall when observer saturation is increased to high. This suggests that observers may deter fraud at control stations in electorally competitive areas.[11]

In stronghold constituencies, by contrast, overvoting rates in control stations increase substantially and consistently as saturation increases. In other words, political parties appear more capable of strategically relocating electoral fraud, even in the presence of many election observers, in stronghold constituencies. The spillover effect in single-party dominant constituencies is particularly large in NDC-dominated constituencies. In NDC strongholds, results show that increasing the share of total polling stations treated from 30 to 80 percent doubles the overvoting rate in control stations. NPP-dominated constituencies are associated with only small increases in overvoting.

In Figure 2, we present parallel results for ballot stuffing; again, numerical results appear in Table C.2. The spillover effects on ballot stuffing are not statistically significant. But the spillover patterns for ballot stuffing appear to differ from those associated with overvoting. At the high saturation condition, ballot stuffing in control polling stations is less than at low and moderate sat-

[11] As this result shows, spillover can take the form of displacement or of deterrance. In our data, we observe almost no evidence of deterrance, which we find difficult to interpret in this context.

urations. This is true in general and in electorally competitive constituencies. It is also the case in NDC-dominated constituencies. In these environments, greater treatment saturation deters ballot stuffing. However, in NPP-dominated constituencies, greater saturation promotes a higher incidence of ballot stuffing in control stations. The latter suggests that NPP "foot soldiers" were active in relocating ballot stuffing when an election observer was present; as the saturation of observers rose, so did ballot stuffing at unobserved polling stations. However, ballot stuffing appears relatively easily deterred in environments that were politically hostile to the NPP. We interpret these results as showing that the NPP was generally more active in ballot stuffing than the NDC.

Figure 2 about here.

These results illustrate that evasive actions of party militants in areas controlled by government and opposition parties differ. Turnout rates over 100 percent appear at control polling stations in areas controlled by each party, although more so in NDC strongholds. Ballot stuffing, by contrast, appears more often in control polling stations in NPP-dominated constituencies. If we assume that it is the party activists of the locally-dominant party who engage in each type of behavior in their strongholds, the pattern of results suggests that the two parties utilize different technologies of election fraud: the NDC is more prone to overvoting than the NPP, which specializes in ballot stuffing. These results are consistent with those reported in Table 6, which showed that overvoting rates are slightly higher in NDC strongholds but that ballot stuffing in NPP strongholds was nearly double that in NDC strongholds. Together, results suggest that the incumbent is associated with higher rates of overvoting and the opposition with ballot stuffing.

There is no evidence that spillover effects are different in urban and rural areas (see the results reported in Table C.2). This differs from our expectation that urban areas would provide political parties greater organizational capacity to relocate election fraud. It is possible that the measure of urban areas that we use is a poor proxy for party capacity.

7 Spillover within Electoral Areas

The results in the previous section provide statistically weak evidence of average within-constituency spillover effects. We now examine more localized spatial spillover effects than those that were incorporated into our research design. These more fine-grained analyses provide additional information about the processes underlying the spatial relocation of fraud when an election observer is present.

We study localized spillover in Electoral Areas. EAs are political units where voters elect local government councilors. Although in principle local councilors are non-partisan, in reality these figures are often closely involved with a specific political party and use partisan networks and resources to achieve election. EAs thus serve as fundamental units in party organization in the country. There are $6,135$ EAs in the country (of which 1,045 are in Ashanti, 571 in Central, 662 in Volta, and 544 in Western). Each parliamentary constituency is divided into approximately 25 EAs, with five to 10 polling stations in each.

To estimate local spillover effects within EAs, we compare levels of fraud at two types of *control* polling stations: 1) control polling stations in EAs where at least one polling station is treated; and 2) control polling stations in EAs where there are no treated polling stations. In our sample, 424 control stations are located in EAs that contain no treated stations, and 594 are in EAs that contain at least one treated station. We estimate the spillover effect within EAs as follows:

$$E(Y_{ij}|T_{ij}=0, EA_{ij}=1) - E(Y_{ij}|T_{ij}=0, EA_{ij}=0) \tag{4}$$

where EA_{ij} takes a value of one if polling station i is a control polling station in an EA that contains at least one treated polling station and zero otherwise.

Since sample polling stations are not distributed equally across EAs, each polling station does not have the same probability of being located in an EA with a treated unit. This difference bias estimates of localized spillover (Gerber and Green, 2012, ch. 8). We therefore estimate

spillover effects weighting each observation by the inverse probability of assignment into its realized treatment condition.[12] This procedure down-weights remote control polling stations which have little prior probability of local spillover exposure, which in turn ensures that our estimates are driven by comparisons of similar units.

Table 9 presents the estimated spillover effects and 95 percent confidence intervals calculated using randomization inference assuming constant effects across all units.[13]

We find evidence of spillover effects for overvoting within EAs in the full sample. Control polling stations located in the same EA as a treated polling station are significantly more likely to experience overvoting than those that are not. Although we found no statistically significant evidence of an average within-cluster spillover effect of election observers (see Table 8), results reported here provide evidence of statistically significant spillover in rates of overvoting within areas smaller than constituencies. The magnitude of the coefficient on ballot stuffing also suggests spillover, although results are not statistically significant.

Table 9 about here.

Consistent with H3, we find that localized spillover effects vary with party capacity. Localized spillover effects on overvoting are concentrated in single-party dominant constituencies. The marginal effect is significant and substantively large. In competitive constituencies, on the other hand, the marginal effect is smaller and cannot be distinguished from zero. Evidence of spillover on ballot stuffing is statistically imprecise for both stronghold and competitive electoral areas. However, the spillover effect in NPP-dominated constituencies is substantively large and about 80 percent of the confidence interval is positive.

[12] We use simulation methods to estimate treatment assignment probabilities. We simulate the treatment assignment process $10,000$ times and use the distribution of treatment assignments to calculate the probabilities.

[13] We use the estimated treatment effects to generate hypothetical outcome variables that define the potential outcomes. We then simulate the experiment 10,000 times, each time calculating each of the spillover estimates. This process generates a distribution of treatment effects that we use to calculate a confidence interval. The calculation of these confidence intervals requires no parametric assumptions. See (Gerber and Green, 2012, ch. 2).

The results provide additional evidence consistent with the argument that Ghana's two parties use distinct evasive technologies. Overvoting rates in spillover are substantially higher in NDC than NPP strongholds, suggesting that the NDC has an advantage in inducing overvoting by citizens. Although results on ballot stuffing are not statistically significant, NPP-dominated constituencies exhibit more spillover in ballot stuffing than either competitive constituencies or NDC strongholds. This is consistent with findings reported earlier that the NPP specializes in ballot stuffing.

These results provide information about how election fraud is coordinated in Ghana. We found statistically weak evidence for average within-constituency spillover effects. We find statistically stronger and more precise evidence of within-EA spillover effects. Party activists are not moving far when they relocate fraud, and tend to remain within the same EA. This suggests that fraud is coordinated and effected within localized party networks rather than centrally by the constituency or national level party organizations. When political parties confront an election observer and relocate fraud, relocation is spatially delimited, consistent with depictions in the literature describing the structure of Ghanaian party organization.[14] Local party networks enjoy a degree of autonomy from constituency and national level structures. Our findings suggest that the lowest level of the party hierarchy is responsible for the coordination of electoral fraud in Ghana.

8 Conclusions

Five findings stand out from the analysis presented in this paper. First, the overall level of election fraud in Ghana is modest but politically consequential. Only 8 percent of polling stations in our sample experience ballot stuffing or so much double voting that turnout rises above 100 percent. We have no way to estimate whether the quantity of fraud was large enough to reverse the 300,000 vote margin of the winning presidential candidate. But fraud was sufficiently obvious to cause the

[14]For instance, Osei (2012) notes that "although each committee is accountable to the next higher level, there is a degree of self-organization" at each of the party's lower levels (pp. 141).

losing party to bring suit in the country's Supreme Court in a legal case that riveted the country for eight months.

Second, domestic election observers reduce fraud. Political parties take evasive action and relocate fraud to unobserved polling stations when they encounter an election observer. But the mere fact of having to relocate fraud reduces the incidence rate of fraud, and strategic relocation does not fully negate the effects of election observers. This confirms H1, that fraud is sensitive to observation and to potential exposure and sanction.

Third, there is little difference in the overall incidence of fraud in constituencies controlled by the government or by the opposition. In authoritarian and electoral authoritarian regimes, governing parties retain a monopoly of power and a monopoly of fraud. Our findings show that in a competitive democracy, the opposition party can be as likely to commit fraud as the governing party. Future empirical and theoretical work in democratic contexts cannot therefore assume that the incumbent necessarily has a monopoly on electoral fraud.

Fourth, the country's two major parties specialize in different types of election fraud. The incumbent party uses a resource-intense strategy, one that involves ordinary voters in double voting. We infer from this that the party of government is likely to use its control over government resources in order to orchestrate this. Possibilities include promises of jobs as well as other government goods and services, or cash payments that draw on funds amassed through political corruption. The opposition party, by contrast, uses a resource-thin strategy. This is consistent with controlling fewer financial and government resources. These findings have implications for future empirical research on electoral fraud. In particular, they suggest that inferences about the drivers of fraud may depend on the type of fraud being studied and the relative opportunities for fraud by the party of government and the opposition parties.

Why should the incumbent party orchestrate voters to engage in double voting if it could instead use the resource-thin technique required to ballot stuff? We speculate that by encouraging double or fraudulent voting, the party of government gains other advantages in its relations with

voters. With the commission of illegal activities, voters demonstrate their loyalty to the party, thereby distinguishing themselves from others who may request patronage goods or favors, for instance. Perhaps double voting serves as the entry point into networks of political corruption. Future field research is required to understand these phenomena more fully, but our findings imply that this type of election fraud offers a theoretically interesting way to understand other aspects of party-activist linkages.

Finally, our results on spillover effects suggest that fraud in Ghana is conducted by decentralized and localized party networks rather than emanating from above. Theoretical approaches to electoral fraud that assume that parties are unitary strategic actors, rather than organizations made up of relatively independent groups of local activists, may therefore be inappropriate in the study of election fraud. Electoral fraud may be centrally inspired but it is not centrally organized.

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Table 1: Numbers of Sampled Constituencies by Cluster-Level Treatment and Numbers of Sampled Polling Stations by Unit-Level Assignment

Panel A: Numbers of Constituencies by Cluster-Level Assignment

	Low	Medium	High	Total
Competitive-Urban	2	5	5	12
Competitive-Rural	3	4	4	11
Uncompetitive-Urban	4	7	7	18
Uncompetitive-Rural	4	8	7	19
Total	13	24	23	60

Panel B: Numbers of Sampled Polling Stations by Unit-Level Assignment

	Low	Medium	High	Total
Treated	182	422	688	1,292
Control	311	511	196	1,018
Total	493	933	884	2,310

Note: Panel A reports the number of clusters in each block by saturation level, where clusters are electoral constituencies. Panel B reports the number of units assigned to treatment and control at each saturation level, where units are polling stations. We block randomize the cluster level treatment with a 20 percent probability a cluster is assigned to Low and a 40 percent probability a cluster is assigned to Medium or High.

Table 2: Polling Station (Unit) Level Covariate Balance

	Mean treatment	Mean control	Difference	P-value
NPP Presidential vote 2008	0.359	0.368	-0.009	0.562
NDC Presidential vote 2008	0.425	0.426	-0.000	0.975
NPP Parliamentary vote 2008	0.359	0.391	-0.032	0.034
NDC Parliamentary vote 2008	0.408	0.401	0.008	0.614
Poverty index	0.956	0.981	-0.025	0.151
Electricity	1.117	1.156	-0.039	0.104
Medicine	0.896	0.886	0.010	0.659
Sufficient food	0.840	0.879	-0.039	0.106
Cash income	0.970	1.002	-0.031	0.143
No formal schooling	0.145	0.145	0.000	0.987
Completed primary schooling	0.716	0.698	0.018	0.206
Post-primary schooling	0.543	0.522	0.021	0.184
Formal house	0.181	0.177	0.004	0.737
Concrete permanent house	0.427	0.416	0.011	0.463
Concrete and mud house	0.218	0.219	-0.001	0.952
Mud house	0.168	0.181	-0.014	0.242
Akan	0.685	0.699	-0.013	0.350
Ga	0.021	0.018	0.002	0.614
Ewe	0.220	0.203	0.016	0.201
Other, refuse, or don't know	0.074	0.079	-0.005	0.546

Note: Data was collected in a post-election random survey conducted in the communities around each polling station in the sample (N=6,000). Enumerators visited each sampled polling place and selected four households using a random walk technique. P-values calculated from two-tailed difference-of-means tests. Poverty index constructed by adding responses to the following items and dividing by the total number of items: How often did you go without the following in the past year, where the items are cash income; sufficient food; medicine; and electricity. Responses were: *Never* (0), *Occasionally* (1), and *Most of the time* (2).

Table 3: Constituency (Cluster) Level Covariate Balance

	Low	Medium	High	F-test P-value
NPP Presidential vote 2008	0.290	0.300	0.321	0.811
	(0.172)	(0.161)	(0.184)	
NDC Presidential vote 2008	0.365	0.388	0.385	0.861
	(0.186)	(0.166)	(0.195)	
NPP Parliamentary vote 2008	0.334	0.312	0.324	0.980
	(0.189)	(0.165)	(0.192)	
NDC Parliamentary vote 2008	0.327	0.371	0.373	0.679
	(0.183)	(0.164)	(0.205)	
No formal schooling	0.145	0.143	0.121	0.659
	(0.0971)	(0.0649)	(0.0904)	
Poverty index	1.026	0.965	0.981	0.762
	(0.241)	(0.240)	(0.220)	
Akan	0.640	0.695	0.653	0.892
	(0.364)	(0.353)	(0.383)	
Ga	0.0177	0.0171	0.0172	0.998
	(0.0166)	(0.0210)	(0.0319)	
Ewe	0.207	0.197	0.250	0.869
	(0.334)	(0.321)	(0.391)	
Other, refuse, or don't know	0.136	0.0918	0.0792	0.673
	(0.251)	(0.145)	(0.166)	

Note: Data was collected in a post-election random survey conducted in the communities around each polling station in the sample (N=6,000). Enumerators visited each sampled polling place and selected four households using a random walk technique. Standard errors in parentheses. P-values are from joint significance F-tests. Pairwise difference-of-means tests all are insignificant at standard levels but not reported here. Poverty index constructed by adding responses to the following items and dividing by the total number of items: How often did you go without the following in the past year, where the items are cash income; sufficient food; medicine; and electricity. Responses were: *Never* (0), *Occasionally* (1), and *Most of the time* (2).

Table 4: Information on Completeness of Data Collection in Control Polling Stations

	(1) Both surveys matched	(2) One survey only	(3) Both surveys different	(4) Missing on both	(5) Total non-missing
Ballot stuffing	635	92	16	14	743
N valid votes	588	78	41	50	707
N rejected ballots	616	83	30	28	729

Note: Enumerators were instructed to collect information at each control polling station from two separate respondents. The observations used in the analyses reported in this paper use those that appear in columns 1 and 2. We do not use observations from column 3 and we cannot use observations from column 4. Robustness tests that use observations only from column 1 are reported in Appendix B. Parallel data from treated polling stations collected by direct observation.

Table 5: Numbers of Sampled Polling Stations with Overvoting and Ballot Stuffing

	Ballot Stuffing		
Overvoting	No	Yes	Total
No	1701	69	1770
Yes	71	6	77
Total	1772	75	1847

Table 6: Descriptive Statistics of Measures of Fraud

	(1) Full sample	(2) Treatment	(3) Control	(4) Competitive	(5) NDC stronghold	(6) NPP stronghold	(7) Urban	(8) Rural
Overvoting rate	0.033	0.062	0.018	0.040	0.028	0.029	0.041	0.026
	(0.245)	(0.164)	(0.351)	(0.222)	(0.321)	(0.198)	(0.296)	(0.187)
Ballot stuffing	0.044	0.032	0.063	0.056	0.034	0.035	0.043	0.044
	(0.204)	(0.177)	(0.244)	(0.229)	(0.183)	(0.184)	(0.203)	(0.205)
Observations	2022	1273	749	856	529	637	960	1062

Note: Standard deviations in parentheses.

Table 7: Average Treatment Effects for Indicators of Fraud Across Treatment Conditions

Panel A: Treatment Effects by Saturation Level without Incorporating Spillover

	Treated mean	Control mean	Difference	P-value
Overvoting rate				
Low	0.018	0.044	-0.026	0.208
Medium	0.016	0.062	-0.046	0.007
High	0.019	0.088	-0.068	0.011
Ballot stuffing				
Low	0.028	0.041	-0.013	0.510
Medium	0.036	0.078	-0.042	0.010
High	0.031	0.054	-0.023	0.161

Panel B: Treatment Effects by Saturation Level Incorporating Spillover

	Treated mean	Control mean	Difference	P-value
Overvoting rate				
Low	0.018	0.044	-0.026	0.208
Medium	0.016	0.044	-0.028	0.083
High	0.019	0.044	-0.025	0.118
Ballot stuffing				
Low	0.028	0.041	-0.013	0.510
Medium	0.036	0.041	-0.005	0.782
High	0.031	0.041	-0.010	0.496

Note: Difference-of-means standard errors calculated from two-tailed test. Panel A compares treated and control polling stations within each saturation level. Panel B compares treated polling stations at each saturation level to control stations in the low saturation level, following equation 1.

Table 8: Regression Results of the Impact of Treatment and Political Incentives

	(1) Overvoting rate	(2) Overvoting rate	(3) Ballot stuffing	(4) Ballot stuffing
Election observer	-0.0262	-0.0260	-0.107	-0.114
	(0.0169)	(0.0181)	(0.337)	(0.176)
Average spillover	0.0249	0.0254	0.277	0.250
	(0.0239)	(0.0261)	(0.400)	(0.182)
Parliamentary margin		0.00614		-0.382*
		(0.0300)		(0.190)
Constant	0.0443*	0.0421*	-1.741***	-1.619***
	(0.0171)	(0.0214)	(0.317)	(0.174)
Observations	1872	1872	1997	1997

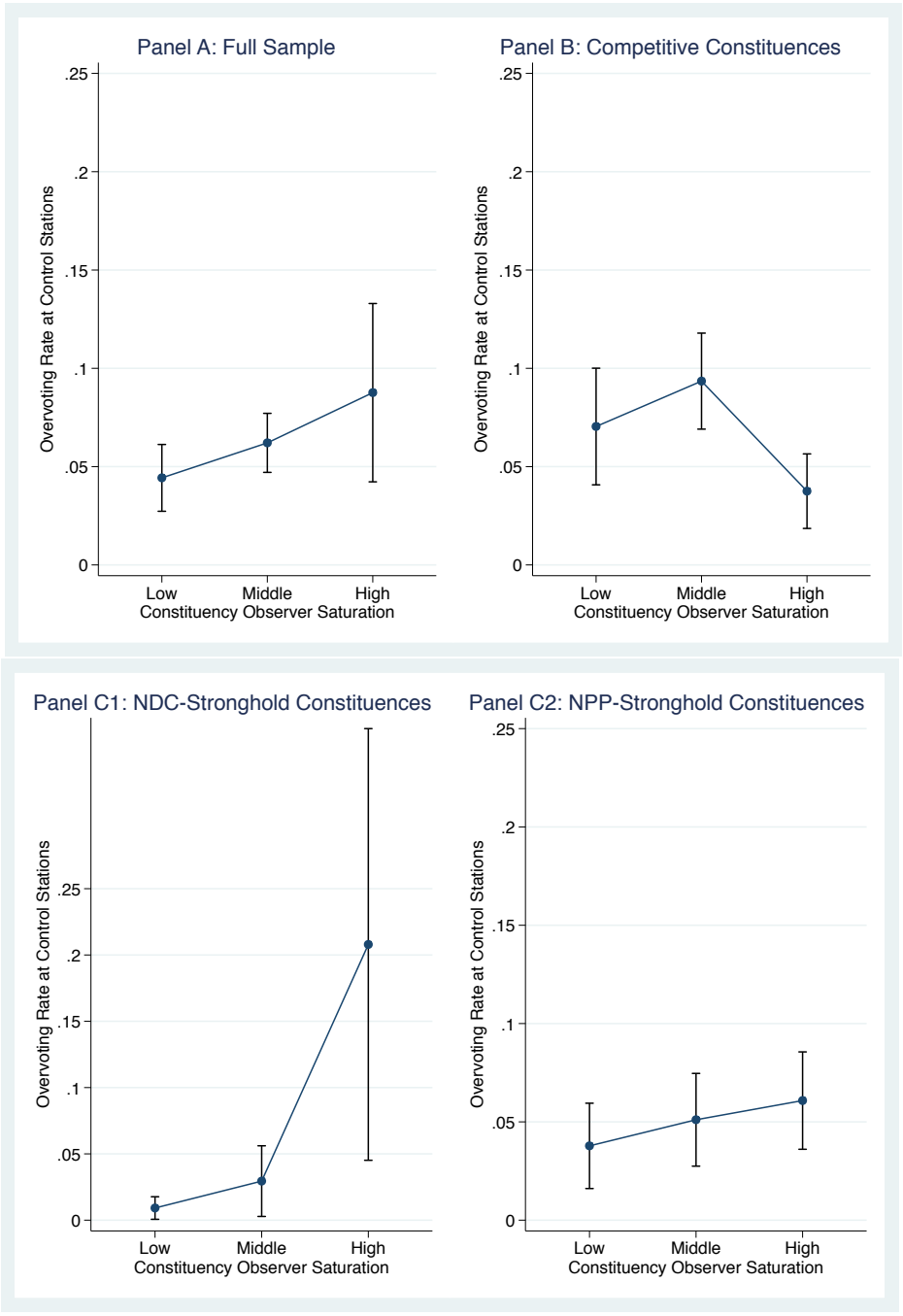
Note: Models 1–2 estimated with OLS; models 3–4 estimated with probit. Models 1 and 3 report robust standard errors clustered by constituency in parentheses; models 2 and 4 report robust standard errors. Effects of observers are given by β_1 from the following regression equation: $Y_{ij} = \beta_0 + \beta_1 T_{ij} + \beta_2 W + \varepsilon_j$, where W is the average spillover effect.

Table 9: Spillover Effects of Treatment on Control Polling Stations within Electoral Areas

PANEL A: Overvoting rate	Full sample	NDC stronghold constituencies	NPP stronghold constituencies	Competitive constituencies
Spillover effect	**0.074**	**0.125**	**0.064**	0.057
	(0.031, 0.115)	**(0.061, 0.223)**	**(0.008, 0.105)**	(-0.025, 0.107)
PANEL B: Ballot stuffing				
Spillover effect	0.040	-0.039	0.077	0.051
	(-0.030, 0.083)	(-0.109, 0.014)	(-0.040, 0.127)	(-0.054, 0.117)

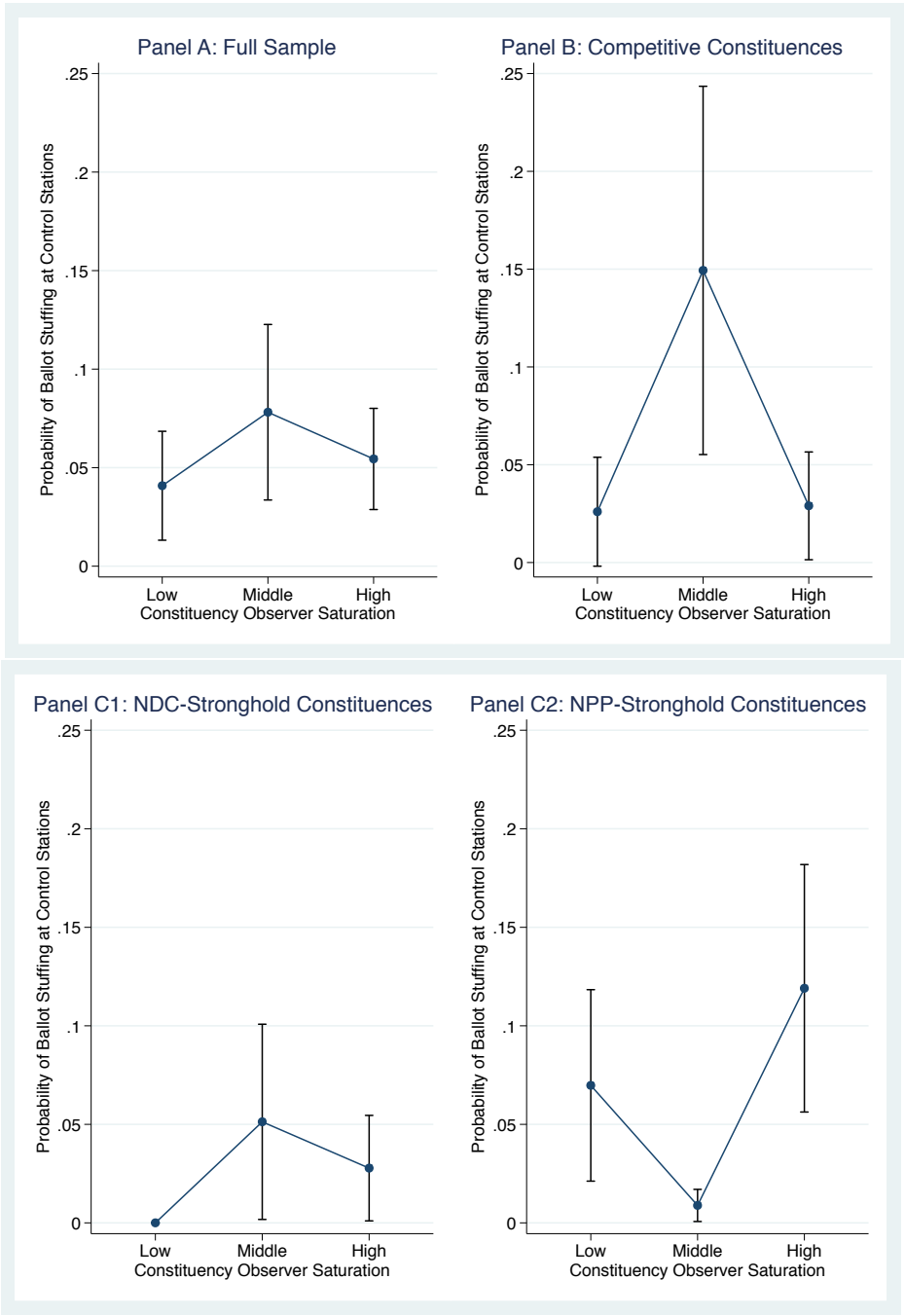
Note: Spillover is estimated as $E(Y_{ij}|T_{ij}=0, EA_{ij}=1) - E(Y_{ij}|T_{ij}=0, EA_{ij}=0)$. EA_{ij} takes a value of one if polling station i is a control polling station located in an EA that contains at least one treated polling station and zero otherwise. Lower and upper bounds of 95 percent confidence intervals calculated using randomization inference with an assumption of constant effects across all units in parentheses. Estimates in bold are those for which the 95 percent confidence interval does not contain zero.

Figure 1: Spillover Effects for Overvoting Rate: Full Sample, Competitive and NDC- and NPP-Stronghold Constituencies



Note: The figures display the overvoting rate in *control* polling stations in low, middle, and high saturation constituencies. Spillover is indicated if overvoting rates are not uniform across saturations. Displacement/deterrance is indicated by increasing/decreasing rates.

Figure 2: Spillover Effects for Ballot Stuffing: Full Sample, Competitive and NDC and NPP Stronghold Constituencies



Note: The figures display the average percent of *control* polling stations that experience ballot stuffing in low, middle, and high saturation constituencies. Spillover is indicated if ballot stuffing rates are not uniform across saturations. Displacement/deterrance is indicated by increasing/decreasing rates.

A Supplementary Materials

A Survey Instrument

Figure A.1: Data Collection Instrument Used in Sampled Polling Stations

CODEO (UCLA) OBSERVER CHECKLIST – 07 December 2012 Elections

Enumerator Name		**Constituency**	AFIGYA SEKYERE EAST
Region	ASHANTI	**Electoral Area**	AMANGOASE
Polling Station Name	WIAMOASE SAL ARMY JHS	**Polling Station Code**	F353001

ARRIVAL

AA Were any election officials present upon arrival? — Yes (1) | No (2)

SETUP

AB At what time did voting commence? — By 7:15 (1) | 7:16 to 8:00 (2) | 8:01 to 10:00 (3) | After 10:00 (4) | Never Opened (5)

AC Were you permitted to observe? — Yes (1) | No (2)

AD Was the polling station set up so that voters could mark their ballots in secret? — Yes (1) | No (2)

AE Was the polling station accessible to persons with disabilities and the elderly? — Yes (1) | No (2)

AF Was a polling agent present for NDC? — Yes (1) | No (2)

AG Was a polling agent present for NPP? — Yes (1) | No (2)

AH Which other political party agents were present? (*Tick one or more*) — None (0) | CPP (1) | GFP (2) | NDP (3) | GCPP (4) | PNC (5) | PPP (6) | UFP (7) | URP (8) | INDP (9)

AJ Were security personnel present? — Yes (1) | No (2)

AK Which items, if any, were missing (*Tick one or more*) — None (0) | Ballot Box (1) | Ballot Paper (2) | Voters' Register (3) | Indelible Ink (4) | Voting Screen (5) | Validating Stamp (6) | Endorsing Ink (7) | Ink Pad (8) | Tactile Ballot (9)

AM Did the polling station have a biometric verification machine? — Yes (1) | No (2)

AN Number of names on the voters register? *(Enter zero if no voters register)*

AP Number of names on the proxy voters list? *(Enter zero if no proxy register)*

AQ Number of <u>presidential</u> ballot papers? *(Enter zero if none)*

AR Were the presidential and parliamentary ballot boxes shown to be empty, sealed and placed in public view? — Yes (1) | No (2)

VOTING

BA Were people's biometric registration information verified? — Yes (1) | No (2)

BB Did biometric verification machine fail to function properly at any point in time? — Yes (1) | No (2)

BC Were people's fingers marked with indelible ink before voting? — Yes (1) | No (2)

BD Were ballot papers stamped with the validating stamp before being issued? — Yes (1) | No (2)

BE Were any unauthorised person permitted to remain in the polling station during voting? — Yes (1) | No (2)

BF Did anyone attempt to harass or intimidate voters or polling officials during voting? — Yes (1) | No (2)

(For Questions BG, BH, BJ, BK and BM: None = 0, Few = 1 to 5, Some = 6 to 15 and Many = 16 or more)

BG How many people with Voter ID Cards <u>were not permitted to vote</u>? — None (0) | Few (1) | Some (2) | Many (3)

BH How many people <u>were permitted to vote</u> without voter ID cards? — None (0) | Few (1) | Some (2) | Many (3)

BJ How many people were <u>permitted to vote</u> whose names did <u>not</u> appear on the voters' register? — None (0) | Few (1) | Some (2) | Many (3)

BK How many people were <u>permitted to vote</u> whose biometric details did not match? — None (0) | Few (1) | Some (2) | Many (3)

BM How many people were assisted to vote (blind, disabled, elderly, etc)? — None (0) | Few (1) | Some (2) | Many (3)

BN Were assisted voters allowed to have a person of their own choice to assist them to vote? — Yes (0) | No (1) | No Assisted Voters (3)

BP Overall, how would you describe any problems that may have occurred during the voting process? — Major (1) | Minor (2) | None (3)

CLOSING & COUNTING

CA How many people were in queue at 5:00 pm? — None (0) | Few (1) | Some (2) | Many (3)

CB	Was everyone who was in the queue at 5:00 pm permitted to vote?		Yes (1)	No (2)
CC	Was anyone who arrived at the polling station after 5:00 pm permitted to vote?	Yes (1) / No (2)	No One Arrived After 5pm (3)	
CD	Did anyone attempt to harass or intimidate polling officials during counting?		Yes (1)	No (2)
CE	Were more ballot papers found in the presidential ballot box than voters who cast ballots?		Yes (1)	No (2)
CF	Did any polling agent request a recount of the presidential ballots?		Yes (1)	No (2)
CG	Did an NDC polling agent sign the declaration of results for the presidential election?	Yes (1) / No (2)	No NDC Agent Present (3)	
CH	Did an NPP polling agent sign the declaration of results for the presidential election?	Yes (1) / No (2)	No NPP Agent Present (3)	
CJ	Did any other polling agent present sign the declaration of results for the presidential election?	Yes (1) / No (2)	No Other Agents Present (3)	
CK	Do you agree with the vote count for the presidential election?		Yes (1)	No (2)
CM	Did all polling agents present sign the declaration of results for the parliamentary election?		Yes (1)	No (2)
CN	Do you agree with the vote count for the parliamentary election?		Yes (1)	No (2)

PRESIDENTIAL VOTE COUNT

DA	Spoilt ballot papers	**DH**	UFP (Akwasi Addai Odike)
DB	Rejected ballot papers	**DJ**	PNC (Ayariga Hassan)
DC	Total Valid Votes	**DK**	CPP (Michael Abu Sakara Forster)
DD	NDC (John Dramani Mahama)	**DM**	INDP (Jacob Osei Yeboah)
DE	GCPP (Henry Hebert Lartey)		
DF	NPP (Nana Addo Dankwa Akufo-Addo)		
DG	PPP (Papa Kwesi Ndoum)		

Who was interview

☐ 1) Party Agent (specify)…….
☐ 2) EC Official
☐ 3) Security Personnel

Enumerator First Name _____ Surname _____ Arrival Time _____ Departure Time _____ Signature _____

B Robustness Tests

In this appendix, we reproduce all the results reported in the paper using a smaller dataset. The smaller dataset contains observations from only those control stations where enumerators collected identical information from two separate respondents. It thus omits the control stations where information was collected from only a single respondent. These were relatively few in number, as evidenced in the data reported in Table 4. The reanalysis shows that dropping observations that were collected from only a single individual do not materially affect the results reported.

Table B.1: Descriptive Statistics of Measures of Fraud, Reduced Dataset

	(1) Full Sample	(2) Treatment	(3) Control	(4) Competitive	(5) NDC Stronghold	(6) NPP Stronghold	(7) Urban	(8) Rural
Rate of Overvoting	0.030	0.018	0.057	0.034	0.029	0.028	0.038	0.023
	(0.240)	(0.164)	(0.351)	(0.200)	(0.326)	(0.198)	(0.294)	(0.176)
Ballot Stuffing	0.042	0.032	0.061	0.053	0.036	0.033	0.040	0.044
	(0.201)	(0.177)	(0.240)	(0.224)	(0.186)	(0.179)	(0.196)	(0.205)
Observations	1946	1273	673	813	514	619	919	1027

Note: Standard deviations in parentheses.

Table B.2: Average Treatment Effects for Indicators of Fraud Across Treatment Conditions, Reduced Dataset

Panel A: Treatment Effects by Saturation Level without Incorporating Spillover

	Treated mean	Control mean	Difference	P-value
Overvoting rate				
Low	0.018	0.047	-0.029	0.208
Medium	0.016	0.049	-0.033	0.039
High	0.019	0.093	-0.074	0.009
Ballot stuffing				
Low	0.028	0.038	-0.010	0.605
Medium	0.036	0.079	-0.043	0.011
High	0.031	0.050	-0.019	0.296

Panel B: Treatment Effects by Saturation Level Incorporating Spillover

	Treated mean	Control mean	Difference	P-value
Overvoting rate				
Low	0.018	0.047	-0.029	0.177
Medium	0.016	0.047	-0.031	0.065
High	0.019	0.047	-0.028	0.092
Ballot stuffing				
Low	0.028	0.038	-0.010	0.605
Medium	0.036	0.038	-0.002	0.914
High	0.031	0.038	-0.007	0.629

Note: Difference-of-means standard errors calculated from two-tailed test. Panel A compares treated and control polling stations within each saturation level. Panel B compares treated polling stations at each saturation level to control stations in the low saturation level, following equation 1.

Table B.3: Regression Results of the Impact of Treatment Incorporating Spillover, Reduced Dataset

	(1) Overvoting rate	(2) Overvoting rate	(3) Ballot stuffing	(4) Ballot stuffing
Election observer	-0.0288	-0.0284	-0.0744	-0.0839
	(0.0174)	(0.0191)	(0.327)	(0.185)
Spillover	0.0149	0.0161	0.305	0.277
	(0.0260)	(0.0282)	(0.410)	(0.193)
Parliamentary margin		0.0135		-0.390*
		(0.0307)		(0.198)
Constant	0.0469**	0.0421	-1.774***	-1.648***
	(0.0176)	(0.0225)	(0.306)	(0.184)
Observations	1794	1794	1905	1905

Note: Models 1–2 estimated with OLS; models 3–4 estimated with probit. Models 1 and 3 report robust standard errors clustered by constituency in parentheses; models 2 and 4 report robust standard errors. Effects of observers are given by β_1 from the following regression equation: $Y_{ij} = \beta_0 + \beta_1 T_{ij} + \beta_2 W + \varepsilon_j$, where W is the average spillover effect.

Table B.4: Spillover Effects of Treatment on Control Polling Stations within Electoral Areas, Reduced Dataset

PANEL A: Overvoting rate	Full sample	NDC stronghold constituencies	NPP stronghold constituencies	Competitive constituencies
Spillover effect	**0.078**	**0.136**	**0.060**	0.047
	(0.037, 0.115)	**(0.076, 0.235)**	**(0.029, 0.090)**	(-0.044, 0.096)
PANEL B: Ballot stuffing				
Spillover effect	**0.060**	-0.039	0.060	0.081
	(0.002, 0.098)	(-0.109, 0.018)	(-0.029, 0.115)	(-0.028, 0.142)

Note: Spillover is estimated as $E(Y_{ij}|T_{ij}=0, EA_{ij}=1) - E(Y_{ij}|T_{ij}=0, EA_{ij}=0)$. Lower and upper bounds of 95 percent confidence intervals calculated using randomization inference with an assumption of constant effects across all units in parentheses. Estimates in bold are those for which the 95 percent confidence interval does not contain zero.

C Average Spillover onto Non-Treated Units

Table C.1: Average Spillover Effect onto Control Units, Overvoting

	(1) Full Sample	(2) Competitive	(3) NDC Stronghold	(4) NPP Stronghold
ASNT(middle)	0.018	0.023	0.020	0.013
	(0.023)	(0.039)	(0.028)	(0.032)
ASNT(high)	0.043	-0.033	0.199	0.023
	(0.049)	(0.035)	(0.164)	(0.033)

Note: The table presents estimates of the average spillover effect (ASNT(p)), described in Equation 3. Robust standard errors clustered by constituency in parentheses.

Table C.2: Spillover Effects onto Control Units, Ballot Stuffing

	(1) Full Sample	(2) Competitive	(3) NDC Stronghold	(4) NPP Stronghold
ASNT(middle)	0.037	0.123	0.051	-0.061
	(0.053)	(0.099)	(0.050)	(0.050)
ASNT(high)	0.014	0.003	0.028	0.049
	(0.038)	(0.039)	(0.027)	(0.080)

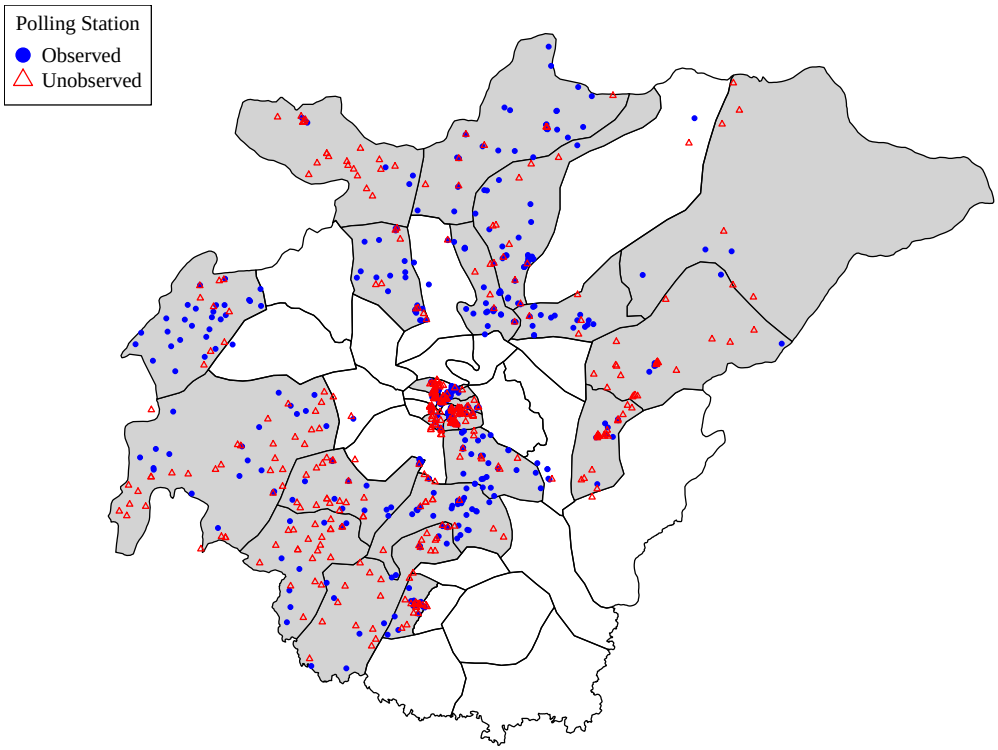
Note: The table presents estimates of the average spillover effect (ASNT(p)), described in Equation 3. Robust standard errors clustered by constituency in parentheses.

D Geo-Coded Spillover Analysis within a Stronghold Opposition Region

How far within an EA do party activists move when they relocate fraud in the presence of an election observer? To investigate the spatial radius of spillover, we examine polling stations within the Ashanti region. The Ashanti region is the historic stronghold of Ghana's main opposition party, the NPP and, after Greater Accra, the most populous region in the country. Resource constraints allowed us to collect geo-coded polling station data from only one region, and we selected the largest in our sample.[15] We analyze spillovers in Ashanti across 817 polling stations in 23 (of a total of 47) constituencies, which comprise just over a third of the constituencies in our entire sample. The sampled constituencies and polling stations are depicted in Figure D.1. Of the 817 sampled polling stations, 52 percent (421) were observed and 48 percent (396) were unobserved. We collected data to plot the geographic co-ordinates for each polling station and we model spillover across a range of distances; one, two, five, 10 and 15 kilometers. We cannot go further out than 15 kilometers without too large of a loss in statistical precision due to reduced numbers of observations.

[15] Data collection took place in July and August 2013.

Figure D.1: Sampled 2012 Constituencies and Polling Stations in the Ashanti Region



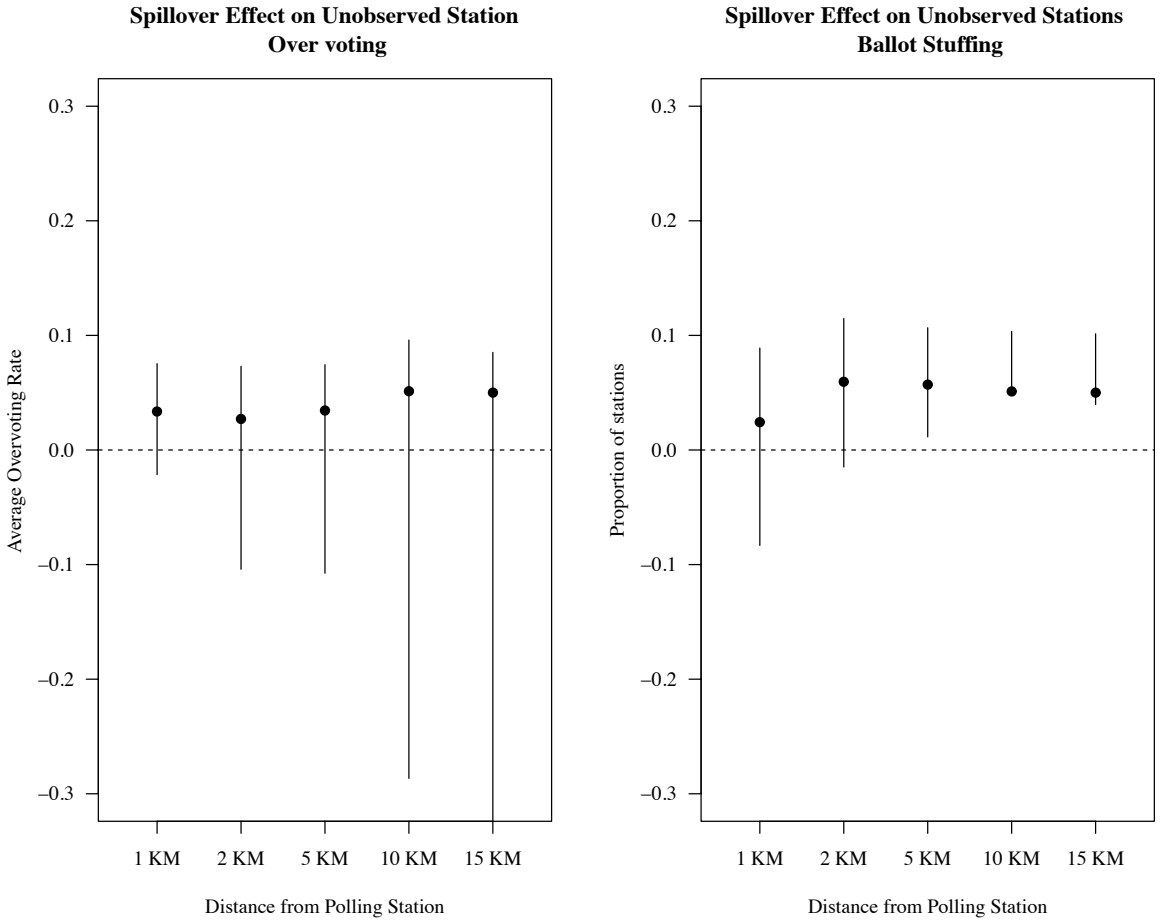
Note: Shaded constituencies are included in the sample. A few polling station points fall outside of shaded constituencies on the map because of small changes to constituency boundaries. The available constituency shapefile does not reflect all of these changes.

There are four possible assignments for each polling station: a station is observed and there is at least one other observed unit within a selected radius; a station is observed but there is no other observed unit within a selected radius; a station is not observed nor are any other units in a selected radius; and a station is not observed but at least one other unit is observed in a selected radius. We weight each polling station according to the inverse probability that it falls into its assignment category. Weighting by the inverse probability of assignment gives more weight to stations that were less likely to fall under their realized assignment. We calculate these probabilities through simulation. We simulate the randomization of all the sampled polling stations in Ashanti 10,000 times. We then use the inverse of the probability generated by the simulations that each polling station entered into its assigned experimental condition.[16]

Figure D.2 displays the estimated spatial spillover results in Ashanti. Each dot represents the difference in fraud between control polling stations within the indicated distance from a treated station and all other control polling stations in the constituency. The first panel in Figure D.2 shows that the rate of overvoting in control stations is systematically higher than in treatment stations, regardless of the distance from an observed station. However, the confidence intervals on overvoting are very large, especially as the distance from the observed station increases. Strategic relocation of ballot stuffing, by contrast, rises slightly at one kilometer and then doubles at more distant polling stations. The estimates for ballot stuffing are statistically precise, reinforcing the earlier finding that when spillover occurs in NPP stronghold areas, it results in ballot stuffing rather than overvoting.

[16]In Ichino and Schündeln (2012), the same issue is handled differently. In that study, regression analysis of fraud in the compilation of the voter registry includes a control variable for each registration center that counts the number of other registration centers in each radius analyzed. Our solution improves on this because it takes into account the fact that, due to their spatial locations, some control polling stations are further from a treated station than others and therefore less likely to be exposed to spillover. The Ichino and Schündeln (2012) study effectively controls for the number of other registration stations in a specific radius, even if those stations have no probability of being within the radius of an observed unit.

Figure D.2: Spatial Displacement Effects in Ashanti Region



Note: Each dot represents the difference beween the average rate of overvoting/percent of polling stations with ballot stuffing in control polling stations within the indicated distance from a treated station and all other control polling stations in the same constituency.

The results show that the spillover effects of election observers on fraud are not spatially differentiated within a 15 kilometer radius. This result offers insights into how Ghana's largest opposition party coordinates election fraud. That displacement effects are spatially uniform at distances within this radius is consistent with the decentralized operation of party activists. A motorbike traveling on unpaved and rutted roads could be expected to access locations at 15 kilometers within about two and a half hours. That is a long ride on a typically small and underpowered vehicle in the open air. Party activists relocate fraud at roughly similar rates to unobserved polling stations at smaller distances as well.